HISTORY OF THE SECOND WORLD WAR

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THE CIVILIAN HEALTH AND MEDICAL SERVICES

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PREFACE

WAR is the enemy of health. There are the risks of famine and undernourishment, of infectious diseases and epidemics through overcrowding, lack of sanitary precautions, movements of troops and population, increased fatigue and mental overstrain and lowering of bodily resistance. This is the story of how the enemy was fought.

Grave fears were expressed at the outset of the Second World War that the national health would be seriously affected. Some considered that enemy action might render the maintenance of the public health and social services difficult, if not impossible. Much additional work was thrown upon the Ministry of Health and the local authorities in the organisation of an emergency medical service for the treatment of air raid casualties and the wounded, and in the evacuation scheme, which included the transfer of school children, expectant mothers, young children, cripples and blind persons from urban centres to other areas less exposed to enemy air raids. Yet by selfless devotion to duty, medical officers and their depleted staffs succeeded throughout the country in maintaining the essential health services during the war at a high level of efficiency.

A reference to the First World War may be useful for comparison.

In the War of 1914–18, in Great Britain the death rates of the acute infectious diseases were not exceptional apart from the high mortality of cerebro-spinal fever. At the same time the war brought its new diseases—*encephalitis lethargica*, trench nephritis and trench fever.

The amount of typhoid and paratyphoid in our armies oversea was lower in proportion to the number of combatants than in any past experience. This good result was chiefly due to anti-typhoid inoculation and the insistence on chlorinated drinking-water. In this country, the care and purity of our water supplies, good sanitation, absence of contaminated shellfish and prompt hospital isolation of the sick helped to control the enteric group of infections.

In the latter years of the War of 1914–18, dysentery and malaria were introduced into England from Salonika and other Eastern theatres of war. A few outbreaks occurred among civilians, but were quickly controlled. The most serious menace to the public health was the pandemic of influenza which swept its tidal wave of destruction throughout Great Britain in the winter of 1918–19. Apart from this unavoidable tragedy, the record of civil public health in this war was good.

Generally, the chief diseases which engaged attention during the previous war were watched for and prevented by the same means in the Second World War. These means were the maintenance of the normal health services as far as possible; port sanitary control, which

guarded against the introduction of infectious diseases from abroad; purity of water supplies; notification of infectious diseases; hospital isolation; maintenance of adequate nutrition and so forth.

The satisfactory record of national health during six years of unprecedented strain alike upon the nation and upon the public health and medical resources of this realm is one that evokes pardonable pride. It was a great contribution to national defence, for many wars have been lost by disease and pestilence.

Let us briefly sum up the conditions, which under providence, helped to secure so excellent a result. First of all can be put the work of organised public health, environmental hygiene and the health services—maternity and child welfare, the school medical service, the tuberculosis and venereal diseases services—which have secured for Great Britain her high reputation in preventive medicine.

Next comes the important subject of nutrition. Rationing was ably done by the Ministry of Food with expert medical advice, and the advances made in recent years of knowledge of the adequate principles of nutrition were well utilised.

Other factors in the maintenance of the nation's health were the special arrangements for war emergencies, evacuation, air raid precautions, the Emergency Medical Services, the comprehensive laboratory services, the blood transfusion service and other triumphs of administrative and scientific organisation, including increased provision for maintaining industrial health and for rehabilitation.

Finally, the years of the war and those immediately preceding it saw great advances in medical science, especially in chemotherapy.

The sulphonamide drugs cure many diseases formerly fatal, while Sir Alexander Fleming's discovery of the therapeutic value of penicillin and the subsequent work of Sir Howard Florey and Dr. Chain have made this drug another powerful medical weapon. It helps to inhibit the germs of pneumonia, gonorrhoea, syphilis, diphtheria, tetanus and anthrax, and combats those which infect wounds, cause blood-poisoning and give rise to skin diseases. Malignant endocarditis was formerly a fatal disease: treated by penicillin 70 per cent. of patients recover. In D.D.T. (dichlor-diphenyl-trichlorethane), B.H.C. (Benzene hexachloride) and other new preparations we possess valuable insecticides which assist in the prevention of typhus, malaria and other insect-borne diseases. New and powerful drugs were discovered for malaria and affections of the thyroid and adrenal glands. Cancer is still a deadly disease, but surgery, radium and deep X-ray therapy can often abolish it in its early stages. The new physics has not only given a weapon of destruction in the atomic bomb, but through its application in a machine termed the cyclotron, certain ordinary salts can be made radio-active at low cost. These can be used not only in the treatment of cancer by radiation, but in new methods of biological investigation.

These great advances in preventive medicine were phenomenal, especially having regard to the brief period in which they were developed for the service of mankind. Here we are concerned more particularly with their application to preventive medicine, and this is described in the two volumes dealing with the Civilian Health and Medical Services in England and Wales, Scotland and Northern Ireland during the Second World War. In the second volume also will be found accounts of the Ministry of Pensions Service and of public health in the Colonies, including the epic siege of the Island of Malta, and conditions under enemy occupation in Hong Kong, Malaya, North Borneo and British Somaliland.

This preface should not close without a reference to an important development that is strictly outside the scope of this History, though it owes much to what is here recorded. It was rightly felt that all this knowledge, all this organisation, though it was designed primarily for war, should not be lost in peace. To this end, a National Health Service was planned in the fifth year of the war, to benefit the whole nation without distinction of class or means. Parliament in 1946 passed the National Health Service Acts and the comprehensive service began in 1948.

This volume has been prepared under the direction of an Editorial Board appointed by H.M. Government, but the Editor alone is responsible for the presentation of the facts and the opinions expressed.

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A. S. M.

PART I

The Ministry of Health Services

INTRODUCTION

THE STATE OF THE PUBLIC HEALTH IN THE YEAR 1938

As a criterion of the state of the public health in England and Wales at the outbreak of war it seems best to take the last complete year of peace, 1938, as the standard. There were, of course, eight months of peace in the year 1939, but they were overshadowed by the gathering clouds of war and, already, had interfered to some extent with the normal functioning of the national health services. Some reference will however be made to the state of the public health in the year 1939.

VITAL STATISTICS

The vital statistics for the year 1938 bore witness to the improvement in the public health which had been continuous in recent preceding years. They may be summarised as follows:

(i) The number of births was 621,204 giving a birth rate of 15·1, as compared with 14·9 in 1937.

(ii) The number of deaths was 478,829 as compared with 509,574 in 1937. The crude death rate in 1938 was 11·6 per 1,000 persons compared with 12·4 in 1937 and 11·7 in 1935. Of these deaths 26·5 per cent. occurred in persons under 50 years of age.

(iii) The infant mortality rate (that is, the death rate of infants under one year of age per thousand born) was 53 as compared with 58 in 1937.

(iv) The number of cases of infectious disease (excluding measles) notified in England and Wales during 1938 was 299,867, as compared with 302,890 in 1937.

(v) The chief causes of death in order of mortality were diseases of the heart and circulation (327 per 1,000 deaths), cancer (143), bronchitis, pneumonia and other respiratory diseases (91), diseases of the nervous system (81) and all forms of tuberculosis (55). These five conditions were responsible for 70 per cent. of the death rate.

The audit of birth and mortality presented therefore encouraging features. The birth rate for the year showed a slight, but still a perceptible increase over the declining figures of previous years. Even the number of deaths and the crude death rate showed a small decrease. For the previous two years the death rate had shown a slight increase. But this could partly be explained by the fact that the proportion of older persons in the population who reach the allotted span of life is increasing from year to year. There was also a prevalence of influenza and influenzal conditions in the early part of 1937 which helped to swell the death rate in that year. In 1938 the deaths in the first quarter of the year showed a decrease of 16 per cent. on the first quarter of 1937 and were among the lowest recorded for any first quarter of the year. The new discoveries

in chemotherapy offered hope that in process of time a substantial reduction in the mortality from pneumonia and respiratory diseases might be achieved, with a corresponding effect upon the national death rate.

The infant mortality rate was highly encouraging. In 1935 a record low infant mortality rate of 57 was noted. The rate, however, slightly rose again in the succeeding year, 1936, when it was 59, and was only a little less (58) in 1937. In 1938 a second record was achieved, the infant mortality rate having declined to the exceptional figure of 53. The conclusion was drawn that as lower infantile mortality rates still existed elsewhere, notably in certain of the American States and Holland, this record figure should prove a strong incentive to press on with measures directed to reducing this mortality, measures which already have attained encouraging success. One thing to be especially desired in the saving of infant life was a reduction in the neo-natal and still-birth rates. These rates had remained practically steady for the previous ten years.

The reduction in the maternal mortality rate continued. The figures for 1938 showed a fall to a rate of 2·97 per 1,000 total births, as compared with 3·13 for 1937 which was then the lowest rate ever recorded for England and Wales.

It may be recalled that considerable attention was devoted to this problem before the war, as indicated by the Departmental Committee of 1928, the Midwives Act of 1936, the reports on maternal mortality (1937),[1] and measures taken by the Ministry with the co-operation of local authorities, the medical profession, midwives and health visitors.

This active campaign to minimise the perils of childbirth so far as was possible, was evidently meeting with success.

Equally encouraging was the outlook on tuberculosis and venereal diseases.

In tuberculosis the figures were the lowest yet recorded. The number of deaths from tuberculosis in 1938 was 26,176 as compared with 28,529 in 1937 and 35,818 in 1931. The crude death rate for tuberculosis per million living was as low as 635; it may be compared with the crude death rate for 1937, which was 695, and with that for 1931, which was 896. There was, also, an acceleration in the rate of decline of mortality of young adults. The suggestion was made that the check to the fall in mortality in adolescents, which had caused much concern among tuberculosis workers for many years, might now be passing away.

In Wales the steady fall in the death rate from tuberculosis since 1931 was continued in 1938, and the death rate for that year, 812 per million of the population, was the lowest yet recorded for the Principality. Thus in Wales the general death rate from tuberculosis had declined (this decline had been in the region of 40 per cent.) but it still lagged behind the decline in the English figures.

The Minister of Health appointed a committee to inquire into the Anti-Tuberculosis Service in Wales and Monmouthshire. This committee presented a very full report;[2] its chief criticisms were directed towards the preventive side of the work and practical steps were taken by the Central and Welsh authorities to promote closer co-ordination and co-operation in the preventive and therapeutic sides of tuberculosis work in Wales.

As regards venereal diseases, the returns from the treatment centres showed that the incidence of both syphilis and gonorrhoea was declining. The insidious and latent character of the latter disease had long been an obstacle to prevention and cure in the venereal diseases scheme. The decline in gonorrhoea appeared to be due to its treatment with the sulphonamide group of remedies. This form of treatment was considered likely to prove of great value to the community and of far-reaching importance.

The general epidemiological review for the year presented many interesting features.

(i) The incidence of scarlet fever was practically undiminished. This was probably also true of other forms of streptococcal infection. The type of the disease continued to be mild and the mortality remained low.

(ii) The deaths from measles and German measles numbered 1,641, being one-third higher than in 1937, and the third lowest in the past ten years. The mortality, while on the whole declining, naturally fluctuated according to the epidemic prevalence of the disease in a particular year.

(iii) The outlook on diphtheria was on the whole disappointing. The notified cases of the disease were 65,008 as compared with 61,341 in 1937 and 57,795 in 1936. The fatal cases numbered 2,931 giving a fatality rate of 4·5 per cent., as compared with 4·8 per cent. in 1937 and 5·3 per cent. in 1936.

In official commentary upon these figures it was pointed out that diphtheria was the principal killing disease among children of school age and that in the past few years the number of deaths from diphtheria had exceeded the number from measles and from whooping-cough.

Yet for this serious disease of childhood an effective method of immunisation was available, and with willing co-operation of the public an immense reduction in the incidence and number of deaths from the disease could be secured.

(iv) Eighteen cases of smallpox were notified, but with the exception of one doubtful case, they all appeared to derive from a source outside this country.

(v) As regards epidemic diseases of the central nervous system, there was an unusually high prevalence of acute poliomyelitis in the last two quarters of the year, the areas chiefly affected being the East and

South-east of England and Wales. The number of cases notified was 1,489 and there were 172 deaths. In the cerebral form of the disease (polioencephalitis) there were 96 cases notified and 82 deaths. This was the peak year of the disease since notification became compulsory in 1912. Even so, the extent of poliomyelitis, although serious, did not approach the wide prevalence which had characterised epidemics of this disease in the United States and in Scandinavia.

Cerebro-spinal fever, the second member of the triad, continued to show an increase in notifications. There was an epidemic period in 1931–33 and thereafter the number of notifications did not fall to so low a point as after the 1915–17 epidemic.

In 1938 there were 1,288 notifications with 652 deaths. It was also observed that the number of infections with Group I type of the meningococcus was increasing so that the possibility that another period of epidemic prevalence was approaching could not be disregarded.

Very fortunately, at this time the treatment of this disease by sulphanilamide preparations had begun, and it had already been shown that the case mortality of cerebro-spinal fever, which in some epidemics during the last war had been as high as 70 or 80 per cent., could be reduced to the low figure of 10 or even 4 per cent. if treatment by modern chemotherapy were begun at an early stage of the malady.

The notifications of encephalitis lethargica continued to show a pleasing decline. They were only 194 as compared with 1,036 in 1929. For the past nine years the number of deaths had largely outnumbered the notifications. They amounted to 650 in the year under review. Most of these deaths were due to infections in the years of epidemic prevalence of the disease.

GENERAL OBSERVATIONS

The enteric group of fevers provides an interesting study in the prevention of epidemics. Few facts are more striking in epidemiological history than the enormous decrease in both the incidence and the mortality of the enteric fevers in this country since the latter years of the nineteenth century. The long range trend is well illustrated by a comparison of the figures relating to the death rate per million living between 1871–5 and 1936. In the former period the rate averaged 371 per annum; between 1871–5 and 1886–90 the rate fell from 371 to 181; in 1914 it was 47. Since then there had been an almost unbroken decline to the low figure of 6 for the year 1936. Much progress had been made in the diagnosis, prevention and control of these fevers, but from time to time outbreaks of them had occurred either by the causal organisms infecting water and milk or from the handling of food by infected persons or 'carriers'. The detection of these outbreaks and their abatement by prompt administrative action is one of the modern triumphs of preventive medicine.

The hospital services were growing and more co-ordination between the work of county, municipal and voluntary hospitals as foreshadowed in the Local Government Act of 1929 was being secured. This was a gradual process, but it was already being markedly accelerated by the setting-up of the Emergency Medical Organisation in the year under review.

The Nuffield Provincial Hospital Trust, established through the munificence of Lord Nuffield, had in contemplation plans for organising hospital and health services under a regional council representing the voluntary hospitals and local authorities within a region, with the help of grants in aid. The Ministry of Health was watching this work with sympathy and interest. It was already clear that no hospital scheme could flourish unless it were based on and closely associated with the health services of local authorities. This simple proposition is often lost sight of in schemes where attention is focused upon the building of hospitals, their situation and their organisation. The patients in these hospitals come from the general practitioner services and the health clinics. The hospital should be designed to meet the needs of the patient and his needs should come first. The patient was not made for the hospital but the hospital for the patient.

All these points, and especially the close association with the health services, were receiving careful consideration in the Ministry of Health's scheme for hospital re-planning.

During the years intervening between the Wars of 1914–18 and 1939–45 increasing attention was devoted to the study of nutrition and the purity of food. These investigations were associated closely with the new discoveries about vitamins and the prevention and treatment of deficiency diseases.

During 1938 the Advisory Committee on Nutrition of the Ministry of Health were actively engaged in a number of nutritional inquiries. Consideration was also being given to the important question of food standards in relation to the new Food and Drugs Act which was passed in this year.

Cancer continued to occupy a high position in the figures of our national mortality. Deaths from cancer showed an almost uninterrupted rise since 1851 when their compilation was begun. The total number of deaths from cancer registered in England and Wales in 1938 was 68,605, and the disease now takes the second highest position among the killing diseases. It was difficult to say whether there was a real increase in cancer, for with the advance in modern diagnostic methods, biopsy, X-ray examinations etc., the diagnosis had greatly improved and more cases which previously would have gone undetected were included in the death returns and further, public health activities, improvements in hygiene and nutrition, temperance and a more sensible way of living had greatly prolonged life. As more people attain the later ages of life

now, more are likely to develop cancer. The setting-up of a National Cancer Service in Great Britain, as defined in the Cancer Act of 1939, was first announced in 1938. In this service, the Ministry of Health, as with the other national health services, acted in a supervising, co-ordinating and advisory capacity. The actual work of administration and provision of facilities for diagnosis and treatment was placed under the chief local authorities (county and county borough councils) in England and Wales. The cost of the work was defrayed partly by an increase in the block grant to local authorities voted by Parliament and partly out of local rates levied by the councils. The medical officer of health of a local authority was to be the medical administrative officer of the scheme.

It was intended that each council within a specified time, after consultation with representative members of the local medical profession, should submit a scheme for the diagnosis and treatment of patients suffering or suspected to be suffering from cancer in its area for the approval of the Minister of Health. Through these schemes it was intended that early and modern expert treatment and facilities for diagnosis should be available generally throughout the country, and their general plan provided for an organisation for this purpose of the cancer hospitals in a large area, foreshadowing in this more limited field the regional organisation of hospitals in the National Health Service.

In the subsequent year, 1939, the death rate from cancer per million living showed a slowing down of the increase which had been observed for many years. It was 1,672 per million living, as compared with 1,665 in 1938. The enforced postponement of measures in connexion with the National Cancer scheme brought about by the war was much to be regretted. The public interest aroused in the earlier part of the year by the promulgation of the scheme had perhaps led to greater attention being paid to earlier diagnosis and treatment, and, possibly, caused more victims of the malady to seek medical aid more promptly.

ORGANISATION

Such then in outline was the state of the public health at the outbreak of war. The organisation of the Public Health Services is complex. Seven government departments, a statutory body, a special committee of the Privy Council, local authorities, and numerous voluntary bodies were concerned in the maintenance of the national health at this time. As we have seen, the chief responsibility rested with the Ministry of Health. The Home Office, through its factory and medical inspectors, looked after the health of the industrial worker. In 1940, after the formation of Mr. Churchill's government, its responsibilities in this field were transferred to the Ministry of Labour. The Mines Department was concerned with the medical inspection of mines, until the creation of the Ministry of Fuel and Power in 1942. The Board of Trade, in

consultation with the Ministry of Health, was concerned with the health of merchant seamen. Its duties in this respect were later absorbed by the Ministry of War Transport. The Service Departments (Admiralty, War Office and Air Ministry) deal with the health of sailors, soldiers and airmen.

The General Medical Council—a statutory body—keeps the Medical Register, determines and supervises the standard of medical education, publishes the *British Pharmacopoeia*, and maintains standards of medical conduct. The Medical Research Council, a committee of the Privy Council, fosters, supervises, and co-ordinates medical research. Nor should one omit to record the influence exercised by the Royal College of Physicians, the Royal College of Surgeons, the Royal College of Obstetricians and Gynaecologists, the Worshipful Society of Apothecaries and the medical faculties of the Universities on public health and medical education and learning and the advancement of medical research.

The voluntary organisations which are concerned with medical and health affairs are legion and all claim on one ground and another to have their say on questions in which they are interested. The most important of these bodies are the British Medical Association, 'which by its long record of enterprise and initiative has come to be recognised by official bodies as the negotiating instrument of the profession', the Society of Medical Officers of Health, the Royal Sanitary Institute, the National Association for the Prevention of Tuberculosis and many others.

All this makes the machinery for the maintenance and advancement of the public health not only extremely complicated, but, also very arduous for the medical administrator. No health reform of any magnitude can be brought to fruition without lengthy discussions and conferences at which all interested bodies shall be represented or without reconciling a number of conflicting interests. Such work demands lucid and reasoned exposition, tact, broadmindedness and conciliation from government officials.

It says much for the soundness of democratic principles that so much had been achieved with such complicated machinery and that the standard of public health at the outbreak of war had reached an unprecedented level of excellence.

CONCLUSION

Reviewing the Annual Report of the Chief Medical Officer of the Ministry of Health for the year 1938, in which many of these matters were recorded, the Editor of the *Lancet* in an annotation entitled 'That's England's Health—That Was',[3] referred to the year 1938 as the last complete year of an epoch. That report indicated the direction in which the stream of public health progress was flowing before the war began.

One cannot help feeling the irony of the situation. A fraction of the money spent upon armaments and armies for destroying life would have helped to save and prolong hundreds of lives if devoted to public health and medical services. Such sums could have promoted social welfare and alleviated the misery and suffering of mankind. At the same time much had been gained, much had been achieved.

Man lives on the heritage of his ancestors, and, when the British people were forced into totalitarian war, they marched into battle fortified by better physique and better health, the gifts of medical and public health progress.

REFERENCES

[1] MIN. OF HEALTH (1937). *Report of an Investigation into Maternal Mortality*, London.
—— (1937). *Report on Maternal Mortality in Wales*, London.
[2] *Report of the Committee of Inquiry into the Anti-Tuberculosis Service in Wales and Monmouthshire*, 1939, H.M.S.O.
[3] *Lancet* (1939). **2**, 1180.

CHAPTER 1

PUBLIC HEALTH ADMINISTRATION AND VITAL STATISTICS IN ENGLAND AND WALES

GENERAL PREPARATIONS

FOR nearly two years before the outbreak of war the Central Health Authority worked at great pressure under the threat of a national emergency which it was earnestly hoped would never arise. At the same time the existing health services had to be fully maintained and a new health service, the Cancer Service, was planned and organised.

Modern war has led to unprecedented demands on the national health services. For centuries Great Britain's insular situation and the protection of the British Navy enabled the inhabitants to regard war as a time in which the bulk of the people could pursue their avocations unmolested while fleets and armies decided the issues at stake on the seas or in other lands. This enviable dichotomy no longer prevails. Since the last war the discoveries of science have placed still more powerful weapons of destruction in the hands of man. The aeroplane can fly immense distances bearing death between its wings. The courtesy of the old warfare has given place in enemy hands to aerial attacks on the civilian population with the object of frightening a nation into capitulation. The cities of our land are no longer cities of refuge for invalids, women and children, but may become the most vulnerable centres of attack. With these fateful considerations in mind the Ministry of Health had to take two important measures of protection. One was the organisation of an Emergency Medical Service, in itself a stupendous task; the other was the evacuation scheme, which included the evacuation of school children (in conjunction with the Board of Education), expectant mothers, young children, cripples, blind persons, etc. from urban centres and their reception in other areas.

Wisely looking ahead, in 1937 the British Medical Association began to compile a register of every doctor in the country, in terms of desire and aptitude for medical service in the Navy, Army and Air Force, or in Home defence or civil work. Thus at the outbreak of war a complete record was ready of the whole medical profession and a machinery ready in the form of a Central Emergency Committee and Local Emergency Committees throughout the country. When war broke out, they were reconstituted as Central and Local Medical War Committees. The Government entrusted to the Central Medical War Committee, in association with the Committee of Reference of the Royal College of Physicians and Royal College of Surgeons, the allocation of doctors to

the Forces according to their demands. The local committees with their knowledge of local needs and personnel endeavoured to see that the demands of the Forces did not seriously interfere with the medical needs of the civilian population. Other ways in which the increasing demand for doctors was met were by the recognition of suitably qualified foreign medical practitioners and by the assistance of many American volunteer doctors.

With the help of representatives of the General Nursing Council, the Royal College of Nursing, the British Red Cross Society, the Order of St. John of Jerusalem and others, a Central Emergency Committee for the nursing profession made arrangements for the registration and recruitment of trained or partially trained nurses available for service in war-time and the Civil Nursing Reserve was thus established. This was later taken over by the Ministry of Health, and the Central Emergency Committee was replaced by an advisory council under the chairmanship of Miss Florence Horsbrugh, M.P., Parliamentary Secretary to the Ministry.

There were numerous other administrative activities planned and organised by the Government and the medical profession during this period for use in the event of war, which are recorded in this narrative in relation to special subjects of public health.

MINISTERS AND CHIEF OFFICIALS OF THE MINISTRY OF HEALTH

During the period of preparation in the event of war and during the years of war the following were Ministers and chief officials of the Ministry of Health:

Ministers: .. .. The Right Hon. Sir Kingsley Wood, M.P. 1935–8
The Right Hon. Walter Elliot, M.C., F.R.C.P., F.R.S., M.P.,—1938–40
The Right Hon. Malcolm MacDonald, M.P., 1940–1
The Right Hon. Ernest Brown, C.H., M.C., M.P.—1941–3
The Right Hon. Henry Urmston Willink, M.C., K.C., M.P.—1943–5
The Right Hon. Aneurin Bevan, M.P.—1945

Permanent Secretaries: Sir George Chrystal, K.C.B.—1935–40
Sir John Maude, K.C.B., K.B.E.—1940–5
Sir William Douglas, G.C.B., K.B.E.—1945

Chief Medical Officers: Sir Arthur MacNalty, K.C.B., M.D., F.R.C.P., F.R.C.S., K.H.P.—1935–41
Sir Wilson Jameson, G.B.E., K.C.B., M.D., F.R.C.P., K.H.P.—from 1940.

PUBLIC HEALTH REGIONAL ORGANISATION

The Ministry of Health during this two-year period of preparation for the event of war set up a regional organisation for their possible new and onerous responsibilities. For many reasons such an organisation in time of war was required. For war, under modern conditions, brings with it countless public health problems which often require immediate decision by responsible officials without reference to headquarters. Especially was such an organisation required to deal with the war questions of evacuation of school children, young children, pregnant women, cripples, blind, aged and chronic persons from crowded centres of population particularly exposed to aerial bombardment. The main problem for both hospital and civilian evacuation was London, that unwieldy large collection of buildings which stretches out its tentacles in so many directions. It was also a possibility in the event of a war waged under new and unknown conditions that communications might be temporarily severed with the central seat of government.

The Government therefore divided England into ten regions, each under the charge of a civil commissioner. There was also a Commissioner for Wales (Region 8). If central communications had been severed at any time during the war, the commissioner in each region would have acted for the Government. Under the commissioner were officers representing the different Government Departments. There was therefore in each region a regional office of the Ministry of Health with a representative staff. This state organisation came into being at the onset of war. The only criticism of substance directed against it was that it was too elaborately planned rather than under-planned.

In each region a hospital officer or officers, appointed by the Ministry of Health before war broke out, had been working on the preparation of the hospital scheme in co-operation with the authorities of local and voluntary hospitals. They were in close touch with the medical officers of health throughout this period of preparation, so that those officers who retained responsibility in war-time, as the officers of local authorities for the organisation of the first aid and ambulance services, were familiar with the hospital proposals.

The problems on the medical side were so complex and various that in April 1939, a scheme was organised under which the work of the medical staff of the Ministry of Health relating to the public health services of local authorities became partly regionalised. For the purposes of this scheme England was divided into five regions, and a principal regional medical officer was appointed by the Minister for each region. Each principal medical officer was assisted by a small team of medical officers, selected from the medical staff and so selected as to make possible some degree of specialisation among the personnel. Offices were found for the regional staffs who took up residence in their respective regions some months before the outbreak of war.

The new arrangement did not involve any substantial alteration in the previous duties of the medical officers of the Ministry, or in their relations with local authorities. This regional medical organisation was an essential element in the preparations which the Ministry made for the provision of medical services in war-time. It fulfilled its purpose. The existence of regional staff, closely familiar with local circumstances and problems was of great assistance to the department. Local authorities, and their officers found it quicker and more convenient to refer to the principal medical officers in their own regions any questions of a medical or quasi-medical nature on which the advice or assistance of the Ministry was desired.

The scheme did not involve any major change in the work of senior medical officers at the Ministry who were responsible for special services such as maternity and child welfare and tuberculosis; it relieved them of a certain amount of routine work and enabled them to cope with the increased work entailed by the war. In addition to their general duties, the senior medical officers' services were available in a consulting capacity to the regional staffs, and also, as in the past, to local authorities and their officers. The regional scheme necessitated some re-organisation of the divisions into which the medical work of the Ministry had been previously divided.

It will be noted that the civil commissioners' areas in England did not correspond with those of the principal regional medical officers, so that a principal regional medical officer was in relation with more than one civil commissioner.

Through the principal regional medical officer and the hospital medical officer, headquarters at Whitehall was kept in close touch with the work of the local authorities and of the voluntary hospitals in preparing for air-raid casualties and the evacuation or reception of women and children. These officers continually advised local authorities and local organisations on air-raid precaution schemes. Their work was a notable contribution to the maintenance of the public health in war-time.

CENTRAL ORGANISATION

Centrally a special department of the Ministry of Health was set up in 1938 to deal with air raid precautions. On the lay side there was a principal assistant secretary with an assistant secretary, principals and clerical staff. On the medical side under the general direction of the Chief Medical Officer, Dr. J. H. Hebb, C.B., C.B.E. (afterwards Sir John Hebb), Director-General of Medical Services at the Ministry of Pensions, was seconded to the Ministry of Health and was appointed Director-General of Emergency Medical Services. His expert knowledge of hospitals and their administration proved of great value in organising the Emergency Hospital Service. On his retirement in 1941 he was

succeeded as Director-General by Sir Francis Fraser, M.D., F.R.C.P. The Emergency Medical Services department directly organised the hospital services through the hospital medical officers in the regions. The liaison with local authority hospitals was effected through the medical officers of counties and county boroughs. It was necessary also to organise the voluntary hospitals in each region. This had never been done before, except in certain areas on a limited scale. The organisation and linking-up with the work of local authority hospitals was secured through the public spirit of the voluntary hospital authorities and their medical staffs. It involved many conferences and explanations both centrally in Whitehall and locally. The details of the work of the Emergency Medical Services throughout the war will be found in the two volumes of this History devoted to this subject. Many public health problems arose in the course of the war with which the Medical Department of the Ministry were concerned. The details of administration are given under appropriate headings in the account in this volume of the public health in England and Wales during the war.

MEDICAL MAN-POWER

The allocation of medical man-power was a difficult problem which called for special consideration and machinery. How it was tackled and solved is told in the first of the Emergency Medical Services volumes, particularly in Chapter 14 on the Provision of Medical Personnel. The demobilisation of doctors is dealt with in Chapter 6 of that volume. Here we are concerned with the effect of the war upon the medical personnel of the public health services.

Recruitment from Public Health Services to the Forces. The wide range of medical services provided by local authorities necessitates the employment of many different types of doctors. The work done is both administrative and clinical. For the former work mainly whole-time medical officers are employed, but for the latter a great many doctors whose primary work is in general or hospital practice are part-time clinical officers. The extensive recruitment of doctors in these fields of medical practice had therefore a considerable indirect effect on the medical man-power available for the public health services. But the recruitment of whole-time medical officers employed by local authorities had a direct and even greater effect on these services. As the war progressed, the equitable distribution among local authorities of the medical man-power still available for the public health services became so complex that special measures were necessary.

The precise number of whole-time medical officers employed in the public health services at the outbreak of war is not known, but it has been estimated as approximately 2,200. About one-third of these were women engaged mainly in clinical work for the maternity, child welfare

and school medical services. As many held posts requiring a post-graduate diploma a considerable proportion were in the older age groups, more than one-third of the male practitioners concerned being over military age.

By the end of 1943, there were 376 whole-time public health medical officers serving with the Forces which represented 47 per cent. of the total of fit recruitable male practitioners in the public health service, and just over 50 per cent. of the recruitable women practitioners. Early in 1944, it became clear that further recruitment on any large scale from this field of medical practice would mean serious impairment of the public health services. So acute was the shortage of public health staff that when, during the winter of 1944–5, a demand arose for senior medical officers to serve for a limited period as hygiene specialists in Germany it was only with the greatest difficulty that 20 suitable men could be found for the purpose.

Control of Public Health Staff of Local Authorities. There was no flow of new entrants into the public health services during the war, since all courses of instruction and examinations for the diploma in public health had been closed. But loss by death and retirement inevitably continued, and as time went on public health staffs came to consist largely of elderly men, men unfit for military service, married women and aliens.

Control over medical appointments was vested in the Minister of Health by a series of measures which required local authorities to report every vacancy to the Minister and prevented their filling it without his knowledge and approval. Similarly, no whole-time public health medical officer was free to quit office or seek a post under another local authority without the Minister's consent. In general, only temporary appointments were allowed even in the case of permanent vacancies. Such comprehensive control, though naturally irksome, was clearly necessary and could not be relaxed, as many hoped, immediately after the end of hostilities in Europe. (See Ministry of Health Circulars 2818, 2881, 62/45 and 30/46.) From August 1945, however, no individual medical officer was refused permission to apply for another post but, if successful, he had to obtain the Minister's approval of the date he proposed taking up his new duties. This was in the interest of the authority whose service he was leaving. In October, the ban on the making of permanent appointments was partly lifted and authorities of areas with a fairly large population, say of 100,000 or over, were permitted to advertise appointments, provided they allowed a period of at least four months for the receipt of applications in order to give candidates still serving in the Forces a fair chance to apply. All control of public health medical man-power was brought to an end in February 1946.

Release and Re-allocation. The release from the Armed Forces of officers by their age and length of service groups (Class A) began on

June 18, 1945, and privileged release on the grounds of urgent civil need (Class B) a month later. Releases of medical personnel were reported by the Service departments concerned to the Central Medical War Committee, who in turn notified the Ministry of Health. By the end of 1945, out of a total of approximately 400 whole-time public health medical officers serving in the Forces at the end of the war, 116 had been released under Class A, two under class B and a few on the grounds of ill-health. The position in the public health services was not, however, immediately improved to that extent, for men released under Class A were entitled to fifty-six days leave and it was three months before many of them returned to work. Meanwhile, many women and some elderly men, deeming their services inessential to the war effort, decided to retire.

Delay in return to civil duty was particularly serious to local authorities in the case of their senior staff, many of whom were serving as specialists in the Forces and, although due for release in the early age service groups, were retained on the grounds of military necessity until replaced by the recruitment of a civilian specialist of similar category.

To find such replacements was always difficult and sometimes impossible. For example, in September 1945, when the War Office asked for a number of venereologists, a survey was undertaken as a result of which the Minister decided that none of the few V.D. officers could be spared. A demand in December 1945 for 20 hygiene specialists by April and 15 more by July 1946 led to a more searching survey of the available public health man-power resources, as a result of which it was found (in January 1946) that, excluding men known to be unfit, there were only 151 whole-time male medical officers of recruitable age on the staffs of all the various local authorities, (including nine citizens of Eire and 35 senior men born in 1905–9) of whom only 55 were engaged in general public health work. Most of these were in key positions and could hardly be recruited without dislocating the public health services, but in the end the Ministry nominated a number which fell far short of the Army's requirements, and this led to a further delay in the release of hygiene officers.

Recruitment of General Practitioners. Under conditions of modern warfare provision must be made for dealing with large numbers of casualties on the home front. The civilian demand for medical man-power, therefore, is not decreased in proportion to the reduction of the civilian population by recruitment, which in the war raised the strength of the Armed Forces and Women's Auxiliary Services of the United Kingdom from 702,000 in 1939 to over 5,000,000 in 1944. By that time, some 30 per cent. of medical men and women registered in England and Wales were in the Services, and the ratio of general practitioners to civilian population had changed from 1 to 2,184 in 1938 to 1 to 2,635.

As a guide to determining the 'quota' of doctors to be recruited from various areas, the Central Medical War Committee adopted the principle that one doctor should be left to 2,400 people in rural areas, one to 2,700 in 'mixed' areas and one to 3,000 in urban areas; but by the end of 1942 more than half the total population of England and Wales were residing in areas where there were more than 3,000 people to each general practitioner. At that time the highest ratio was one doctor to about 4,300 and later the ratio rose in some places to 1 to 4,500.

Of the doctors remaining in civil life the majority were over 50 years of age and at the end of 1942, 8.3 per cent. were over 70 years. The burden of caring for large numbers of patients was increased by many other duties arising out of the war, such as the charge of first-aid posts and the training of nursing and other staff attached thereto, visits to air raid shelters and 'incidents', and the supervision of sick bays and hostels under the Government evacuation scheme. Recruiting boards and the 'works doctor' service in munition factories were almost entirely manned by civilian medical practitioners, who also furnished thousands of medical officers for the Home Guard. As the Chief Medical Officer of the Ministry of Health wrote in his report "*On the state of the public health during six years of war*":

> . . . it is most fortunate that there has been so far little evidence of lowering of the standard of health. The general practitioner forms the front line of medicine: upon his skill and devotion much depends, and no small share of any credit that the medical services deserve for this maintenance of the public health during six years of war, should fall to those general practitioners, who, in such difficulties, carried on, and to those—not a few—who died in harness.

PORT HEALTH ADMINISTRATION

Sea ports. During the war, ports such as Harwich and Dover were taken over by the Admiralty for the use of the Navy and traffic from many ports was diverted owing to enemy action and the introduction of the convoy system. Public health staffs were depleted by the call to the Armed Forces and as the war progressed much strain was thrown on the staff that remained, and the bombing and shelling of sea-ports by the enemy caused port inspection work to be done under hazardous and difficult conditions. Many activities nonessential to the war effort were perforce temporarily suspended. Fortunately, owing to the almost complete cessation of peace-time passenger traffic fewer ships arrived with dangerous infectious diseases on board, although three large vessels on which smallpox had occurred entered the Port of Liverpool from the East.

No case of plague was reported, but throughout the war, as ever, the danger of rat plague being brought to this country was a constant anxiety to port health authorities. Deratisation of ships was done either

by fumigation with a lethal gas or by trapping and poison, and experience showed that hydrogen cyanide, under proper precautions, is now more and more the method of choice when fumigation is necessary. In the years 1939–45 a total of 22,357 International Certificates of deratisation and exemption from deratisation was given at the 23 ports approved for the issue of certificates. The Ministry of Transport issued a memorandum on the rat-proofing of ships, which should go far to lessen the risk and minimise the necessity for regular fumigation.

The Conventions of 1944. Towards the end of 1943 when the United Nations Relief and Rehabilitation Administration (UNRRA) was formed, one of the main aims was to provide aid in the prevention of pestilence. Fears were then expressed of the danger of epidemics in the liberated countries and, as Paris was then in enemy hands and no help could be obtained from the *Office International d'Hygiène publique*, an expert Commission on Quarantine, under the chairmanship of Dr. P. G. Stock, was set up, the terms of reference being to consider the scope of the existing International Sanitary Conventions and to draft any necessary amendments of an emergency nature, taking into account the progress of medical knowledge since the Conventions of 1926 and 1933 were prepared—particularly in regard to yellow fever and the increasing speed of air travel. As a result, two new International Sanitary Conventions came into force on January 15, 1945 (UNRRA becoming the International body responsible for administering them for the time being), viz. the International (Maritime) Sanitary Convention of 1944, amending the International Sanitary Convention of 1926, and the International (Aerial) Sanitary Convention of 1944, amending the International Sanitary Convention for Aerial Navigation of 1933.

Both Conventions were ratified by His Majesty's Government and the new Convention modifying the International Sanitary Convention of 1926 was implemented by the Port Health Amendment Regulations, which were issued in October 1945. The opportunity was taken to alter the title of the existing 'Port Sanitary Regulations' to 'Port Health Regulations' the designation 'Port Sanitary Authority' having been changed to 'Port Health Authority' by the Public Health Act of 1936; but there were then difficulties in making the consequential amendment in the title of the Regulations. This change perhaps marked the end of the old conception of Port Administration embodied in the Public Health Act of 1872, and our seaports at last had Port Health Authorities and Port Health Regulations.

Airports. In war-time air travel was almost entirely restricted to military personnel and persons on Government service. Airfields came largely under R.A.F. control, the only airports entirely administered by the civil authorities being Hurn, near Christchurch, which was used for land planes, and Poole Harbour for sea planes. To deal with the health problems at other airfields the R.A.F. Medical Service undertook

the medical supervision of travellers arriving from abroad. In fact, little infectious disease was found amongst incoming travellers.

The International (Aerial) Sanitary Convention 1944, although ratified by H.M. Government by the end of the war had not been fully implemented pending legislation, for which the Minister of Civil Aviation was to be responsible, to give effect to the Government's proposals regarding civil air traffic.

WATER SUPPLIES

Strict vigilance was exercised in regard to the purity of water supplies throughout the war.

During the air raids of 1940–1, much damage to public services occurred including the fracture of water mains of all sizes. Sewage mains also suffered damage from bombing, and there were occasions when water supplies seemed to be in danger of contamination by sewage. The steps taken by the Ministry of Health and the various local authorities successfully overcame these dangers.

Representatives of the Ministry of Health held meetings with representatives of the three Fighting Services to discuss precautions for the avoidance of accidental contamination of water supplies by sewage effluents, etc., from newly-erected camps or aerodromes. Conferences were also held with various local war agricultural committees, when questions concerning the cultivation of gathering grounds for water supplies arose. Occasionally, proposals by the Fire Prevention Executive were submitted to the Ministry of Health for advice as to whether their adoption would interfere with the purity of water supplies.

In the summer of 1940, to avoid the risk of intentional pollution of water supplies by enemy agents, the Ministry of Health issued two circulars (2086 and 2086A), which required all but the smallest water authorities to chlorinate their supplies; the dose of chlorine suggested was up to one part per million. Many water undertakers—local authority undertakings, statutory water companies and private companies—adopted the reactionary view that chlorination by itself adequately safeguarded the consumer against accidental or unexpected contamination. The Ministry has emphasised that 'to seek a wholesome source of water supply and to keep it wholesome is more important than to rely upon the successful treatment of a polluted water'. As stated in their Memo. 22, 'On the day-to-day management of water undertakings', to treat a contaminated or a potentially contaminated water supply solely by chlorination is fraught with danger and chlorine should only be used in conjunction with some other form of treatment, and as a second line of defence.

The lesson was also driven home that every water undertaker should ensure by constant care and vigilance that the supply is not in danger of contamination from fresh and unsuspected sources, and by means

of frequent regular examinations of the raw water should obtain a clear idea of what is 'the normal' for the water under his care, so that any deviations from it can be immediately noticed and investigated.

In the latter years of the war the Ministry of Health reviewed plans for increasing the number of piped water supplies in England and Wales, and a Water Act was passed by Parliament in 1945.

In the rural areas, where still many houses draw their water from shallow wells and other sources which may not be satisfactory, it was evident that new sources would have to be found. Thus the work of the war years paved the way for progress in the distribution of pure water supplies to the community.

THE REGIONAL INSURANCE MEDICAL SERVICE

The Regional Insurance Medical Service of the Ministry of Health had in peace-time two main functions: first, to give advice when doubt arose as to whether an insured person was incapable of work and therefore entitled to sickness or disablement benefit under the Health Insurance Acts, and, second, to give general advice to medical practitioners on questions arising from their insurance practice. At the outbreak of the war this service was suspended as its members were being employed by the Ministry and other Government Departments on war work of urgent importance. During the year 1940, the Service was revived for a few months, but increasing war demands for its whole-time medical staff necessitated its further suspension. In April 1945 it was decided to restore the service in a limited form. Medical examination centres situated throughout the country were obtained and equipped, and the first sessions for the examination of insured persons were held in May. Approved societies were informed that the number of references per month should not, in general, exceed 50 per cent. of the references made per month during the first half of 1939, that no insured person should be referred who lived outside the radius of twenty-five miles from the nearest medical examination centre and that some types of references, for instance, 'consultation' reference, could not be accepted.

In their capacity as medical referees on the question of incapacity for work of insured persons claiming sickness benefit the insurance regional medical staff during the latter half of 1945 dealt with 62,454 references, of which 62, 236 were referred to them by approved societies and 218 by insurance practitioners.

A new type of reference work was also performed by the insurance regional medical staff during the year 1945. After the passing of the Disabled Persons (Employment) Act, 1944, it was obvious that some of the disabled persons who applied to have their names placed on the Register of Disabled Persons set up by that Act would require medical examination and the Ministry of Health arranged that the insurance medical staff would make any medical examination required for this

purpose by the Ministry of Labour and National Service. Such medical examination was needed in connexion with the scheme of registration, with the provisions of courses of vocational training and industrial rehabilitation and with the placing of disabled persons in suitable employment.

During the war the insurance regional medical staff could not as a routine visit medical practitioners to discuss points arising from their prescribing, but an occasional visit was paid when circumstances appeared to warrant it.

The Maintenance of the Insurance Medical Service during the War. The insurance medical service was maintained during the war under circumstances of great difficulty. As the war continued, the demands of the Armed Forces for medical men increased and the recruiting of general practitioners became more difficult. In describing the work of the Central Medical War Committee (E.M.S. Volume I, Chapter 14, The Provision of Medical Personnel) and in referring to the recruitment of general practitioners in this chapter, accounts are given of the problem and the contribution made by elderly and retired practitioners to maintain the Service under a steadily increasing strain. The normal inflow of new practitioners was completely devoted to the Services, for even those found medically unfit for the fighting Services were almost all employed in hospitals, while death, retirement and breakdown continually depleted the ranks of the seniors. There was little evidence of a lowering of the standard of health during six years of war, and for this no little credit is due to the skill and devotion of insurance medical practitioners.

Work of the Service. As an illustration of the work of the Insurance Medical Service in war-time, the statistics for the year 1945, the last year of the war, may be given.

The number of persons entitled to the medical benefits of the service in England and Wales was 17,620,000.

The following table shows the number of insured persons who elected to obtain treatment from insurance practitioners or from medical aid institutions approved by the Minister of Health, or who, with the consent of the respective insurance committee, made their own arrangements for treatment. There were 578,514 insured persons who had not so far selected a method of receiving treatment:

Number of Insured Persons

	On lists of insurance practitioners	On lists of approved institutions	Making their own arrangements
England	15,960,885	100,420	12,230
Wales	930,902	36,593	456
Totals—England and Wales	16,891,787	137,013	12,686

The total cost of medical benefit, exclusive of the cost of administration, was £13,576,140, of which £9,558,100 was for the remuneration of practitioners and £4,018,040 for the medicines and appliances.

PROTECTION OF PRACTICES

When the war began, a voluntary scheme was devised by the British Medical Association for local adoption for the protection of the practices of medical practitioners who were, or might be, called to do national service. The principle of the scheme was that a practitioner could, if he wished, leave the practice in the collective care of those practitioners remaining in the area who were willing to participate in the scheme. A practitioner acted as the absentee practitioner's deputy, any payment or remuneration received for the patients being divided between the absentee and the acting practitioner. All acceptances of new insured patients were regarded as temporary only, patients being accorded a right on eventual return of the absentee practitioner to make a fresh choice of doctor. A new Regulation was made sanctioning the regularising of the 'temporary' lists of insured patients. (The National Health Insurance (Medical Benefit) Amendment Regulations (No. 3) 1940—S.R. and O. No. 542.)

The voluntary arrangement left a non-participating practitioner in a favourable position to increase his own practice at the expense of the absentee, and amendments of the allocation and distribution schemes were accordingly promoted by the insurance and panel committees in many areas with a view to placing participation, in so far as insurance practitioners were concerned, on a compulsory basis, so that an insurance practitioner would be debarred from accepting for treatment an insured person on the list of an absentee practitioner, except on the terms embodied in the schemes as so amended. In all, schemes of this nature were approved in 27 of the 49 county areas and 50 of the 79 county boroughs.

The majority of these amendments of the allocation and distribution schemes also embodied an amendment to the terms of service, by which practitioners had the same rights, privileges, obligations and liabilities in respect of patients of absentee practitioners, as though they themselves were principals in relation to them. Some of the earlier schemes however, did not contain this provision, so that in the event of any failure of an acting practitioner to observe the terms of service applicable to him, the only person who could be held responsible was the absent principal and the same applied to the voluntary schemes where no such amendment of the allocation and distribution schemes was in force. A further amending Regulation (National Health Insurance (Medical Benefit) Amendment Regulations, 1942—S.R. and O. No. 547) was accordingly made applying the terms of service in such cases to

the so-called 'acting' practitioners generally wherever a protection of practices scheme, voluntary or otherwise, was in force.

At a later date, further extensions of the principle embodied in the protection of practices scheme were promoted by the British Medical Association and adopted in various localities, though not to the same extent as the earlier schemes, covering the cases of practitioners who died or became permanently incapacitated, so as to preserve the goodwill of a doctor's practice until conditions might be favourable for its disposal; and in some instances the extension also covered cases of temporary incapacity. A number of insurance and panel committees consequently promoted further amendments, which were approved by the Department, of the allocation and distribution schemes, covering the same ground. There were also a few cases of amendments being approved to facilitate the acceptance by acting practitioners of new patients on behalf of absentees. This was done mainly in order that doctors should not be debarred by their absence from obtaining some advantage from the new entrants into insurance on January 1, 1942, when the income limits under the National Health Insurance Acts were raised under the National Health Insurance, Contributory Pensions and Workmen's Compensation Act, 1941, though it was not possible to differentiate new entrants under this Act from other new entrants into Insurance.

DENTAL SERVICES

THE REGIONAL INSURANCE DENTAL SERVICE

Under the dental benefit scheme, approved societies and dentists could seek the advice of regional dental officers of the Ministry of Health on matters relating to treatment proposed or completed for insured persons. In the year 1939 up to August 26, when the service was temporarily suspended, 31,062 such references had been received, and the staff employed consisted of 17 whole-time dental officers, assisted by some 30 part-time referees situated in various parts of the country. The service was resumed in a modified form in November 1939, and under the revised arrangements, whole-time officers were attached to the headquarters of each region, whilst the employment of part-time staff was discontinued. During the war, sessions for the examination of insured persons at special centres were discontinued, largely because of the risk attaching to the concentration of numbers of people at centres in what might prove to be vulnerable areas. Provision was therefore made for insured persons to be examined at the surgeries of their dentists, or at their homes. The whole-time regional dental staff could only cope with a reduced number of references; and approved societies were advised in A.S. Circular 323 as to limitation of the number of cases to be referred.

From November 1939 to December 1945, in England 57,662 cases were examined by the regional dental officers, and in Wales 2,756 cases.

A special record was kept of the dental condition of juvenile contributors in age groups 17, 18, 19, referred. The insurance dental service also advised on the provision of dentists and dental equipment under the Emergency Medical Services (see E.M.S. Volume I, Chapters 1 and 3) and on maternity and child welfare dental schemes, including an investigation into the dental condition of children in day and residential nurseries in London in 1944–5. In 1942, at the request of the Ministry of Supply, they surveyed the dental condition of industrial workers in three Royal Ordnance Factories, one in South Wales, another in the Midlands and a third in the north of England. (See Report of the C.M.O. of the Ministry of Health, 1939–45, pp. 197–206). The dental staff of the Ministry of Health advised generally on dental equipment and supplies throughout the war and was frequently called upon to advise the Emergency Medical Service and the Ministry of Supply on the dental instruments and materials necessary for efficient dental practice.

Denture materials. In 1942 the loss of the rubber producing areas in the Far East necessitated the substitution of some other material for vulcanite which had been used for the large majority of artificial dentures. A committee was appointed by the Minister of Health to consider this question, and it advised the Ministry of Supply that certain brands of acrylic resin denture material, then on the market, could be regarded as satisfactory substitutes for dental rubber. In order to assist dentists and their mechanics a leaflet explaining the technique and certain precautions required in the use of acrylic resin was issued by the Ministry of Health.

DENTAL MAN-POWER

Dental War Committee. Reference is made in E.M.S. Volume I, Chapter 1, to the setting up of a Central Dental Emergency Committee and to work of the Dental War Committee. Prior to the outbreak of war, considerable numbers of dentists had volunteered for service with the Forces. Recruitment on a voluntary basis failed to meet the growing demand for dentists, and early in 1940 compulsory recruitment was instituted.

Inter-Departmental Committee on Dentistry. This committee, under the Chairmanship of Lord Teviot, in their interim report of November 1944 (Cmd. 6565) and in their final report of February 1946 (Cmd. 6727) drew attention to the serious shortage of dentists and dental mechanics which was likely to be experienced unless vigorous measures were taken to increase the rate of recruitment. (See Report of the C.M.O. of the Ministry of Health, 1939–45, pp. 207, 208.)

CHANNEL ISLANDS DENTAL SURVEY

An account of a dental survey carried out after the relief of the Channel Islands will be found in Chapter 5 of Part II of this volume.

REPATRIATED PRISONERS-OF-WAR

Special arrangements were made to provide free dental treatment for repatriated prisoners-of-war and civilian internees. Under this scheme treatment was given at E.M.S. hospitals with special dental units or by private practitioners selected by the patients. Application had to be made to the Senior Dental Officer, Ministry of Health, and then a form was issued so that an estimate of the dental treatment required could be submitted for approval under conditions similar to those applying to E.M.S. and dental benefit cases. From October 1 to December 31, 1945, 862 applications for dental treatment were received, the majority from civilians repatriated from the Far East. Among the repatriated internees dealt with under the scheme, the number of teeth conserved exceeded the number requiring extraction.

CONCLUSION

This brief account of dental services during the war indicates that the regional dental staff of the Ministry of Health and dentists generally in England and Wales, their numbers much depleted, in various ways contributed appreciably to the maintenance of the national health.

THE EMERGENCY PUBLIC HEALTH LABORATORY SERVICE

Public health laboratory work in its origin was due to the stimulating influence of Sir John Simon and of his successors at the Local Government Board—George Buchanan, Richard Thorne Thorne and William Power. Simon regarded it as essential that special investigations should be promptly made in all parts of England and Wales wherever and whenever the local prevalence of disease afforded ground for apprehending the existence of epidemics or the prevalence of local occupational or other insanitary conditions. Also, special laboratory investigations were made by the department for the elucidation of obscure aetiological questions, and for bringing the data so obtained to bear on public health administration.

The Royal Commission on Tuberculosis, appointed in 1901, worked for ten years on the question of bovine tuberculosis. Its brilliant staff of research workers which achieved important results included Dr. A. E. Eastwood and Dr. Fred Griffith. At the end of the commission's work in 1911 these men were appointed pathologists to the Local Government Board. The Board (afterwards the Ministry of Health) established a laboratory of its own in London where Eastwood and Griffith and later W. M. Scott conducted a series of important researches on meningococci, haemolytic streptococci and food poisoning which gained international recognition. This central laboratory acted in a consultative capacity for the whole country. To the great loss of public health, both

Fred Griffith and W. M. Scott were killed in an air raid on London in 1941.

Since the days of Simon the central health authority had encouraged the development of pathological work by local authorities, but only the most important of them could maintain their own laboratories. The rest had to rely on laboratories, often far off, a system of postal pathology, with often no consultation between the medical officer who took the sample and the pathologist or technician who examined it. The relatively high cost of laboratory provision deterred many of the smaller authorities from seeking pathological help. Under these conditions, many outbreaks of infectious disease were perfunctorily investigated.

Sir Arthur Newsholme, when he was Medical Officer of the Local Government Board, was anxious to establish a comprehensive service, and urged the provision of pathological facilities for the diagnosis and treatment of a large number of diseases in his annual report for the year 1912–13, in which was set out a statement of the facilities already provided at that time by some larger authorities. As a result of these representations, provision for general pathological services through local authorities was made in the financial estimates of the Government for the year 1913, but the advent of the first world war postponed central action until 1938.

In this year, in view of the lack of adequate laboratory facilities and the risk of serious epidemics under war conditions, the Government decided to include plans for an Emergency Public Health Laboratory Service among their preparations for war. The planning and direction of the Service were entrusted to the Medical Research Council, acting first for the Committee of Imperial Defence, and later for the Ministry of Health. A separate scheme was organised by the Department of Health for Scotland in consultation with the Council (see Emergency Medical Services in Scotland, E.M.S. Volume II, Part I, Chapter 3).

The service, with Prof. G. S. Wilson, M.D., F.R.C.P. as Director, was mobilised in full by the Council at the outbreak of war. It then consisted of three central laboratories at Oxford, Cambridge and Cardiff respectively, sixteen smaller constituent laboratories and six associated University laboratories. In addition ten public health laboratories were established in the London sectors which, for convenience of administration, were incorporated in the Emergency Medical Services under the Ministry of Health; this number was subsequently reduced to seven. Further, since the work of the service covered only part of the country, a number of the larger pre-existing public health laboratories owned by the county councils, municipal authorities, or, in a few instances, private pathologists, were associated with it.

The service greatly augmented and co-ordinated the existing facilities for bacteriological diagnosis, gave valuable help to the Forces, did routine work for a number of local authorities, provided reference

laboratories for bacteriological and other problems, distributed vaccines and sera and at the invitation of medical officers of health took part in field investigations of infectious disease. A more detailed account of the Service's organisation and war work will be found in the Medical Research Volume of this History and in the list of references below.

By the end of the war the Emergency Public Health Laboratory Service had proved its value. By constant research and by the adoption of the best technical methods available it had set a high standard of work which necessarily reacted favourably on other laboratories. In many parts of the country it had become an integral part of the public health organisation, and early in 1944 the Ministry of Health proposed to continue it on a peace-time basis and to extend it to the whole of England and Wales. Provision to this effect was made in the National Health Service Act, 1946, and the Public Health Laboratory Service as a permanent service came into operation immediately. The Medical Research Council agreed to administer the service for an initial period of five years, and the work began of building up a national organisation that would provide a public health laboratory and epidemiological service for the whole country. Clinical pathology in the National Health Service is under the general control of the Regional Hospital Boards, but it is expected that public health and hospital laboratories will work in close co-operation.

HEALTH PUBLICITY

For many years the Central Health Department through the medium of the press, lectures, films, radio posters, leaflets and exhibitions, has brought to the attention of the public the ways in which health can be secured and maintained and disease prevented. The progressive local authorities and voluntary health organisations aided the Department in this endeavour, while the establishment of the Central Council for Health Education with the support and encouragement of the Ministry of Health greatly facilitated it.

The war gave an additional impetus to health educational activities. The first stimulus came from the revelations of the habits and conditions of certain town dwellers which followed the national evacuation scheme and from the general fears expressed by press and public in regard to the risk of epidemics through overcrowding of the air raid shelters in 1940. Much publicity was given by the newspapers and the B.B.C. to the steps taken to improve conditions in the shelters, to the educational work of the doctors and nurses attached to medical aid posts, and to the advice on health given to shelterers by posters and leaflets. In the words of the Chief Medical Officer of the Ministry of Health the public began to realise that 'germs might be as dangerous as Germans'.

Throughout the war there was no restriction on publication of health statistics (except for local population figures); but a real danger existed

of the spread of unconfirmed reports, and even wild rumours, about outbreaks of disease. That danger was met and overcome by a departmental policy of full, frank and regular press conferences and reporting which secured and maintained the confidence of the press and the general public. These meetings and official broadcast talks became a most useful means of health education.

The next development was the use of the whole range of publicity media made available to the Department through the Ministry of Information, for specific education campaigns on diphtheria, droplet infection and the venereal diseases. Posters by humorous artists, with the caption 'Coughs and Sneezes Spread Diseases', exhorted the public to remember the individual's responsibility to the community and 'to trap the germs in their handkerchiefs'.

The campaigns against diphtheria and the venereal diseases were each planned on a long-term basis. In the case of diphtheria immunisation the successive phases and objectives were (1) 1941–2, the employment of publicity on a national scale to reduce the great mass of the unimmunised, paying most attention to the largest and most accessible group, the school children; (2) 1943–4, concentration on children under 5 years of age; (3) 1945, concentration on children of one year old. With this campaign, organised schemes for the personal persuasion of parents by doctors, health visitors and teachers were associated. Every year since 1942, a pamphlet setting out details of the central publicity campaign and of the material and facilities offered for campaigns was sent by the Ministry of Health to local authorities. In each of these years between three and four hundred local authorities took advantage of this assistance.

The first objective of the venereal diseases campaign was to break the 'taboo' on public discussion of the problem through the press and radio; the second objective, a continuous one, was to disseminate detailed education on the subject.

All these campaigns were conducted in collaboration with the Central Council for Health Education, which continued and expanded its work by organising film lectures and providing other assistance and material for local authorities.

The Ministry of Health continued to develop its educational work on maternity and child welfare. In collaboration with the British Medical Association, publicity was given through the press, broadcasting and the cinema to the rules of the Good Patient Movement—how to 'help your doctor' to carry the burdens of war-time winters. Films produced for the Ministry on scabies, plastic surgery and neuro-psychiatry were shown to medical audiences throughout Great Britain and in many parts of the Empire and the United States. The Ministry also assisted the British Council in the making of films for both professional and general audiences oversea.

In these various ways of health education the co-operation of the general public was enlisted in the maintenance of national health during the war years.

THE PLANNING OF A NATIONAL HEALTH SERVICE

It is interesting to note how changes imposed to meet the needs of war have contributed to the organisation of the present National Health Service.

At first organised preventive medicine in England and Wales concerned itself chiefly with environmental hygiene. The years 1875 to 1900 covered a long series of progressive reforms under the direction of the Local Government Board, which supervised especially such local government as related to the public health and the relief of the poor. These measures were followed by a general decline in mortality and a great improvement in the national health. From the reign of King Edward VII onwards the personal health services, that is, the services concerned with the welfare of the individual, were established and developed. First came the School Medical Service in 1907. It was followed by the National Health Insurance Scheme, which from 1913 provided a general practitioner service for all workers earning not more than £250 per annum (later £420). This was followed by the tuberculosis service, the maternity and child welfare service, the venereal diseases service and last of all by the cancer service. As regards hospitals, hospitals for the isolation and treatment of infectious disease were provided by local authorities; the Poor Law hospitals since 1930 had come under the control of the major local authorities; and many of these authorities had built new and well-equipped municipal and county hospitals.

These services, excellent in themselves, were set up to meet some particular need and for the benefit of special groups of the population. They suffered from lack of co-ordination and from administrative regulations which prevented co-ordination. The National Health Insurance Scheme provided a general practitioner service only, without consultant advice and hospital treatment, and was completely separated from the health services of local authorities. Although the Local Government Act of 1929 provided for arrangements being made between the major local authorities and the authorities of voluntary hospitals for the co-ordinated hospital treatment of persons in their area, for the most part the voluntary hospitals kept apart from municipal hospitals and one another, while municipal hospitals were developed without regard to the circumstances of neighbouring local authorities and without co-ordination with the resources of the voluntary hospital system.

It had long been realised that reform and reorganisation of the health services were required. As far back as 1920, a proposal for the

integration of medical services was propounded in an interim report of the Consultative Council for Allied and Medical Services. This council was appointed by the Minister of Health and Lord Dawson of Penn was its chairman. The proposal contemplated, in the districts of small population, primary health centres, mainly under the control of general practitioners; secondly, centres served by consultants in the more populous places and a link with the nearest teaching hospital centre. This plan is the parent of all regional schemes of health services. It represented an honest and able attempt to reconcile conflicting medical interests for the benefit of the public. It is regrettable that medical and public opinion were not at the time sufficiently enlightened to give adequate consideration to this report. The proposal might have been worked out on an experimental basis in one or two areas. Something of the kind was indeed attempted in Gloucestershire, but through lack of central encouragement it achieved only partial success.

In 1936, the Chief Medical Officer of the Ministry of Health (Sir Arthur MacNalty) submitted a memorandum to the Minister of Health, (Sir Kingsley Wood) on specialist services. The memorandum appreciated that the circumstances of that time and the heavy drain on national expenditure might not permit of the setting up of a complete and comprehensive scheme of specialist services by local authorities in the near future. It did, however, review the present provision, traced the steps that had already been taken to provide certain services of a specialist character, pointed out the need for co-ordination and integration of these existing services, and indicated ways of development which could reasonably be taken by local authorities, with the aid of voluntary hospitals to provide more specialist advice and treatment for the inhabitants of their areas. The substance of this memorandum formed the introduction to the annual report of the Chief Medical Officer for 1937. The memorandum further advised the inclusion of dependants and the provision of specialist advice and treatment in the National Health Insurance Scheme. The threat of war and the additional burden of work thrown upon the Ministry of Health prevented any action being taken upon this memorandum.*

Other publications bearing on this question of reform of the Health Services were the British Medical Association's proposals for 'A General Medical Service for the Nation', 1930 (revised in 1938); the report on the Scottish Health Services (Cmd. 5204) in 1936; the report on the British Health Services by Political and Economic Planning in 1937; the Sankey Report of the same year, which gave the views of a commission set up by the British Hospitals Association to review the whole position of the voluntary hospitals; the draft interim report of the Medical Planning Commission of the British Medical Association;

* See also MACNALTY, A. S. *The Reform of the Public Health Services.* Report to Nuffield College, Oxford. Oxford University Press, 1943.

the report of the Society of Medical Officers of Health on 'A National Health Service'; and finally, in 1942, the report by Sir William Beveridge (afterwards Lord Beveridge) on 'Social Insurance and Allied Services', which called for the establishment of a comprehensive medical service as Assumption B of the three assumptions on which his proposals rested. In detail these several reports differed, but they agreed in the desire to see a wiser planning and a better use of the national health services; the re-integration of the separate services into a single comprehensive service; and thereby an advance towards making the promotion of health the first object of medical planning and care.

The successful co-operation of the voluntary and municipal hospitals with the Central Government in the Emergency Hospital Service, and the work of King Edward VII's Hospital Fund for London and the Nuffield Provincial Hospitals Trust further paved the way for a permanent national hospital service, as did the Ministry of Health's surveys of hospitals throughout the country both before and during the war.

The Government whole-heartedly welcomed the proposal for a comprehensive Health Service and early in 1943 the Minister of Health and the Secretary of State for Scotland began discussions with representatives of the interests most concerned, namely, the medical profession, the voluntary hospitals and the major local authorities.

Following on these preliminary consultations, in a White Paper entitled 'A National Health Service' (Cmd. 6502), published in 1944, the Government made proposals for the establishment of such a service as a preliminary to introducing legislation to Parliament. This document embodied the considered views of a number of public health and medical authorities and stated the following five general principles as implicit in the organisation of the scheme.

1. Freedom for people to use or not to use the facilities of the service.
2. Freedom for people to choose their own medical advisers under the new arrangements as much as heretofore.
3. Freedom for the medical practitioner to pursue his professional methods in his own individual way, and not to be subject to outside clinical interference.
4. The personal doctor-patient relationship to be preserved and the whole service founded on the family-doctor idea.
5. The principles to be combined with an appropriate degree of public organisation directed to ensure the proper provision of the services, through better distribution of resources and the employment of new methods such as group practice in health centres.

Other proposals postulated that central responsibility to Parliament and the people would lie with the Minister of Health and that he would be advised by a Central Health Services Council representative of general and specialist medical practice, medical teaching, hospital organisation and other professional interests.

The organisation of the service would be based on the County and County borough councils, combining as joint authorities where necessary, such larger areas being designated by the Minister for the administration of the hospital and consultant services. The 'clinic' and other local services previously organised by the separate local authorities would be planned on an 'area' basis and be administered usually by the major local authorities.

For the requirements of general practice a new central body, the Central Medical Board, would be established.

These services covering the whole range of medical provision for the individual would be free to all, in the sense that no payment would be made at the time for the service used. The cost of the National Health Service would be met through the new Social Insurance Scheme, and by contributions from central and local public moneys.

After the appearance of the White Paper it was intended that discussions with representatives of the medical profession, the voluntary hospitals and the local authorities should take place upon it, but the restrictions upon large meetings and travel and the flying bomb attacks, prevented any effective progress with the discussions until the end of 1944 and the early months of 1945. During these conferences the Health Ministers received suggestions from the representatives consulted, which they agreed should be submitted to the Government as constituting helpful modifications of the original scheme. The end of the Coalition Government in May 1945 and the coming into being of the Labour Government in July called a temporary halt in the preparation of the legislation, but on March 19, 1946, Mr. Aneurin Bevan, the Minister of Health, presented to Parliament a Bill for the establishment of a comprehensive Health Service. This became law as the National Health Service Act, the appointed day for the setting-up of the new Service being July 15, 1948. The Act embodied the principles of the White Paper and retained many of its features. The most sweeping modification was in the Hospitals plan, all hospitals, municipal and voluntary (with a few exceptions) being owned by the Minister of Health, who delegates their management, and the provision of specialist services generally to regional boards appointed by himself. Medical and dental schools and teaching hospitals were not transferred to the Minister and teaching hospitals were excluded from the control of the regional board.

The Medical History of the War would not be complete without this account of the steps taken to plan a National Health Service. It is a tribute to the foresight and imperturbability of the British people that the ground work of so revolutionary a change in the interests of national health was surveyed and planned when the country itself was waging a fierce struggle for national existence.

INTER-DEPARTMENTAL COMMITTEE ON MEDICAL SCHOOLS

A less striking but equally statesmanlike action was the appointment in March 1942, by the Minister of Health and Secretary of State for Scotland of an inter-departmental committee, under the chairmanship of Sir William Goodenough, Bart., to 'inquire into the organisation of Medical Schools, particularly in regard to facilities for clinical teaching and research, and to make recommendations'. The committee reported in May 1944 (Report of Inter-departmental Committee on Medical Schools (1944), London, H.M. Stationery Office). It recommended a comprehensive programme for the reform and development of medical education and research, and included in its purview the appointment and payment of teaching staff, the provision of an adequate range and variety of clinical material and of suitable laboratory accommodation and equipment for teaching and research, and arrangements for post-graduate teaching and research. The Government invited the universities, medical schools and teaching hospitals to give the report early consideration. Thus, amid the clash of war's alarms, the British Government prepared for the future in the sphere of British medicine.

VITAL STATISTICS—ENGLAND AND WALES 1939–1945

POPULATION

The population of England and Wales as enumerated at the census in April 1931, was 39,952,377, and that of Great Britain 44,795,357. On September 29, 1939, the civilian population of England and Wales enumerated for the purposes of the national register was 40,652,000 and the total population at mid-1939 was estimated at 41,460,000. The latter figure has been used as a provisional basis for national birth rates during 1939–45; but for the study of death rates a mean population during each year was calculated by averaging quarterly estimates of the civilian population derived from the national register, births, deaths, movements into and out of the Services and migration records. These mean populations are shown in the table on p. 35.

Children under 15 years of age declined in number from 8·79 million in 1938 to the low level of 8·53 million in 1942, but increased again by 1944 to 8·67 million and by 1945 to 8·75 million. The loss of 4 million persons at ages 15 to 64 between 1939 and 1944 merely reflects transfer from the civilian population; but the addition of half a million older persons during five years of war carries important implications for the provision of future health and pension services.

Taking into account men in the Services both at home and abroad at the middle of 1941, the rate of decennial increase in population since 1931 was 4·4 per cent., compared with 5·5 from 1921 to 1931 and 4·9 per cent. from 1911 to 1921.

The estimated mean population of civilians in England and Wales during 1945 was 38,157,000. This denoted an increase as compared with 1944 of 372,000.

England and Wales: Estimated Mean Population in thousands by Age and Sex in each year 1939 to 1945

(*Excluding non-civilian Males after September 3, 1939, and non-civilian Females after June 30, 1941*)

Sex and age	1939	1940	1941	1942	1943	1944	1945
Males:							
0– . .	4,416·1	4,392	4,330	4,325	4,358	4,407	4,454
15– . .	13,673·2	12,231	11,247	10,776	10,215	9,976	10,108
65 and over	1,598·2	1,620	1,651	1,701	1,761	1,805	1,850
All ages .	19,687·5	18,243	17,228	16,802	16,334	16,188	16,412
Females:							
0– . .	4,309·8	4,280	4,212	4,201	4,225	4,264	4,299
15– . .	15,115·0	15,195	15,091	14,956	14,889	14,895	14,928
65 and over	2,133·7	2,171	2,212	2,284	2,370	2,438	2,518
All ages .	21,558·5	21,646	21,515	21,441	21,484	21,597	21,745
Persons:							
0– . .	8,725·9	8,672	8,542	8,526	8,583	8,671	8,753
15– . .	28,788·2	27,426	26,338	25,732	25,104	24,871	25,036
65 and over	3,731·9	3,791	3,863	3,985	4,131	4,243	4,368
All ages .	41,246·0	39,889	38,743	38,243	37,818	37,785	38,157

Note.—For full details of age see Registrar-General's Statistical Review for each year, Table I.

BIRTHS AND DEATHS

The following table summarises the principal vital statistics of England and Wales during the war years as reported by the Registrar-General:

England and Wales: Births, Deaths, Population, Infant Mortality, 1939 to 1944

Year	Birth rate per 1,000 living	Number of births registered	Estimated population	Number of deaths registered	Death rate per 1,000 living	Infant mortality rate (deaths of children under 1 year of age per 1,000 live births)
1939	14·8	614,479	41,246,000	499,902	12·1	51
1940	14·1*	590,120	39,889,000	581,537	14·4	57
1941	13·9*	579,091	38,743,000	535,180	13·5	60
1942	15·6*	651,503	38,243,000	480,137	12·3	51
1943	16·2*	684,334	37,818,000	501,412	13·0	49
1944	17·7*	751,478	37,785,000	492,176	12·7	45
1945	15·9*	679,937	38,157,000	488,108	12·6	46

* Rates in these years are based upon total population including Armed Forces at home and abroad.

England and Wales: Principal Certified Causes of Death, 1939 to 1945.

Cause of death (classified by 1938 Revision of International List)	Number of deaths* (including those of non-civilians) registered in England and Wales						
	1939	1940	1941	1942	1943	1944	1945
Cerebro-spinal fever	517	2,584	2,163	1,206	780	592	555
Whooping-cough	1,229	678	2,383	799	1,114	1,054	689
Diphtheria	2,133	2,480	2,641	1,827	1,371	934	722
Tuberculosis	25,623	28,144	28,670	25,549	25,649	24,163	23,955
Syphilitic diseases	3,300	3,216	3,140	2,939	2,825	2,591	2,395
Influenza	8,020	11,482	6,901	3,399	12,616	3,900	2,686
Cancer—malignant disease	67,154	68,922	69,227	70,419	72,155	72,110	74,291
Intracranial lesions of vascular origin	48,672	51,683	48,173	48,381	48,945	50,877	52,169
Other diseases of nervous system and sense organs	9,023	9,474	9,156	8,260	7,912	7,808	7,557
Diseases of the heart	125,938	136,476	122,086	116,866	120,737	124,143	128,323
Other diseases of circulatory system	14,553	15,732	14,296	14,248	15,041	15,577	16,057
Bronchitis	31,436	46,281	34,051	26,863	31,420	27,186	29,665
Pneumonia (all forms)	23,403	29,195	26,418	20,828	24,763	20,040	19,984
Other diseases of respiratory system	6,720	8,645	6,430	5,744	6,344	5,903	6,118
Enteritis and diarrhoea	4,345	4,433	4,654	4,926	4,927	5,018	5,337
Other diseases of digestive system	18,700	19,502	18,456	16,913	16,637	16,226	15,832
Non-venereal diseases of genito-urinary system	23,112	24,157	22,842	21,656	21,280	20,912	20,527
Premature birth, congenital malformations and diseases of early infancy	18,752	19,033	18,418	19,354	18,845	19,679	18,317
Other defined diseases	24,109	24,978	24,460	22,117	21,677	20,032	20,627
Old age, senility	17,267	19,232	17,782	15,852	16,673	16,325	16,982
Violence (accidents, suicide, homicide, war)—							
Operations of war	319	27,411	25,662	9,192	8,978	16,286	5,239
Road vehicle accidents	7,476	7,739	8,357	6,087	4,906	5,338	4,572
Other violent causes	17,170	19,004	17,829	15,888	15,123	14,820	14,942
Ill-defined causes	931	1,056	985	824	694	662	567
Totals	499,902	581,537	535,180	480,137	501,412	492,176	488,108

* According to the revised classification used by the Registrar-General from 1940 onwards. Deaths in 1939 in this table are classified to conform with this (see Statistical Review for 1939, Appendix B). The corresponding deaths in years 1931 to 1938, corrected to the revised classification, are given in the Statistical Review for 1940, Table 6.

The birth rate, rising from 1941 onwards, reached 17·7 in 1944, the highest it has been since 1926, and the effective reproduction rate (provisional 0·99) came within one per cent. of a full replacement standard, though it fell subsequently. An outstanding feature was the low mortality of children from disease during the war years. Despite the loss of some 7,000 lives at ages under 15 as a direct result of enemy action, and an increase in accidental deaths arising through war conditions, the mean annual death rates during 1940–4 were below the rates for any year prior to 1939, at every year of age from 1 to 5, and at 5 to 9, and 10 to 14. The year 1939 was remarkable in producing new low records for mortality at every age group under 15 years, the fall being specially great at ages between 1 and 10. It was hardly anticipated that such favourable figures would be attained during the war, much less that they would be surpassed, yet new records for the 2nd and 3rd years of life were set up in 1942, and for the 1st, 2nd, 4th, 5th and at 5–9 years in 1943. Further improvement followed in 1944, when new low levels were reached for neonatal mortality, and for mortality at 1–12 months, in the 2nd, 3rd, 4th and 5th years of age, and at 5–9 years.

Principal Certified Causes of Death, 1939–45. In the table (p. 36) are shown the principal certified causes of death in each year 1939 to 1944:

The percentage contributions to the total deaths made by the more important groups were as shown below, the deaths of non-civilians being included as in the previous table:

	1939	1940–1	1942–3	1944	1945
Diseases of heart and circulatory system and old age	31·6	29·2	30·5	31·7	33·1
Cancer, malignant disease	13·4	12·4	14·5	14·7	15·2
Bronchitis, pneumonia and other respiratory diseases	12·3	13·5	11·8	10·8	11·4
Intracranial lesions of vascular origin	9·7	8·9	9·9	10·3	10·7
Violent causes (including operations of war)	5·0	9·5	6·1	7·4	5·1
Tuberculosis, all forms	5·1	5·1	5·2	4·9	4·9
Diseases of digestive system	4·6	4·2	4·4	4·3	4·3
Non-venereal disease of genito-urinary system	4·6	4·2	4·4	4·2	4·2
Premature birth, congenital malformations and diseases of early infancy	3·8	3·4	3·9	4·0	3·8

INFANT AND CHILD MORTALITY

Infant mortality declined from 156 per 1,000 live births in 1896–1900 to 52·8 in 1938 and 50·6 in 1939. After a considerable setback in the next two years, the rate of 50·6 was again reached in 1942, followed by 49·1 in 1943, 45·4 in 1944, and 46·0 in 1945. The trend of the death rate within each of the first five years of age from 1939 to 1945 is shown in the table below:

Period	Per 1,000 related live births 0–1	Per 1,000 living at age specified			
		1–2	2–3	3–4	4–5
1939 .	50·57	6·17	3·14	2·39	2·14
1940 .	56·77	8·43	4·55	3·42	2·78
1941 .	60·04	9·27	4·90	3·84	3·20
1942 .	50·62	5·95	3·10	2·57	2·23
1943 .	49·12	5·80	3·12	2·40	2·02
1944 .	45·44	4·57	2·56	2·15	1·80
1945 .	46·00	4·20	2·40	2·00	1·65

At each age 1–2, 2–3, 3–4 and 4–5 the death rate in 1931–5 was less than a quarter of that in 1871–5. The decline was then accelerated particularly in 1939, when the rates for the second and third years of life were only about half of the 1931–5 averages. After increases in the next two years the fall was resumed, 1944 rates being 26, 18, 10 and 16 per cent. below those of 1939 for the 2nd, 3rd, 4th and 5th years of life respectively.

Stillbirths have been registered since 1927 and the rate per 1,000 total live and stillbirths improved to a remarkable extent during the war period, as shown below:

1928 . . 40	1934 . . 40	1940 . . 37
1929 . . 40	1935 . . 41	1941 . . 35
1930 . . 41	1936 . . 40	1942 . . 33
1931 . . 41	1937 . . 39	1943 . . 30
1932 . . 41	1938 . . 38	1944 . . 28
1933 . . 41	1939 . . 38	1945 . . 28

The neonatal rate, that is to say, deaths at ages under 4 weeks per 1,000 live births, was about 40 in the early years of the century, about 32 in the period 1923–33, and reached 28.3 in the years 1938 and 1939. New low levels were attained after 1941, the rate in 1944 being 24·4. This was followed by a slight rise to 24·8 in 1945. The death rate at ages 1–12 months was 24·5 in 1938, and in the next six years the rates were 22·3, 27·2, 31·0 23·4, 23·9 and 21·0.

NOTIFIABLE INFECTIOUS DISEASES

For many years there has been a system of compulsory notification of the principal infectious diseases in England and Wales, as explained in

Notifications in England and Wales in each year 1938 to 1945, including those of non-civilians and from Port Health Districts

Disease	Notifications, partially corrected*						Number of original notifications		Totals after diagnosis revision	
	1938	1939	1940	1941	1942	1943	1944	1945	1944	1945
Cerebro-spinal fever	1,288	1,500	12,771	11,077	6,029	3,303	2,982	2,739	2,309	2,063
Continued and relapsing fevers	7	12	10	6	4	6	8	6	7	6
Diphtheria	65,008	47,343	46,281	50,797	41,404	34,662	29,949	25,246	23,199	18,596
Dysentery	4,170	1,941	2,860	6,670	7,296	7,905	13,346	16,774	13,025	16,278
Encephalitis lethargica (acute)	194	159	211	187	148	109	88	93	79	76
Erysipelas	16,671	14,141	13,123	12,232	11,598	11,833	11,240	9,995	11,148	9,853
Malaria (contracted at home)	2	2	2	2	2	4	21	15	9	7
Measles	?	?	409,521	409,715	286,341	376,104	159,041	446,828	158,479	446,796
Ophthalmia neonatorum	5,168	4,594	4,390	4,195	4,517	4,502	3,708	3,341	3,660	3,314
Paratyphoid fever	388	745	1,947	3,705	390	328	303	280	258	234
Plague	–	–	–	–	–	–	–	–	–	–
Pneumonia (acute primary and influenzal)	45,160	42,312	47,875	50,942	42,698	52,407	38,690	34,412	38,631	34,371
Poliomyelitis (acute)	1,489	744	951	876	581	410	523	827	464	784
Polioencephalitis (acute)	96	87	128	83	93	46	67	77	68	74
Puerperal pyrexia	9,307	9,252	7,627	7,356	8,542	8,354	8,039	7,065	7,944	7,013
Scarlet fever	99,278	78,101	65,302	59,433	85,084	116,033	94,859	75,233	92,671	73,687
Smallpox	18	1	1	–	7	–	18	5	16	4
Tuberculosis (respiratory)†	37,879	34,930	36,151	39,499	40,629	42,410	43,794	42,166	–	–
Tuberculosis (other forms)†	12,810	11,276	10,421	11,465	11,990	11,932	10,519	9,944	–	–
Typhoid fever	934	734	886	1,058	468	385	356	392	284	301
Typhus	–	2	–	–	–	–	–	26	–	26
Whooping-cough	?	?	53,617	173,330	66,016	96,136	94,217	62,894	94,044	62,691

* These totals, which correspond with the numbers published in the quarterly and annual reports of the Registrar-General, incorporate such corrections as were reported on the weekly cards. The original notifications, comparable with those of 1944, can be estimated approximately by multiplying the figures by the following factors ascertained from 1943 records. Cerebro-spinal fever 1·045; Diphtheria 1·044; Dysentery ·958; Measles ·988; Poliomyelitis and polioencephalitis 1·035. For other diseases the correction is immaterial.

† Formal notifications only throughout.

Deaths from Notifiable Diseases in England and Wales in each year 1938 to 1945, including those of non-Civilians

Disease (1938 Revision of International List)	Number of deaths at all ages, according to the classification in use from 1940 onwards							
	1938	1939	1940	1941	1942	1943	1944	1945
Cerebro-spinal fever	655	517	2,584	2,163	1,206	780	592	555
Relapsing fever	–	–	1	–	–	–	–	–
Diphtheria	2,861	2,133	2,480	2,641	1,827	1,371	934	722
Dysentery (all forms)	112	96	185	329	198	124	157	165
Encephalitis lethargica (acute and sequelae)	516	572	729	704	590	495	417	461
Erysipelas	342	248	214	190	141	124	119	119
Malaria	26	20	46	19	20	21	13	28
Measles	1,524	303	857	1,145	458	773	243	729
Paratyphoid fevers	15	22	52	66	20	15	10	15
Pneumonia (acute primary)	27,467	23,403	29,195	26,418	20,828	24,763	20,041	21,112
Pneumonia (influenzal)	2,179	3,588	4,708	2,880	1,389	5,576	1,682	
Poliomyelitis, acute	174	95	107	113	82	63	87	97
Polioencephalitis, acute	82	48	54	47	50	27	22	42
Puerperal sepsis	682	649	498	499	522	519	462	342
Scarlet fever	311	181	154	133	104	134	107	84
Smallpox	3	–	–	–	–	–	3	–
Tuberculosis (respiratory)	21,282	21,542	23,660	23,633	20,989	21,342	20,104	20,013
Tuberculosis (other forms)	4,257	4,081	4,484	5,037	4,560	4,307	4,059	3,942
Typhoid fever	144	90	83	82	69	57	45	32
Typhus fever (louse borne)	–	–	–	–	–	–	–	2
Whooping cough	1,052	1,229	678	2,383	799	1,114	1,054	689

England and Wales: corrected total of Notifications of Certain Infectious Diseases analysed according to Sex and Age for the Year 1944.

Age group	Scarlet fever		Whooping cough		Diphtheria		Measles		Acute poliomyelitis and polioencephalitis	
	M	F	M	F	M	F	M	F	M	F
Civilians										
0–	194	158	5,053	5,018	167	111	3,102	3,032	5	4
1–	3,031	2,771	12,008	13,020	757	603	15,401	14,794	31	39
3–	6,718	6,696	11,542	12,876	1,307	1,226	19,157	18,575	47	29
5–	19,138	21,873	13,906	15,429	3,537	3,663	32,656	33,008	66	54
10–	7,817	10,491	1,108	1,387	2,022	2,395	4,270	5,102	47	36
15–	2,389	4,189	159	397	1,046	2,677	1,388	2,651	31	35
25 and over	1,287	3,294	210	819	519	1,884	521	1,702	25	36
Unstated	245	290	477	535	77	94	854	912	5	5
All ages	40,819	49,762	44,463	49,481	9,432	12,653	77,349	79,776	257	238
Non-civilians										
15–	1,014	303	13	11	437	146	501	230	15	2
25 and over	575	109	16	6	431	53	429	73	13	1
All ages	1,589	412	29	17	868	199	930	303	28	3

	Typhoid and para-typhoid fevers		Dysentery		Cerebro-spinal fever		Acute pneumonia		Erysipelas	
	M	F	M	F	M	F	M	F	M	F
Civilians										
0–	19	15	1,938	1,516	412	312	4,117	3,393	125	123
5–	61	50	1,397	1,141	273	185	3,322	2,424	194	209
15–	79	148	885	1,829	313	290	5,724	4,159	1,133	2,233
45–	37	43	400	747	85	98	5,555	3,033	1,893	2,691
65 and over	8	15	402	762	9	12	2,431	2,162	906	1,175
Unstated	4	5	206	253	8	21	255	220	70	142
All ages	208	276	5,228	6,248	1,100	918	21,404	15,391	4,321	6,573
Non-civilians										
15–	47	1	1,165	280	254	28	1,616	71	194	24
45 and over	1	–	77	2	3	3	63	1	28	2
All ages	48	1	1,242	282	257	31	1,679	72	222	26

Mortality from Certain Diseases according to 1940 classification

Period	Comparative mortality indices (1938 unit basis)										Death rates per million at ages under 15 years						
	Typhoid and para-typhoid fevers	Cerebro-spinal fever	Dysentery	Influenza	Encephalitis lethargica	Tuberculosis (all forms)	Tuberculosis of respiratory system	Cancer	Diabetes	Pneumonia (all forms)	Measles	Scarlet fever	Diphtheria	Whooping cough	Acute poliomyelitis including acute polio-encephalitis	Rheumatic fever	Heart diseases
1938 .	1·000	1·000	1·000	1·000	1·000	1·000	1·000	1·000	1·000	1·000	169	27	305	119	18	44	68
1939 .	0·693	0·765	0·794	1·830	1·114	1·001	1·005	0·985	1·048	0·841	34	15	228	140	10	34	56
1940 .	0·824	3·833	1·593	2·522	1·405	1·142	1·164	1·002	1·059	1·055	95	12	266	78	9	30	49
1941 .	0·980	3·290	2·885	1·509	1·393	1·203	1·204	0·994	0·953	0·958	128	11	280	279	9	22	45
1942 .	0·553	1·827	1·731	0·735	1·166	1·092	1·093	0·992	0·855	0·746	53	9	192	94	7	18	39
1943 .	0·457	1·192	1·040	2·652	0·983	1·117	1·132	0·994	0·813	0·871	86	11	134	129	4	27	40
1944 .	0·357	0·892	1·270	0·806	0·824	1·057	1·073	0·975	0·749	0·691	28	9	92	121	4	28	42
1945 .	0·299	0·810	1·286	0·546	0·903	1·035	1·058	0·982	0·726	0·670	80	7	67	79	4	26	34

NOTE: The table above gives death rates at ages under 15 or comparative mortality indices at all ages from certain notifiable diseases, and also from cancer and diabetes, for each of the war years.

The Comparative Mortality Index expresses the mortality of any other year in the terms of that of 1938 after making the best possible allowance for changes in sex and age-structure of the population during the interval. It was devised by the General Register Office and introduced into the Registrar-General's Statistical Review (Part I, Appendix) for 1941, since when it has taken the place of the standardised death rates which, based as they were on the census population of 1901, had become unreliable and misleading as a result of the considerable changes in sex and age-structure which had taken place in the meantime.

the following note which has appeared in Annual Reports of the Chief Medical Officer of the Ministry of Health:

> In 1889 the Infectious Diseases (Notification) Act which was adoptive so far as the provinces were concerned, became law. It prescribed the notification to the local sanitary authority of certain specified diseases. Ten years later the Act was made compulsory. A local authority has power to add—with the assent of the Minister—to the list contained in the 1889 Act, but under the Act the additions must be unqualified, whereas, under regulations issued by the Minister from time to time, a local authority can be empowered to adopt the notifications to their special needs, for example, limiting the notification of measles to cases of persons under a certain age or to the first case of the disease in a house.

The tables (pp. 39, 40) give the record of notifications, and of deaths from notifiable diseases, in England and Wales in each year 1938 to 1945:

The numbers of notifications of each disease except tuberculosis made to the local authority are reported to the Registrar-General at the end of each week and published in the weekly return. Prior to 1944 any subsequent corrections arising from revision of diagnosis by the notifier or from errors in enumeration were reported to the Registrar-General, and revised national totals incorporating also late returns were published in the weekly return for the week following. No provision was made until 1944, however, for corrections of diagnosis made at infectious diseases hospitals, such corrections being especially numerous in the case of diphtheria, cerebro-spinal fever and acute poliomyelitis. From 1944 a new arrangement came into force whereby at the end of each quarter a return of the corrected total of notifications, after incorporating revisions of diagnosis both by the notifier and the infectious diseases hospital, is made to the Registrar-General, analysed according to sex and age. The table (p. 41) shows the result of combining these new returns for the four quarters of 1944.

REFERENCES

MIN. OF HEALTH (1946). *On the State of the Public Health during six years of war.* Report of the Chief Medical Officer of the Min. of Health, 1939–45. London: H.M.S.O., 1946.

Min. of Health Circular 2818, May 26, 1943.

Min. of Health Circular 2881, November 5, 1943.

Min. of Health Circular 62/45, April 12, 1945.

Min. of Health Circular 30/46, February 6, 1946.

THOMSON, A. L. (1943). 'The Organisation of a National Public Health Laboratory Service'. *Brit. Med. Bull.*, 1, No. 4, 38–39.

(1946). 'The Emergency Public Health Laboratory Service'. Report of Chief Medical Officer of the Ministry of Health, 1939–45, 83–89.

WILSON, G. S. (1948). 'The Public Health Laboratory Service, Milroy Lectures to R.C.P.'. *Brit. Med. J.*, 1, 627 and 677.

CHAPTER 2

GENERAL EPIDEMIOLOGY

INTRODUCTION

FORTUNATELY the mortality from epidemic disease in Great Britain during the war was remarkably low. There was no serious epidemic save that of cerebro-spinal fever, of which the incidence far exceeded that in the First World War. The greatly reduced case-mortality of the war years in this disease is explained by the new methods of treatment which have saved some fifteen thousand lives. A feature in the war epidemiology was the increase in epidemic hepatitis, or infective jaundice, alike in troops and civilians in this country and in the Army on the various fronts. To investigate this prevalence the Jaundice Committee was appointed by the Medical Research Council, and in November 1943 the disease was made compulsorily notifiable in East Anglia in order to facilitate their investigations which cover the cognate subjects of serum jaundice and the jaundice which may follow the injection of therapeutic substances.

With the experience of the First World War in mind, influenza was a dreaded menace, but in six winters, three of which were severe, there were only two short epidemics, which were of a comparatively mild type. Typhoid fever in 1944 was less prevalent than in any pre-war year. In 1940 and 1941 there were three considerable outbreaks of paratyphoid fever of mild type. The bacteriophage typing of typhoid and paratyphoid bacilli furnished epidemiologists with a new method of precision. There was a large increase in the notifications from dysentery, but little increase in the mortality. This prevalence appeared to be mainly due to the wide distribution of *B. dysenteriae sonne*. There were many outbreaks of food poisoning, chiefly of a mild type.

In diphtheria new low records of both cases and deaths were established in each successive year after 1941. The deaths from diphtheria in 1945 were less than one-quarter of those in 1938, the last whole year of peace. While this decline is due without doubt to the intensive campaign for immunisation begun in 1940, the further diminution of this preventable mortality demands sustained effort to maintain a high proportion of immune children and continual vigilance upon the methods and antigens employed.

The epidemiology of measles is remarkable, the notifications in 1945 being 446,796 or 40,000 more than the number recorded in any previous year since compulsory notification of measles and whooping cough was introduced as a measure of war emergency in 1940. The number of deaths from measles in 1945 was only 729, giving the extraordinarily low rate of 0·16 per cent., about one-seventh of the immediate fatality rate

of whooping cough in that year. The incidence of scarlet fever seemed unaffected, but the case-mortality (with a slight remission in 1943) continued to decline, and, like the case-mortality of measles, which had been falling for twenty years, reached an unprecedented low level during the war.

Scabies, which declined almost to extinction after the First World War, began to increase in 1930, and the rate of increase was accelerated during the war years when the incidence rose to epidemic heights, helped by overcrowding, shortage of houses, evacuation and transfer of workers. Treatment by benzyl benzoate emulsion proved remarkably efficient.

Pediculosis capitis was found to be far more common than had been believed, when the evacuation scheme took place after a month of summer holidays. The investigations of K. Mellanby showed that the incidence of this infestation in great cities had been seriously underestimated. An efficient remedy in lethane (special) hair oil was introduced. According to previous war experience, there was an increase in fungous diseases, especially in ringworm of the scalp and ringworm of the groin and foot.

Several small outbreaks of trichinosis occurred in the earlier years of the war.

Special precautions were taken by the medical department of the Ministry of Health against the importation of typhus from oversea. A few cases occurred among laboratory workers, in which the infection was contracted in this country. A few cases occurred also among men who had been prisoners-of-war and among the medical students who did such excellent work at Belsen Camp in Germany. Although thousands of Service men returned to England and Wales from malarious countries, very few patients were infected with malaria in this country.

The Second World War must be the first war in which the epidemiological record of the United Kingdom has been so satisfactory, for war conditions favour outbreaks of epidemic disease. While great credit for this fortunate result belongs to the central and local health authorities and their public health staffs during the years of the war, praise should also be given to the past epidemiological work of these authorities extending over many years, the fruits of which were reaped when the havoc of war assailed the public health.

An account will now be given of those infectious diseases which were the objects of special concern in the war.

SMALLPOX

In the six years 1939–44, 27 notifications of smallpox were received; in six instances the diagnosis was not confirmed. Only three deaths occurred, all in 1944. The distribution of the 21 smallpox cases was as follows:

In 1939, 1 case, infected abroad; in 1940, 1 case, infected abroad; in 1941, no case; in 1942, 5 cases (connected with a ship-borne case arriving at a Scottish port); in 1943, no case; in 1944, 14 cases of which one group of 11 cases was of interest as an example of spread of smallpox from a case infected abroad and unrecognised when the disease developed in this country.

On March 1, 1944, the Ministry was informed of a case of suspected smallpox near London; it was visited by a medical officer of the Ministry who diagnosed confluent smallpox. The patient, E.M.H., who died two days later, was an unvaccinated nurse, aged 23, at home on sick leave from a hospital. Attention was at once given to this hospital where there were approximately 1,100 persons. In the meantime it was learned that haemorrhagic smallpox had been diagnosed at Bedford in the case of D.C., an unvaccinated female aged 36 who died March 2; and in the investigations made by the borough medical officer of health and the Ministry's medical officers it was found that she had been a visitor to the hospital on February 12. At the hospital it was discovered that R.C., a soldier returned from Gibraltar, had been admitted direct on February 6 for a functional nervous condition. On February 7 he became febrile, on February 10 he had a 'rubella-like' rash, and two days later a 'chickenpox' eruption appeared; he was regarded as an instance of concurrent rubella and chickenpox. On March 2 he was seen by a medical officer of the Ministry, who was of the opinion that R.C. was recovering from modified smallpox that had exhibited a prodromal rash. The man had been successfully vaccinated in infancy, and in 1942. Four persons in the hospital were found to be infected from this case; A.L., a female aged 52, suffering from carcinoma, vaccinated in infancy, and presenting all the signs and symptoms of haemorrhagic smallpox, of which she died three days later, and three nurses aged 20, 22 and 25 who were undergoing mild, discrete attacks; they had been vaccinated in infancy. What might be regarded as the third generation of cases were four that developed the disease after March 2, namely, two in the hospital (a patient and the ambulance driver) who had doubtless been infected by one of the nurses ill of smallpox, and the two sisters of E.M.H. infected by her in their home. The virus was clearly of a virulent strain. Of the three fatal cases, E.M.H., aged 23, and D.C. (the Bedford case) aged 36, had never been vaccinated, and in A.L. the vaccination was 50 years old. R.C., the primary case, had been vaccinated two years previously and was not seriously ill. The three nurses who had mild attacks had been vaccinated from 20 to 25 years before. The remaining four cases—the third generation—when vaccinated with other contacts on March 2 were incubating the disease; the vaccinations were successful, and though too late to avert, yet were in time to mitigate, the attack. Two more contacts were notified as smallpox, but later on it was recognised that they were not suffering

from that disease. The three other cases of smallpox which occurred in 1944 were all in widely separated districts; in none was the source of infection traced. The patients recovered and there were no secondary cases. Serological examination was made on a certain number of exanthematous cases of smallpox and the evidence confirmed the clinical diagnosis; the examination was also suggestive of smallpox in a number of contacts who became ill but who failed to develop the characteristic eruption. (See Prof. A. W. Downie's contribution to the Medicine and Pathology Volume, Chapter 24.)

POST-VACCINAL ENCEPHALITIS

H. M. Turnbull in 1912 first noted the association of encephalitis with recent vaccination, and in December 1922 recorded four cases at the London Hospital. Since that date it has been found to occur in many other countries. It is essentially a complication of vaccinia, irrespective of what lymph is used, and the clinical characteristics and pathology are indistinguishable from those of encephalitis following measles, influenza, and certain other naturally acquired diseases.

In the six years of the war 63 cases of this complication of vaccine were recorded by the Ministry of Health. There were 34 deaths; a figure of 54 per cent. may be taken as the fatality rate. Three of these cases occurred in 1945, in infants, all of whom died. Deaths of infants from post-vaccinal encephalitis are, however, uncommon, and in two of these cases the scanty information which was available afforded only slight grounds for attributing the deaths to vaccinia.

Since 1929, when Horder in England, and, later and independently, Hekman in Holland, treated patients suffering from post-vaccinal encephalitis with blood or serum obtained from a recently vaccinated person, this method of treatment has frequently been used. In 1941, M. H. Gordon advocated the establishment of a bank of serum drawn from healthy young adults on the fourteenth day of a normal vaccination, and in 1942 the Army Medical Service instituted the maintenance of a stock of dried serum obtained from vaccinated persons one month after vaccination. The Director-General of the Army Medical Services supplied the Ministry of Health with a stock for civilian use; this was stored at the Government Lymph Establishment and at all regional headquarters, and was despatched promptly on request with a sufficient quantity of pyrogen-free water to make an appropriate solution of the dry serum for administration. During the period under review this treatment was administered in 14 cases; there were 8 recoveries and 6 deaths. In 44 untreated cases there were 21 recoveries and 23 deaths. This gives a small balance of 9 per cent. in favour of the treatment.*

* Excluding 5 cases, viz. a fatal case in which blood from the mother vaccinated in infancy was given, a recovered case in which the serum was described as 'normal' and the three cases which occurred, in infants, in 1945.

Doubt was subsequently expressed as to whether the convalescent vaccinal serum is obtained sufficiently early from a recently vaccinated person, or is being administered in sufficiently large doses to give the patient an effective amount of neutralising anti-body. Further, the reconstitution of the dried serum has proved difficult. For these reasons treatment of the complication has reverted to the original plan of using fresh blood or serum from the recently vaccinated.

VACCINATION

Prophylactic inoculation against smallpox is the oldest form of biological therapy and is the only one which has been the subject of legislation in this country; calf lymph, moreover, was the only biological remedy in common use manufactured by the Government. Teaching of students in the medical curriculum was the subject of a special fee, and usually was provided through arrangements with public vaccinators. With the coming of immunisation against diphtheria and other forms of prophylaxis involving inoculation the time arrived when medical opinion considered that vaccination should be dealt with in the medical curriculum together with instruction in immunisation as a whole. Arrangements for this purpose have now been made in many medical schools and the special classes in vaccination have been discontinued. The Ministry of Health for similar reasons, concluded that calf lymph need no longer be manufactured by the Government, particularly as all vaccine lymph is subject to Regulations made under the Therapeutic Substances Act of 1925.

The Ministry of Health therefore decided in 1943 to proceed to close down the Government Lymph Establishment which had been in existence for forty years, and to hand over the manufacture of lymph to the Lister Institute of Preventive Medicine, the issue to public vaccinators being made by conveniently situated laboratories of the Emergency Public Health Laboratory Service and its associates. This transfer was not completed until after the end of the war, namely on June 30, 1946. Both Institute and Laboratories now act as the agents of the Minister of Health.

REFERENCE

A Historical Note on the Prevention of Smallpox in England and the Foundation of the Government Lymph Establishment, by J. R. HUTCHINSON, M.D., D.P.H. Report of the Ministry of Health for the year ended March 31, 1946. Cmd. 7119. H.M.S.O., London, 1947. Appendix A, 119.

DIPHTHERIA

The annual incidence of diphtheria and the number of deaths attributed to it from 1939 to 1945 are shown in the table on p. 49.

A considerable downward trend in deaths from diphtheria has been seen during the war years. In the years 1940 to 1944, in the seven age periods, viz. under 1 year; 1–2; 2–3; 3–4; 4–5; 5–10; 10–15, the death

rates per 100,000 population have declined respectively as follows: 10 down to 8; 30 to 16; 40 to 27; 60 to 38; 60 to 42; 40 to 26; and 10 to 6. It was still a matter of reproach that, as late as the quinquennium here recorded, diphtheria, a preventable disease, should still be the most frequent cause of death of children between 4 and 5 years of age, second only to violence between ages 4 and 5, and the third between ages 3 and 4. The death rates for 1945, however, were less than those for 1944 at each age-group, the fall being most marked in the fifth year of life. For all ages under 15, the rate per 100,000 in 1945 was 6·7, as against 9·2 in 1944 and 28 in 1941. Thus, as the next table shows, there has been a decline in both incidence and deaths from diphtheria. The explanation, it is suggested, is to be found in the artificial immunisation of children against the disease.

Year	Notified cases	Deaths
1939	47,343	2,133
1940	46,281	2,480
1941	50,797	2,641
1942	41,404	1,827
1943	34,662	1,371
1944	29,949*	934
1945	25,246*	722
Totals	275,682	12,108

* Original notifications.

IMMUNISATION AGAINST DIPHTHERIA

Successive Chief Medical Officers of the Ministry of Health have advocated artificial immunisation, which has achieved such excellent results in Canada and the United States of America, since 1922. In that year a memorandum (No. 68/Med.) on the supply and administration of diphtheria anti-toxin and on the use of the Schick Test and methods of active immunisation for the prevention of diphtheria was issued. This was followed in 1932 by a second memorandum (No. 170/Med.) entitled *Memorandum on the Production of Artificial Immunisation against Diphtheria*. In 1940 this latter memorandum was revised and re-issued and the special attention of medical officers of health was drawn to the need for pressing on with schemes of immunisation. A number of medical officers of health had planned schemes of immunisation in connexion with their maternity and child welfare centres. By 1937, for example, Chester had immunised 45 per cent. of its pre-school population. Birmingham, Walsall, Worcester, Leeds, Manchester and Chatham had immunised about 30 per cent. The County of London came last with 5·3 per cent. At no time previous to 1940 was immunisation extensively practised, and both incidence and mortality continued to be high. The Registrar-General's Reports show that between 1920 and 1940 the

incidence varied between 69,480 cases in 1920 to 46,281 in 1940, and the deaths in these years numbered 5,648 and 2,480 respectively. There is no record of the number of children under 15 years who were affected, but they supplied 93·3 per cent. of the deaths in 1940. At the end of 1940 the Ministry undertook the free provision of prophylactics; previously, the cost had been borne by local rates and this provision undoubtedly aided the campaign for immunisation, which under the stimulus of war was vigorously pressed. In the memorandum of 1940 and subsequent circulars, attention was drawn to the risk of diphtheria becoming epidemic through the evacuation of large numbers of children from towns where the disease was endemic to rural areas where it was comparatively rare. Overcrowding, through the destruction of houses, shelter life and the absence of light and ventilation on account of blackout regulations were potential aggravating circumstances. The Ministry issued some thirty circulars of advice and information specifying the type of antigen to be used and its dosage, the help which could be given by county councils, education authorities and voluntary bodies and the use of health visitors. Every local authority was urged to provide a scheme whereby every parent should be told the dangers of diphtheria and that his child could be immunised free of cost to him. The Ministry of Health and the Ministry of Information, jointly instituted national propaganda by posters, broadcasts, advertisements in newspapers and by the provision of health films. These intensive efforts advanced the practice of prophylaxis, for all local authorities have now the necessary arrangements. By the end of 1944, 2,069,377 children under five and 3,296,578 children between the ages of 5–15 years, a total of 5,365,944, had been artificially immunised under local authorities' schemes. These figures are exclusive of children under 5, who were immunised prior to 1940, and who are still under 15 years, and those immunised privately by their own doctors. It was roughly estimated that between 55 and 60 per cent. of the child population of England and Wales by December 31, 1944, had been immunised. Reference to the figures of incidence of and mortality from diphtheria already given, shows a recently marked lowered incidence and a decline in mortality. The decline in the number of deaths has been most pronounced at those ages at which immunisation has been done, but a comparison of the effects of diphtheria among the immunised and non-immunised gives better evidence, when the periods at risk are calculated in terms of child years. Taking the numbers of immunised children as returned by local authorities every six months and estimating the child population under 15 to be eight and a quarter millions, it has been shown that out of every five children suffering from diphtheria during the years 1942, 1943 and 1944, four were children who had not been immunised, and of every 30 deaths, 29 were of non-immunised children, although the total populations of immunised and non-

immunised children at risk were roughly equal. The evidence is clear that immunisation protects against infection and death from diphtheria. For further advances in the elimination of this disease the co-operation of the public is essential.

SCARLET FEVER

The incidence of scarlet fever declined in the period 1939–41; it then increased to epidemic proportion in 1943, with some regression in 1944. During the war the already low fatality rate fell still lower and throughout compares favourably with that of any pre-war period.

Year	Notified cases	Deaths	Fatality rate
			per cent.
1938	99,278	311	0·31
1939	78,101	181	0·23
1940	65,302	154	0·24
1941	59,433	133	0·22
1942	85,084	104	0·12
1943	116,034	134	0·12
1944	94,859*	107	0·11
1945	75,233*	84	0·11

* Original notifications. (Corrected notifications for 1944 and 1945 numbered 92,671 and 73,687 respectively. Fatality rates based on these were 0·12 and 0·11.)

As the Chief Medical Officer of the Ministry of Health observed in his report for the years 1939–45 (p. 30), it is probable that the notification of scarlet fever at present is incomplete. F. Griffith investigated numerous strains of the *streptococcus haemolyticus* and found that the strain which could produce scarlet fever with the characteristic rash in one person could in another produce the signs and symptoms of the disease without rash; thus a case which is notifiable can give rise to one which is not, and the converse can occur. Moreover, there is a considerable morbidity due to 'sore throat', not infrequently fatal, caused by different infective strains of the streptococcus and deemed to be infectious. The suggestion is put forward that for the adequate control of infection, notification should be extended beyond scarlet fever with rash to the infections bacteriologically related to it.

REFERENCE

GRIFFITH, F. (1934). *J. Hyg. Camb.*, **34**, 542.

MEASLES

As a measure of war precaution, and with special consideration for the control of epidemics in evacuated children, the notification of measles (excluding rubella) became compulsory in England and Wales in February 1940.

Measles was severely epidemic in 1940 and 1941; a remission in 1942 was followed by a recrudescence; in 1945 the recorded number of cases was 446,796 or 40,000 more than the number recorded in any previous year since 1940. Though the notifications in 1940 and 1941 were nearly the same, the number of deaths in 1941 was greater and the fatality rate rose from 0·21 to 0·28 per cent. The deaths, however, in these years of epidemic were only 75 per cent. of the average number in the quinquennium 1935–9, and a rate of 0·28 is still unusually low. The number of deaths in 1945 was only 729, giving the extraordinarily low rate of 0·16 per cent.

The mortality from measles has considerably declined within the past thirty years. The credit for this primarily belongs to the late Sir Arthur Newsholme, who, when Medical Officer of the Local Government Board, instituted an intensive campaign against the mortality from measles in 1915; the mortality was then as high as 11·6 per cent. For the purposes of ascertainment compulsory notification of the first case of measles in a household was instituted. Compulsory notification was abolished in 1920, except that certain local authorities might make measles notifiable in their district with the sanction of the Ministry of Health provided they had organised arrangements for the prevention and treatment of measles. Local authorities were informed in 1915 of the serious nature of the complications of measles, in particular broncho-pneumonia; of the need for protecting children under 5 years of age, the age period of highest mortality from infection by measles; while they were encouraged to institute health-visiting of cases, and to provide nursing and medical care and hospital treatment for severe cases. These methods, pursued for many years, have undoubtedly caused a decline in mortality although the incidence of the disease remains high. Other contributing factors have been treatment by convalescent measles serum, oxygen therapy, and improved standards of hygiene and nutrition. It is doubtful whether any lowering of virulence of the causative organisms has occurred.

REFERENCE

BUTLER, W. (1947). *Proc. roy. Soc. Med.*, **40**, 384.

WHOOPING COUGH

As a war measure, whooping cough, like measles, was made generally notifiable in 1940. The recorded figures indicate that the incidence is on the average much less than that of measles and little more than that of scarlet fever. Whooping cough is the most fatal of the three infections. The death rates from whooping-cough per million for the war years are as follows:

1939	1940	1941	1942	1943	1944	1945
140	78	279	94	129	121	79

During the war measures for protection against, and the treatment of whooping cough, were still not on an assured scientific basis. As with measles, early clinical diagnosis was difficult and laboratory diagnosis had its limitations. Serum therapy had been tried with inconclusive results. Vaccine prophylaxis, in effect, seemed of little avail, though some held that vaccine treatment modified the severity of the disease and its respiratory complications. Nevertheless, the Ministry of Health in 1942 decided to sanction the provision of free immunisation against whooping cough by local authorities on request. The choice and expense of the prophylactic were considered matters for the local authority.

INFLUENZA

Number of Deaths from Influenza in England and Wales in each year during the War Years (including non-civilians)

Year	No. of deaths	Year	No. of deaths
1939 .	8,020	1943 .	12,616
1940 .	11,482	1944 .	3,900
1941 .	6,901	1945 .	2,686
1942 .	3,399		

Having in mind the terrible ravages wrought by the influenza pandemic of 1918–19 at the close of the First World War, epidemiologists throughout the war years were apprehensive of the return of epidemic influenza in this country, a risk which was likely to be accentuated by war conditions, transfers of population, opportunities for increased infection through the blackout, overcrowding in shelters and the evacuation of children. Fortunately, this grave apprehension was not realised. There was moderate epidemicity in 1940 and again in 1943, and in 1945 the number of deaths was the lowest recorded for thirty years. The epidemic of 1943 was an appreciable one. Following scattered outbreaks in the summer of that year the number of deaths from influenza in the third week of November in the 126 great towns rose from 46 in the previous week to 106. They increased to a peak of 1,148 in the week ended December 11. Thereafter, they continuously declined, and the state of influenza had returned to normal by the week ended February 5, 1944. There was no recrudescence in that year. Early in the epidemic, Dr. C. H. Andrewes of the National Institute for Medical Research reported that he had found the influenza virus A active in various parts of the country. In his experience it was the first time that this virus had been found active after April and before December.

The features presented by this epidemic were summarised as follows by the Chief Medical Officer of the Ministry of Health:

(1) The year 1943 compared with the years 1929 and 1933 was a year of moderate epidemicity.

(2) The distribution of deaths by age-groups was of the normal type.

(3) For the first time since 1927, when virus A was identified, this virus was found active after April and before December.

(4) For the first time since 1918 the proportion of deaths from influenza was not the highest in the first of the four quarters of the year.

(5) In 1943, as in 1918, influenza became epidemic in the last quarter of the year, but with this difference that the disease had been epidemic in the summer of 1918.

(6) We have to go back nearly a hundred years, that is, to 1847 for an analogy with the epidemic of 1943.

Since virus A was first studied in 1933, it has been recognised as the causal agent in practically all the serious outbreaks of influenza wherever they have occurred. Virus B is of less significance. American evidence brought forward at a conference of the Medical Research Council held in June 1944, at which representatives of the Service Departments, the Indian and Colonial Services and the Ministry of Health were present, suggested that the subcutaneous inoculation of a concentrated inactive vaccine influences the incidence of influenza. It was shown that an uninoculated person was more than three times as liable to infection than an inoculated one. A stock of vaccine was accumulated by the Services for their joint use; and from South African, Canadian, Australian and other sources, a quantity was available to the Medical Research Council for clinical trial on a large scale should a suitable opportunity occur.

During the epidemic special arrangements were put in force at the Ministry of Health for obtaining early statistical information about influenza from the Registrar-General, careful watch was kept by medical officers of the Ministry in the regional areas on the epidemic, and circulars were issued by the Chief Medical Officer to local authorities emphasising the recommendations set out in the Ministry's *Memorandum on Influenza*, 2/Med., 1939.

EPIDEMIC DISEASES OF THE CENTRAL NERVOUS SYSTEM

The chief epidemic diseases of the central nervous system are cerebro-spinal fever, acute poliomyelitis and encephalitis lethargica. Of these, cerebro-spinal fever, as in the War of 1914–18, gave rise to the one serious epidemic of the war years, the incidence far exceeding that of the previous war. Fortunately, however, new methods of successful treatment were available, which were the means of saving some fifteen thousand lives. There were extensive epidemics of poliomyelitis abroad in Malta and Southern Italy, but the disease in this country had declined steadily from 1939 to 1945 when the notification rose again. Encephalitis lethargica is a declining disease in England and Wales.

CEREBRO-SPINAL FEVER

Notifications with Deaths (in brackets)

1936	1937	1938	1939	1940	1941	1942	1943	1944	1945
994 (638)	1,140 (701)	1,288 (655)	1,500 (517)	12,771 (2,584)	11,077 (2,163)	6,029 (1,206)	3,303 (780)	2,309* (592)	2,063* (555)

Notifications of, and Deaths in each year 1929 to 1945 distinguishing between Civilian and non-Civilian, after 1938

Year	Number of notifications		Number of deaths (1940 classification)		Deaths per 100 notifications	
1929	667		590		88·5	
1930	674		635		94·2	
1931	2,216		1,446		65·2	
1932	2,136		1,218		57·0	
1933	1,695		946		55·8	
1934	1,094		732		66·9	
1935	883		619		70·1	
1936	994		638		64·2	
1937	1,140		701		61·5	
1938	1,288		655		50·9	
	Civilians	Non-civilians	Civilians	Non-civilians	Civilians	Non-civilians
1939	1,414	86	503	14	35·6	16·3
1940	11,185	1,586	2,459	125	22·0	7·9
1941	9,893	1,184	2,065	98	20·9	8·3
1942	5,286	743	1,143	63	21·6	8·5
1943	2,976	327	746	34	25·1	10·4
1944	2,684†	298†	570	22	21·2	7·4
1945	2,491†	248†	527	28	21·2	11·3

* Corrected total after diagnosis revisions, including all cases notified in port health districts.

† Original notifications. For comparability the partially corrected notifications of previous years should be increased by about 4½ per cent., and fatality rates diminished to the same extent.

In 1938, Sir Arthur MacNalty drew attention to the fact that, as the annual numbers of notifications had not fallen since the epidemic prevalence of cerebro-spinal fever in 1931–3 to so low a point as after the 1915–17 epidemic, and, as the number of group I infections appeared to be increasing, the probability that another period of epidemic prevalence was approaching could not be disregarded. Experience verified this forecast. In 1939 the notifications were higher, and in January 1940 the disease began to increase rapidly. In the second week of January, the number of notifications rose from 53 to 107 and mounted steadily to 617 in the week ended March 2: from then they declined irregularly to 106 in the first week of September. Thenceforward there

was a rise, which continued with slight remissions to the end of the year and into 1941. The total of notifications in 1940 was nearly fourfold that of our previous worst experience, namely, in 1915 during the last war. In character, the disease was of the usual severity, and in distribution it prevailed throughout the country; no county in England or Wales escaped and the proportion of non-civilian cases was not so high as in 1915. London, which in 1915 suffered severely in comparison with the rest of the country, in 1940 returned only 880 notifications out of the year's total of 12,771. No doubt this was due to the absence, through evacuation, of a large proportion of young persons—those in the most susceptible age groups.

New Treatment. This wide epidemic prevalence of so serious a disease would have excited much alarm in the country had it not been for the beneficial results obtained by treatment with the sulphonamide derivatives. Through their administration the lowest fatality rate on record of cerebro-spinal fever was achieved. The historic story of this chemotherapy, including the use of penicillin, is dealt with elsewhere in this History. (Medicine and Pathology Volume, Chapter 33 and Medical Research Volume, Chapter 7.) The Ministry of Health kept a watchful eye on the epidemic throughout its duration. In March 1940 they issued a memorandum (234/Med.) which gave an account of the modern treatment by appropriate dosage of sulphanilamide or sulphapyridine, emphasised the importance of early administration, and observed that it was then uncertain whether the combined use of either drug with a polyvalent anti-meningococcal serum was preferable to the use of the drug alone. During the high prevalence of the disease in 1940, the Ministry sent in April of that year a letter to the medical officers of health of certain large boroughs requesting particulars of cases treated in hospital by the new therapy since the beginning of the year. From the information supplied, it was estimated that with the exclusion of cases that died within twenty-four hours of admission to hospital, the fatality rate in treatment by chemotherapy combined with serum was 13·8 per cent. and in treatment by chemotherapy alone 9·2 per cent.

Cerebro-spinal Fever as a War Epidemic. It is well established that war favours epidemics of cerebro-spinal fever. Overcrowding and lack of adequate ventilation in camps and billets assist droplet infection, and movements of troops lead to the introduction of fresh and virulent strains of the meningococcus. Epidemics prevailed during the Napoleonic Wars, during the American Civil War, and in the War of 1914–18. From the end of 1914 to 1918 cerebro-spinal meningitis was epidemic on an unprecedented scale in this country. The epidemic synchronised in onset with the importation of cases of cerebro-spinal fever by the Canadian troops, the first cases occurring on Salisbury Plain, where these troops were encamped. According to the report of the Medical Research Council's Special Advisory Committee, the Canadians did

not import a new disease, but they did introduce a virulent strain of the meningococcus, and were in some degree responsible for its spread. Infection was widespread, but the greater number of cases of the disease were notified in the eastern and south-eastern parts of England, where the majority of the troops were stationed. The general distribution of troops, therefore, appeared to influence the prevalence of cerebro-spinal fever. In the War of 1939–45 the first contingent of Canadian troops landed in England on December 17, 1939, and thereafter fresh contingents followed. There was thus again opportunity for fresh strains of the meningococcus to be introduced from Canada. The epidemiological evidence, already cited, shows that apart from this an epidemic of cerebro-spinal fever was already smouldering in this country. Hence, any introduction of virulent strains of the organism by troops from Canada or elsewhere oversea could only have added fuel to the flames. So widespread an epidemic would have seriously impaired the war effort by its high mortality among troops and the civilian workers had it not been for the sulphonamides, which reduced previous fatality rates ranging from 42 to 72 per cent. in 1914–18 to 10 or even in some instances 4 per cent. (See also Medicine and Pathology Volume, Chapter 6.)

POLIOMYELITIS

Oversea, poliomyelitis has been a serious disease of wars, as the accounts of outbreaks in North Africa, Southern Italy and Malta indicate. In the two first theatres of war many cases occurred among the British troops. In England and Wales there have been few epidemic outbreaks during the war years as the subjoined table shows. It must be remembered, however, that many cases of the disease are undiagnosed and unnotified during the acute stage, their existence only being revealed by subsequent paralysis, that numerous mild and abortive cases are never notified at all, and that a substantial proportion of acute cases recover without subsequent paralysis. Nevertheless, when allowance was made for these circumstances, the figures in the table supported the view that poliomyelitis had declined in this country since 1938, in which peak year the number of cases was more than treble the numbers notified in the years 1943 and 1944 respectively, and nearly double the figure for 1945. Over 75 per cent. of the cases in 1945 occurred in the second half of the year, the maximum incidence being observed in the weeks ended September 22 and October 13, in each of which 45 cases were notified. The incidence was widespread: notifications were received from more than half the county boroughs, from practically every metropolitan borough, and from 146 urban and 100 rural districts. In certain districts there was a continued low incidence over a period of several months, notably in Cambridge, Manchester, and some districts of Cornwall, Essex and Staffordshire.

Notifications with Deaths (in brackets)

Year	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945
Poliomyelitis	633 (98)	530 (68)	768 (97)	1,489 (174)	744 (95)	951 (107)	876 (113)	581 (82)	410 (63)	464* (87)	784* (97)
Polioencephalitis	67 (48)	53 (35)	96 (56)	96 (82)	88 (48)	128 (54)	83 (47)	93 (50)	46 (27)	68* (22)	74* (42)

* Corrected totals after diagnosis revisions.

Advance in knowledge of the Disease. Based upon the careful work of Wickman,[1] and confirmed by the epidemiological inquiries made by the central health department,[2] the droplet theory of infection had been regarded as the main explanation for the spread of poliomyelitis, although an intestinal route was not excluded. It had been known for many years that the virus of the disease might be present in the stools of patients, while the abortive forms and the initial stages of the malady are frequently characterised by gastro-intestinal symptoms. In addition, widespread visceral lesions may be found, such as hyperplasia of the tonsils, the spleen and lymphatic glands together with cloudy swelling of the kidney and liver.

Toomey in America, from experiments on monkeys, advanced the view that infection in poliomyelitis enters by the intestinal tract. The recent studies of Paul and Trask and their colleagues have shown that with an adequate technique the virus of poliomyelitis can be demonstrated in the stools of human cases with remarkable regularity (Trask, Vignec and Paul, 1938;[3] Trask, Paul and Vignec, 1940;[4] Melnick, 1943;[5]). Paul, Trask and Gard[6] in 1940 isolated the virus from the sewage of urban communities in which poliomyelitis was epidemic. In this investigation 5 out of 19 specimens collected from sewers in the vicinity of isolation hospitals in which cases of poliomyelitis were being nursed yielded positive results. Sewage samples collected at a distance from the hospitals were negative, as were samples collected after the cessation of the epidemic. Positive results were obtained if the specimen of sewage was examined within twenty-four hours of its collection; negative results were the rule with sewage which had stood for thirty or more days. This suggests that the virus dies out in sewage fairly rapidly. American work (Paul, Trask, Bishop, Melnick and Casey, 1941[7]; Sabin and Ward, 1941[8]), has also shown that the virus can be recovered from blowflies and green bottle-flies (but not from biting flies) which had access to the faeces of acute and convalescent cases of poliomyelitis.

The acceptance of the view that the common route of infection in man is the alimentary tract does not controvert the well-established evidence that infection also occurs by droplet infection. As Bedson[9] observes, it seems permissible to conclude that in poliomyelitis the virus

may invade the central nervous system from a variety of peripheral starting-points, the naso-pharynx, the throat (tonsil) or the intestinal tract, the last two being the most important.

This discovery of the importance of the alimentary tract as a portal of entry in poliomyelitis explains certain features which have been noted in epidemiology of the disease. For instance, certain investigators in the New York epidemic of 1916 found some grounds for the belief that poliomyelitis followed the course of a river. This can now be correlated with the presence of the virus in sewage. Again, Aycock[10] and others have described milk-borne epidemics of poliomyelitis. Hence, the virus, in addition to being disseminated by droplet infection, can reach man indirectly through the agency of contaminated food, milk and possibly water. Further, the alimentary route of infection accords with the clinical symptoms of poliomyelitis, which suggest a general febrile disease with localisation in the central nervous system. The visceral lesions previously mentioned are in accord with this view. Occasionally, as the experiments of Hurst and Fairbrother on monkeys demonstrate, the virus enters the body by the naso-pharynx, invades the free ends of the olfactory nerve-filaments, and travels by the axis cylinders directly into the olfactory bulb, and thence into the brain. The subsequent passage of the virus to the central nerve cells may be entirely axonal. This portal of entry is probably the explanation of most cases of the polio-encephalitic form of the disease. The frequency with which the lumbar enlargement of the spinal cord is involved in the spinal form of poliomyelitis points to the importance of invasion from the intestinal tract. In all probability, therefore, virus entering by the alimentary tract can pass to the central nervous system by a variety of routes at different levels, a view which helps to explain the distribution of the lesions in human cases.

These advances in knowledge have obviously an important bearing on measures that can be taken for the control of poliomyelitis, especially in epidemics.

REFERENCES

[1] WICKMAN, I. (1911). *Die Akute Poliomyelitis*, bzw., *Heine-Medinische Krankheit*, Leipzig and Vienna.
[2] MACNALTY, A. S. (1927). *Epidemic Diseases of the Central Nervous System*, London.
[3] TRASK, J. D., VIGNEC, A. J., and PAUL, J. R. (1938). *J. Amer. Med. Assoc.*, **111**, 6.
[4] —— PAUL, J. R., and VIGNEC, A. J. (1940). *J. Exp. Med.*, **71**, 751.
[5] MELNICK, J. L. (1943). *J. Exp. Med.*, **77**, 195.
[6] PAUL, J. R., TRASK, J. D., and GARD, S. (1940). *J. Exp. Med.*, **71**, 765.
[7] —— BISHOP, M. B., MELNICK, J. L., and CASEY, A. E. (1941). *Science*, **94**, 395.
[8] SABIN, A. B., and WARD, R. (1941). *Science*, **94**, 590.
[9] BEDSON, S. P. (1943). *Proc. roy. Soc. Med.*, **37**, 41.
[10] KNAPP, A. C., GODFREY, E. S. Jr., and AYCOCK, W. L. (1926). *J. Amer. med. Ass.*, **87**, 635.

TYPHUS FEVER

From immemorial times typhus fever has been favoured by war conditions. Famine, overcrowding, defective hygiene, exhaustion and

mental depression pave the way for infection and the disease is particularly associated with movements of populations. For these reasons the Medical Department of the Ministry of Health in 1942 took special precautions against the risk of introduction of the disease into the country. Port and riparian health authorities were informed that the medical examination of refugees and aliens on arrival at ports or other coastal points (a measure which had already been adopted[1]) was regarded as insufficient to cover the risk of importation of typhus by the arrival of vessels from European and Mediterranean ports. The Ministry, therefore, advised that when such vesssls arrived at their first port of call in England and Wales, in the event of any passengers or members of the crew being disembarked, all persons on board should be medically inspected, unless such a medical inspection had already been made at a port of call in Scotland or Northern Ireland and nothing had occurred on the ship to suggest a need for further inspection.[2] Similar precautions were taken against the introduction of typhus from Eire, where 13 cases, with one death, had been reported in Co. Galway. The presence of Irish labourers in Britain gave rise to fears of an outbreak, particularly in Wiltshire. The County Medical Officer of Health there (Dr. C. E. Tangye) reported that a military disinfestation unit was secured and did excellent work, though 'some two thousand Irishmen exercised their right as free men and remained unexamined.'[3]

Other measures consisted of:

(*a*) the establishment of a panel of experienced consultants, 40 in number, throughout the country;

(*b*) the designation of specified isolation hospitals as centres for the reception, disinfestation and treatment of patients occurring in the districts which the hospitals would serve;

(*c*) local arrangements for the disinfestation of the homes and of the contacts of patients at specified centres;

(*d*) formation by local authorities of sanitary teams to deal with the transport of patients and contacts, and also to carry out the duties that (*c*) would entail;

(*e*) immunisation against typhus fever of these sanitary teams and all those members of hospital staffs allotted to the reception and disinfestation of typhus patients. At the same time a memorandum on louse-borne typhus fever (252/Med.) was issued giving an account of the clinical features of the disease, and suggestions as to the materials and design of protective clothing to be worn by all persons during their performance of transport, disinfestation and disinfection;

(*f*) two types of yolk-sac vaccine were provided—one prepared by the U.S. Public Health Service after the original Cox method, and the other by the Connaught Laboratories, Toronto, in which a different processing method was used. Tests of the sera from inoculated subjects for OX19 agglutinin response (Weil-Felix test) showed that both vaccines produced a significant rise in agglutinin titre. The agglutinin response is, however,

in itself, not necessarily a measure of the immunising value of the vaccine, nor can the titre attained be regarded as an index of the degree of resulting immunity. Nevertheless, the Army medical authorities, who have had many opportunities of estimating the efficacy of egg yolk vaccine in protecting against louse-borne typhus fever, are satisfied that it is substantial.

Arrangements were also made whereby authorised civil personnel proceeding abroad and requiring this protection could be inoculated by the Army medical authorities at any military hospital, and later a complementary service which catered also for unofficial travellers was provided at every emergency public health laboratory.

Up to the end of 1944 only two cases of suspected typhus fever were reported. In one, a Canadian soldier recently arrived, the consultant was satisfied that the disease was of the tick-borne type which is of no public danger in this country; the patient recovered. The other patient, a young soldier who had never been out of the country, became ill a few days after being inoculated against the disease, and some interesting possibilities arose as to the relationship of the inoculation to the atypical illness. In the end it was held that the serological tests were not confirmative of typhus fever, and the patient recovered quickly after a short and rather severe illness.

It was expected that the grave risk of the introduction of the disease into this country would come at the close of hostilities in Europe and the repatriation of prisoners-of-war, as no matter what steps might be taken by the Fighting Services, it seemed inevitable that some Service personnel would be incubating the disease on arrival here. In all, 21 cases were detected; all were infected abroad; 14 had been prisoners-of-war, and seven were medical students who returned from voluntary duty in the infamous Belsen concentration camp. All the patients recovered, and there were no secondary cases.

In no case was there evidence of lousiness at the time of importation—a remarkable tribute to the efficiency of the precautions taken by the Fighting Services. The danger was considerable, because the disease appeared in a hundred different foci in the British Zone of Germany alone between the end of hostilities and the beginning of 1946, but on each occasion the delousing of contacts with D.D.T. quickly stopped it.[4]

Advances in knowledge. During the war, medical research greatly advanced the knowledge of typhus, its prevention and treatment. Much remains to be done in specific treatment of the declared disease, but means for its prevention and treatment are already available through recent discoveries. The principal measure for checking an epidemic is effective delousing of the population at risk; this puts a stop to the activities of the vector of the disease. 'No lice, no typhus', remains the guiding rule. The new synthetic compound, 'D.D.T.'(dichlor-diphenyl-

trichlorethane) has a toxic effect on lice and other pest insects. (See Medical Research Volume, Chapter 4.) It is harmless to the human skin and its smell is unobjectionable. Its use requires effective organisation by team workers. The Ministry of Health Bulletin, June and December 1945, explained that a supply of D.D.T. (as a 5 to 10 per cent. powder) was then available for civilian use, together with suitable blowers, at certain ports for the delousing of verminous persons arriving in this country, and that the method of use had been explained to all medical officers of health. By December, D.D.T. was generally available for civilians.

Delousing and vaccine therapy should now speedily control an outbreak of typhus fever. With these advances in knowledge we can look forward to the time when the disease will be regarded as a comparative rarity, not only in Great Britain but throughout the world.

REFERENCES

[1] Min. of Health Circular W.R.L. 43, October 21, 1941.
[2] Min. of Health Circular 2642, May 6, 1942.
[3] Personal communication to Editor-in-Chief.
[4] BRADLEY, W. H. (1946). *Practitioner*, 157, 161.

MALARIA

The presence of endemic foci of malaria in England is not generally recognised by the medical profession and the public. They do, however, exist, and investigation by medical officers of the Ministry of Health in the period between the two World Wars indicates that the distribution of indigenous malaria in England is about the same as that recorded in the eighteenth century. Sinton and Shute(1) advance sufficient reasons for believing that the density of *Anopheles maculipennis* offers the most likely explanation of this topographical distribution.

In the War of 1914–18 the total number of locally contracted cases notified or discovered by special inquiry after September 1917 amounted to 330, of which 38 were in the Navy, 224 in the Army and 68 in the civil population. It appears that 231 of these cases were contracted in 1917 and 99 in 1918. One interesting observation was the detection in 1918 of some patients in whom an infection contracted in the previous autumn had remained 'latent' during the winter. This was previously noted in England during the early years of last century.(2) The sources of infection were multiple. In the Army the origin of practically all the locally contracted cases were attributable to the presence in their immediate neighbourhood of relapsing cases of malaria among soldiers returned from eastern war areas, especially Salonika. The same source was usually responsible for cases among naval ratings and civilians.

At certain English ports during 1917 and 1918, a potential source of infection of considerable importance was provided by the crews and passengers of transports and merchant ships which had called at Dakar, Sierra Leone and other ports on the west coast of Africa, where malaria

was exceedingly prevalent and severe. In 1917 more than 500 cases of malignant tertian malaria were introduced into England on ships from the West Coast and the Cameroons. Fortunately, the anopheles of Great Britain do not act as efficient carriers of tropical malignant malaria.[3] In addition, it was found in some cases that malaria seemed to be attributable to infection, not from military foci, but from civilian patients in their immediate neighbourhood and, in a few instances, to civilian cases which had occurred before troops began to return from Salonika. Such an indigenous origin was ascribed to a considerable local spread of malaria in Kent. The clinical symptoms of these Kentish cases were less severe than those of cases which were traced to an origin from military foci.

The successful policy pursued towards the end of the War of 1914–18 was based primarily on the early detection of all cases and carriers, followed by thorough treatment, protection from mosquitoes and special supervision control, and in a few areas by local anti-mosquito measures, directed against breeding places. After the armistice of 1918 with demobilisation, the possibility of local spread of malaria had to be watched. Accordingly, the Local Government Board in a General Order (Public Health, Pneumonia, Malaria, Dysentery, etc. Regulations, 1919) (afterwards amended by the Public Health (Infectious Diseases) Regulations, 1927) included clauses which imposed on local authorities and their officers throughout the country certain new powers and duties in regard to the prevention of malaria. Cases of malaria, including those of demobilised ex-Service men, and others who had contracted infection abroad were made notifiable in England and Wales. The medical officer of health in any district was empowered to investigate the risks of local spread of malaria and to take any necessary action to prevent it. For example, when a man suffering from malaria occupied a house which was infested by anopheles, mosquito netting could be provided at the cost of the local authority, suitable quinine treatment given, and proper advice afforded as to the precautions needed against the spread of infection. The medical officer of health, after confirming the diagnosis and the local origin of the case, sent the name and address with all available particulars to the Ministry of Health. All practical assistance was given by expert officers of the department to medical officers of health and medical practitioners in whose areas indigenous malaria was suspected. Blood films and other specialised examinations were arranged.

The malarial work of the Ministry of Health was afterwards augmented by the provision of a malarial laboratory in 1925, on the suggestion of Lieut.-Colonel S. P. James, C.M.G., M.D., F.R.S., I.M.S. (ret.). The primary object of this unit was to provide treatment for general paralysis of the insane by induced malaria as initiated by Wagner-Jauregg of Vienna. The Board of Control, the London County Council and the authorities of Horton Hospital, Epsom, were closely associated

with the Ministry in this work. The laboratory portion of the unit was at first under the control of Colonel James and, afterwards, under that of Lieut.-Colonel (afterwards Brigadier) J. A. Sinton, V.C., M.D., F.R.S., I.M.S. (ret.), assisted by Mr. P. G. Shute and laboratory assistants, while Dr. W. D. Nicol, medical superintendent of Horton Hospital was in charge of the clinical side of the work. The unit further acted as a centre for the study and identification of mosquito nuisances in Great Britain, and for research.[4] Mr. Shute paid visits to many districts to advise on the control of anophelines and his services as a consulting entomologist were lent by the Ministry of Health to several European Governments.

ADMINISTRATIVE MEASURES TAKEN BY THE MINISTRY OF HEALTH

From this account of the administrative and scientific machinery instituted by the Ministry of Health during and since the War of 1914–18 it will be readily understood that an organisation was available for effectually safeguarding the population of Great Britain against the risks of indigenous malaria during and after the War of 1939–45. No amendments were considered necessary in the Regulations for dealing with malaria, but the Medical Department of the Ministry of Health gave much attention to malaria from the onset of the war and collaborated with other departments in dealing with those aspects of the problem with which they were particularly concerned.

In July 1940, a memorandum was issued on measures for the control of mosquito nuisances in Great Britain (Memo. 238/Med.) and the precautions which could be taken against spread of the disease in this country were carefully considered with the Service Departments. The memorandum was revised and re-issued in 1943 with maps showing the distribution of indigenous malaria in England during the 18th century and after the War of 1914–18. A map was prepared showing the areas in England where from past experience malaria would be most likely to spread, and it was agreed that, as far as possible, neither camps nor demobilisation centres for troops returning from malarious regions should be set up in areas which are potentially very dangerous. The Chief Medical Officer also wrote to medical officers of health of the districts in the dangerous areas enclosing a memorandum containing suggestions for the prevention, diagnosis and treatment of malaria.

Special attention was also given to the location and supervision of camps for Italian prisoners-of-war, many of whom were infected with malaria. The War Office also arranged that all men returning from the West Coast of Africa should be given a supply of anti-malarial drugs with a pamphlet containing notes on the treatment of malaria, and advised them if they fell ill to report at once to the nearest military, E.M.S., or local hospital, and to show the pamphlet to the doctor.

The Ministry also arranged for the services of consultants and for the allocation of beds with expert staff at suitable hospitals in the vicinity of the larger ports for the treatment of cases of malaria. Letters were also sent to the medical officers of health of the ports likely to be concerned, enlisting their co-operation both in regard to Service personnel and members of the Mercantile Marine.

Later, articles were published in the Ministry's Monthly Bulletin (December 1943; January 1944 and February 1946), which is sent to medical officers of health, and the Chief Medical Officer sent a circular letter to all medical practitioners practising in England and Wales, and enclosed an article on the diagnosis of malarial infections which had been prepared by Brigadier J. A. Sinton, the consultant in malaria to the Army and, until recalled to service early in the war, the Ministry's adviser on malaria. Various communications were also issued by the Emergency Medical Services, and in 1944 the Director-General issued a memorandum (E.M.S.I./466) on the diagnosis and treatment of malaria for the attention of all medical officers attached to hospitals. In addition, the Board of Control, at the request of the Ministry, issued a circular (No. 948, April 1944) to medical superintendents of mental hospitals, etc., repeating their previous instructions that between April 1 and September 30, patients receiving malaria therapy should be protected from mosquitoes during the period that they might be infective.

MALARIA ON SHIPS

Towards the end of 1939 the Ministry of Health's attention was drawn to an increasing number of cases of malaria on incoming vessels. Owing to the war, vessels had to change their routes and many ships homeward bound called at Freetown and other West African ports, where malaria was prevalent. The Ministry of Shipping, on the advice of the Ministry of Health, issued a revised edition of a leaflet on the precautions to be taken against malaria, which had been prepared for the Mercantile Marine. The Colonial Office were similarly approached with a view that everything possible should be done at the West African ports to prevent malaria spreading to the crews of ships, and the help of the authorities in Gambia, Sierra Leone, Nigeria and the Gold Coast was enlisted to the same end. (See Volume II, Part I, Chapter 1.)

At that time vessels were also calling at Dakar, and through the good offices of Dr. M. T. Morgan, M.C., the President of the *Office International d'Hygiène Publique*, representations were also made to the French authorities. There were many difficulties and later the Colonial Office sent a special Commission to Freetown to deal with the situation. After their return the Ministry of War Transport sent three officers to the West Coast of Africa whose duties were to visit vessels and ensure as far as possible that the precautions against contracting the disease were observed.

Port medical officers of health in this country were warned to keep malaria constantly in mind when examining sick persons on ships arriving from foreign ports, and specially those which had called at West African ports, and the Chief Medical Officer of the Ministry of Health (September 13, 1940) asked them to forward to the Ministry particulars of all vessels on which malaria had occurred during the voyage. Copies of these returns were sent to the Ministry of War Transport and to the Colonial Office in order that the authorities on the West Coast might be kept informed of the number of cases and the names of vessels on which they were found.

A summary of the returns received to the end of 1945 is given in the following table:

Cases of Malaria on Ships

Year	*Number of ships*	*Cases reported*	*Deaths reported*
1940 (last six months) .	132	354	11
1941 . . .	243	756	14
1942 . . .	152	859	12
1943 . . .	143	845	8
1944 . . .	156	780	9
1945 . . .	29	145	—
Totals . . .	855	3,739	54

The big decrease in the figures for the year 1945, compared with those for previous years, is largely due to the fact that fewer vessels called at West African ports after V.E. Day (May 8, 1945) when the convoy system was no longer necessary.

A memorandum on the prevention, diagnosis and treatment of malaria on ships, was prepared for ships' surgeons, and issued by the Ministry of Shipping. A revised edition was issued in August 1943.

With the entry of Japan into the war it became necessary to conserve the existing stocks of quinine but supplies were earmarked for the Mercantile Marine. As the war progressed, however, more became known of the value of mepacrine for preventing and treating malaria, and after consultations, the Ministry of War Transport (successors to the Ministry of Shipping) amended the Merchant Shipping Medical Scales and provided for the carriage of mepacrine hydrochloride for the prophylactic (suppressive) treatment of members of a crew.

INDIGENOUS CASES OF MALARIA DURING THE WAR

Under arrangements made early in the war with the Registrar-General, notifications of malaria are extracted and sent each week to the Ministry of Health, in order that any case which is suspected of being contracted in this country, may be investigated.

The numbers of known indigenous cases in England and Wales since 1919 are given below, the cases in 1920 and 1921 being an aftermath of the previous war.

Year	No. of cases	Year	No. of cases	Year	No. of cases
1920	35	1929	1	1938	2
1921	11	1930	1	1939	1
1922	6	1931	1	1940	2
1923	3	1932	3	1941	1
1924	3	1933	1	1942	1
1925	6	1934	3	1943	3
1926	—	1935	5	1944	9
1927	2	1936	1	1945	7
1928	4	1937	—		

In addition to the nine cases recorded in 1944, there were two cases in which there was doubt as to whether the disease had been contracted in this country or abroad. The figures appear to indicate that there is now a greater risk of indigenous cases occurring, but it is satisfactory to note that during 1945, only seven cases of indigenous malaria were brought to notice. It must be remembered, however, that benign tertian malaria, the type most likely to give rise to indigenous malaria in this country, may have a prolonged incubation period and that cases infected in the late autumn may not declare themselves until the following spring or early summer.

WORK OF THE MINISTRY OF HEALTH'S MALARIA LABORATORY

In spite of the incidental difficulties, the Ministry's Malaria Laboratory at Horton continued to supply infective material for use in malaria therapy, the species of parasite and the methods of transmission of infection being shown in the following table:

Species of parasite	Transmission by											
	Blood inoculation						Mosquito inoculation					
	1939	1940	1941	1942	1943	1944	1939	1940	1941	1942	1943	1944
P. falciparum	10	12	16	6	24	34	15	65	9	25	14	35
P. vivax	264	172	189	264	245	247	248	278	188	167	167	135
P. malariae	21	22	51	13	39	42	0	0	0	0	0	0
P. ovale	43	27	29	27	10	24	6	12	0	1	0	2
P. tenue	0	1	0	0	0	0	0	0	0	0	0	0
Totals	338	234	285	310	318	347	269	355	197	193	181	172

Infective material was supplied for general paresis and other forms of post-syphilitic disease. A few cases of mycosis fungoides and disseminated sclerosis were also treated.

Mosquito Control Surveys. The staff of the Ministry of Health worked with the local authority, as far as possible, in inquiries into mosquito nuisances, including identification of the species of mosquito involved and the location of the breeding grounds, and advised on measures of control.

In some districts anti-tank ditches and bomb craters created a problem. If bomb craters holding water are left unfilled for a few years aquatic vegetation is likely to grow profusely. The craters then form breeding grounds for several species of mosquito, including the variety which can spread malaria. The Ministry advised that bomb craters in rural areas and on common land should be filled in. Many large ornamental lakes were drained early in the war for security reasons. When these were re-filled it was noticed that mosquitoes, particularly anopheles, were breeding in larger numbers than before the war. Fish, the natural enemies of mosquito larvae, had been killed by the drainage and vegetation had grown prolifically. The Ministry advised that as soon as labour was available these lakes should be cleared of vegetation and the banks generally trimmed.

One investigation yielded results of special interest. In October 1940, the shelterers in the underground railway stations were being badly bitten by mosquitoes. Mr. Shute, the Assistant Malaria Officer of the Ministry, found that the culprit was *culex molestus* which was breeding in stagnant water in the sumps and the inverts under the platforms. Active measures soon ended the nuisance. Steps were also taken to deal with any nuisance arising from breeding in the static water tanks erected for fire-fighting purposes, and a circular was issued to local authorities on the subject. Fortunately, with few exceptions, the only species which the surveys showed to be breeding in the tanks was *culex pipiens*, which hardly ever attacks human beings.

Other work of the laboratory. During the war the laboratory was extensively used for teaching purposes, and demonstrations were given to medical officers of the Armed Forces, to members of the Friends ambulance units proceeding abroad, to medical students and to visitors specially interested in malaria. On several occasions, large numbers of blood films demonstrating malaria parasites were prepared and sent to the Royal Naval College, Clevedon, to the Army School of Hygiene, to the R.A.F. Institute of Pathology, Halton, to the Molteno Institute, Cambridge, to the London School of Hygiene and Tropical Medicine, to the School for Tropical Diseases, Liverpool, to the Director of Tropical Medicine, Army Medical School, Washington, to the Rocky Mountain Laboratory, Hamilton, Montana, and to the Pasteur Institute, Paris. The laboratory also helped to prepare a film on malaria, which was shown to Service personnel going oversea. For the War Office, several thousands of stained blood films showing the various species of human malaria parasites were also prepared and sent to North Africa, Italy and Burma for inclusion in malaria panniers.

Special investigations were made for the Medical Research Council and the War Office into the therapeutic and prophylactic value of some of the newer synthetic anti-malarial drugs. This involved breeding some thousands of mosquitoes and infecting them with various species

of malaria parasites, and for over three years this additional work was a considerable strain on the staff and the resources of the laboratory. At the request of the War Office, Mr. Shute, also visited North Africa and Italy in 1943 to obtain strains of the parasite responsible for the malaria from which the troops suffered. Mosquitoes bred for the purpose at Horton were taken to the theatres of war, infected from patients suffering with malaria, flown back to England and used to infect volunteers, who were treated with the newer drugs, and most valuable information was obtained.

MEDICAL RESEARCH COUNCIL AND WAR OFFICE COMMITTEE

Shortly after the outbreak of war, the Medical Research Council and the War Office set up a committee to deal with the malaria problem, on which Dr. P. G. Stock, of the Ministry of Health, Dr. W. D. Nicol, the Medical Superintendent of Horton Hospital, who was responsible for the malaria wards and Mr. P. G. Shute served. Dr. Stock also served as chairman of the Malaria Committee appointed by the Advisory Committee on Medical Supplies and Services of the Allied Post-war Requirements Bureau.

CONCLUSION

The anti-malarial work of the Ministry of Health in collaboration with other Departments, especially the War Office, the Colonial Office, the Ministry of Shipping, the Ministry of War Transport and the Medical Research Council, has been a triumph of preventive medicine. The risks of infection and of the introduction of malaria into Great Britain were great; the administrative precautions under skilled scientific direction were comprehensive, detailed and world-wide. That these precautions achieved their aim is evident from the insignificant number of cases of indigenous malaria that came to notice. The late Sir George Buchanan and the late Lieut.-Colonel S. P. James set up an anti-malarial organisation in this country which safeguarded the population against the risks of an increase of indigenous malaria after the War of 1914–18. This organisation fortunately remained in being in the years between the two World Wars and was further strengthened by the Ministry of Health's Laboratory at Epsom. Consequently, when war risks of malarial infection again became imminent, the Ministry of Health had ready an efficient organisation and an expert staff conversant with the problems that were likely to arise. The anti-malarial work done in Great Britain during the war was blessed by foresight, endowed with scientific direction, comprehensive in character and crowned with success.

REFERENCES

[1] SINTON, J. A., and SHUTE, P. G. Memorandum on Measures for the Control of Mosquito Nuisances in Great Britain. Memo. 238. Med. Ministry of Health. Revised Edition, London, H.M. Stationery Office, 1943.

[2] Reports and Papers on Malaria contracted in England in 1918. Reps. to L.G.B. (N.S. No. 123), London, H.M. Stationery Office, 1919. See also P. G. SHUTE. 'Protracted Incubation Periods in Indigenous Cases of Malaria contracted in England', *J. Trop. Med. and Hyg.* (July 15, 1939).

[3] SHUTE, P. G. 'Failure to Infect English Specimens of *Anopheles maculipennis* var. *atroparvus* with certain strains of *Plasmodium falciparum* of Tropical Origin'. *J. Trop. Med. and Hyg.* (July 1, 1940).

[4] MACNALTY, A. (1943) 'Indigenous Malaria in Great Britain'. *Nature*, **151**, 440.

[5] On the State of the Public Health during Six Years of War. Annual Rep. of the Chief Medical Officer of the Ministry of Health, 1939–45. London, H.M.S.O., 1946, Malaria, 53–58.

ENTERIC FEVER

The incidence of and mortality from the enteric group of fevers during the war years are given in the following table:

Enteric Fever, 1939 *to* 1945: *Notifications and Deaths*

	Typhoid fever		Paratyphoid fever	
Year	Notifications	Deaths	Notifications	Deaths
1939	734	90	745	22
1940	886	83	1,947	52
1941	1,058	82	3,705	66
1942	468	69	390	20
1943	385	57	328	15
1944	284	45	258	10
1945	301	32	234	15
Totals	4,116	458	7,607	200

Note: For notification purposes the distinction between typhoid and paratyphoid fevers was not officially made until July 1941. A complete system of correction of notifications was first introduced in January 1944.

As in the War of 1914–18 the enteric group of fevers called for special vigilance on the part of the Ministry of Health and of local authorities. In November 1939, a memorandum on typhoid fever (Memo. 225/Med.) was issued by the Ministry. This gave a succinct account of the aetiology, prevalence, and the methods of prevention and control, with an appendix on laboratory diagnosis. The memorandum also mentioned the powers of a local authority to deal with carriers, and referred to the work of Dr. A. Felix on the value of the presence of the Vi-antibody in their detection. Felix reported (*Brit. med. J.*, 1939, ii, 1253) that a standard agglutinating Vi-serum and a preserved suspension representing a pure reagent for the Vi-antibody were available, and that the test for the presence of the Vi-antibody had thus become a routine procedure.

INCIDENCE OF TYPHOID AND PARATYPHOID FEVERS DURING THE WAR

It will be observed from the above table that the number of cases of typhoid and paratyphoid fevers rose in 1941; in that year it was more than double the mean of the preceding three years. The Chief Medical

Officer of the Ministry of Health stated that this rise was almost entirely accounted for by three extensive outbreaks of paratyphoid B. fever at Bristol, Liverpool, and an associated outbreak at Birmingham and Leicester. Previously there had been a considerable rise in the notifications of paratyphoid fever in the latter half of June 1940. In this year the incidence was general, and in a few places only did an appreciable number of cases occur. In the first six months of the year, 200 districts were invaded, but in the majority of them only one case was notified, and where there was more than one, there was usually an interval of at least four weeks between them. These figures are an indication of the actual danger of carriers.

In July 1941 a distinction was made between typhoid and paratyphoid fevers for purposes of notification. This was made possible largely by the newly created Emergency Public Health Laboratory Service (see Chapter 1), which began to provide highly refined cultural and serological facilities. A great proportion of cases of typhoid fever were investigated bacteriologically, and it is probable that some of the rise in the notifications of the disease is attributable to improved ascertainment.

MEASURES OF PREVENTION

The chief defence against a water-borne disease like typhoid fever is chlorination of the water-supply, a measure which since the epidemics at Bournemouth and Poole in 1936 and at Croydon in 1937, is applied to the water-supply of most towns of any size. In 1938 and 1939, under the gathering clouds of war, precautions were planned and applied against the pollution of supplies by aerial bombardment. It was realised that major waterworks were liable to become objects of attack and that widespread damage to water-mains and adjacent sewers must be expected. All practical means were taken to make the process of chlorination fully efficient; precautions were taken against the introduction of chemical poisons either deliberately or by the use of poison gas in warfare; staffs were augmented by trained volunteers; a system of guards was instituted and alternative laboratories were equipped in safer areas. These measures proved to be remarkably effectual when put to the test. 'During the aerial attacks on London' said the Director of Water Examination, Metropolitan Water Board, 'almost every conceivable form of damage was inflicted upon the waterworks; in two months alone over 3,000 mains were fractured and many were heavily polluted. All the necessary protective measures were in readiness and there is not a shred of evidence that the water supplied to London was at any time less safe than before the war.'* Medical officers of health of many metropolitan boroughs served by the Board bore testimony in their reports to the skill and speed with which damaged water-mains

* 'London's Water Supply in Peace and War' by Lieut.-Col. E. F. W. Mackenzie, *The Medical Officer*, December 30, 1944.

were repaired and supplies restored. The repair of sewers, many of the largest of which were extensively damaged during periods of heavy bombing, was no less important. In St. Marylebone at one time only one sewer flowing through the eastern half of the borough in a north to south direction remained open. Here a specially designed concrete arch was used in effecting repairs, saving much time, timber and difficult brickwork—a method which was widely adopted in the metropolitan area. In the City of London 67 incidents with damage to Corporation sewers were reported between September 1940 and December 1942. In Hampstead, where 45 sewers were damaged and many dwelling houses and business premises were flooded, one main sewer received three direct hits in a run of 150 yards; the fracture by high explosive of another sewer, 46 ft. under Hampstead Heath, was only discovered during a survey made nearly two years afterwards. In Southwark, where a considerable number of the local council's sewers and also several L.C.C. main sewers were broken, the 'chance in a million' occurred. Here a bomb was dropped, forming a crater and damaging a sewer. Two days later, while workmen were in this crater repairing the damage, another bomb fell on the identical spot and all were killed.

The prevention of outbreaks, especially of paratyphoid fever, through carriers infecting food and drink is a much more difficult matter. On November 25, 1940, the Ministry of Health issued an official circular (2198) on 'Precautions against the spread of alimentary infections.' This was sent to every sanitary authority and every medical officer of health with the request that it be brought to the notice of all persons engaged in any trade or business connected with the preparation or distribution of food for human consumption. The circular was a plea for the observance by caterers of a standard of personal cleanliness as is maintained in a well ordered private house; such a standard would go far to diminish the risk of contamination of food by organisms of the enteric group. Domestic sewage is always liable to contain the specific organisms of the enteric fevers, even in the absence of known clinical cases in the area wherever the sewage is derived. The risk of these diseases following the pollution of water supplies by the destruction of sewers and of water mains by enemy action was a possibility to be guarded against, and, on the advice of the Chief Medical Officer of the Ministry of Health, on December 7, 1940, an official letter on the subject was sent to every local authority giving the Minister's sanction under Section 177 (1) of the Public Health Act, 1936, to the free provision of typhoid-paratyphoid vaccine for the protection of persons whose employment exposed them to special risks, and for anyone else who desired it. Local authorities became fully alive to this danger of war and took every precaution against it. Public response to the offer of free inoculation varied in extent. For example, in Plymouth, after extensive

damage to water-mains in March 1941, anti-typhoid inoculation was advised and was offered free; but only some 200 people were then inoculated. Here, in all, some 400 persons availed themselves of free inoculation. But in Southampton more than 27,000 people were inoculated at clinics, first-aid posts and works, and, in spite of damage to water-mains and sewers in 1940 and 1941, notifications were fewer than in previous years. In Birmingham four-fifths of the inhabitants were without piped water for six to ten days after a heavy raid in November 1940. It is a great tribute to the work of the medical officers and engineers of local authorities whose areas sustained heavy air raids with destruction of sewers and water-mains through enemy action, as in London, Coventry and elsewhere, that not a single case of enteric disease was traceable to the damage perpetrated.

DYSENTERY

The incidence and mortality from dysentery from 1935 to 1945 are given in the following table:

Dysentery (all forms), 1935 to 1945: Notifications and Deaths

Year	Notifications	Deaths
1935	1,177	95
1936	1,333	72
1937	4,167	111
1938	4,170	112
1939	1,941	96
1940	2,860	185
1941	6,670	329
1942	7,296	198
1943	7,905	124
1944	13,025	157
1945	16,278	165
Totals	66,822	1,644

Between 1934 and 1945 there was a steady rise in the notifications of dysentery, broken only in 1939. The commonest type of dysentery now seen in this country is that due to the Sonne bacillus. Sonne dysentery has probably been endemic in this country for many years and a proportion of the increase is doubtless due to its bacteriological recognition, and to a wider knowledge among practitioners that it is notifiable under the Public Health (Pneumonia, Malaria, Dysentery, etc.) Regulations, 1919. An account of the chief features of Sonne dysentery was given in the Annual Report of the Chief Medical Officer of the Ministry of Health for 1937, pp. 44–49. High as are the figures of incidence, they do not represent the full prevalence of dysentery during the war years, for it is acknowledged that a substantial proportion of cases has been unnotified, through pressure of work on a depleted medical staff, and, because there are mild cases which are not brought

to medical attention. As with the enteric group of fevers, scrupulous care in the handling of food for human consumption, and attention to personal hygiene by the general public are essential for controlling and reducing the prevalence of dysentery.

B. Hobbs and V. D. Allison found by the use of a selective cultural medium (desoxycholate-citrate agar) that patients may continue to excrete *B. sonne* for considerably longer periods than had previously been found from the laboratory examination of specimens on the usual media.

The authors conclude that the failure to recognise 'missed' cases, the symptomless carrier (often an adult), the premature release from isolation of convalescent carriers as a result of reports based on the use of indifferent media, and the indications that a proportion of patients may continue to excrete the organism for several months, even when removed from infected surroundings and the risk of re-infection obviated, are all factors in the prevalence of dysentery.

Specimens of blood for agglutination were taken from 16 cases at varying intervals after the onset of illness, and from a control series of 12 children who had not been exposed to infection. The results suggested that positive agglutination reactions may be of value in retrospective diagnosis of cases of Sonne dysentery up to at least six weeks after the onset of the illness.

FOOD POISONING

There was a steady increase in the number of outbreaks of food poisoning during the war years. This rise was associated with the increase in communal feeding in communal kitchens, canteens and restaurants and also with the increased facilities for accurate diagnosis afforded by the Emergency Public Health Service and its associated laboratories.

The total number of outbreaks reported during the years 1939–44 was 1,326—the lowest number being 47 in 1940 and the highest 545 in 1944. Of these outbreaks 892 were caused by organisms of the salmonella group and the number of cases was 2,544.

Bacteriological investigations showed that there was a remarkable increase in new types of salmonella responsible for outbreaks of food poisoning chiefly after 1940. Before 1939 only 10 types had been identified in this country, but, in 1943 and 1944, 16 new types were identified and there was also a considerable increase in untypeable strains—28 in 1943 and 98 in 1944. It is probable that from them further new types could have emerged.

The investigations carried out in the laboratories of the Emergency Public Health Service have established the fact that the majority of these new strains were imported to the United Kingdom in various foods, chiefly from America where salmonella infections are widespread among poultry and in other foods. The importation of American dried egg appears to have been chiefly responsible. The subject of food

poisoning during the war has been fully dealt with by V. D. Allison, M.D., in a contribution to the Volume on Medicine and Pathology, Chapter 21.

TRICHINOSIS

As in the case of food poisoning, trichinosis, which was comparatively rare in this country before the war, showed a large increase during the war. The increase was attributed to the eating of imperfectly cooked sausages or raw sausages made from inadequately cured pork derived from pigs which, owing to the shortage of feeding stuffs it was no longer profitable to keep alive. This subject is also dealt with by Dr. V. D. Allison.

SCABIES

Scabies is another of the diseases associated with war. In the War of 1914–18 it greatly increased among both troops and civilians. An analysis of 1,000 consecutive cases admitted as scabies, boils or impetigo to No. 25 General Hospital at Hardelot from August 1916 to March 1917, showed that scabies was responsible for 64·9 per cent. of all forms of pyodermia, and that it caused more than half the common forms of skin disease in the army.

After 1919 there was a rapid decrease in incidence, the lowest level being reached in 1926. About 1930 the rate of incidence again began to rise. This probably was largely a periodic characteristic for it was observed simultaneously in other countries. In 1937 and 1938, Sir Arthur MacNalty called attention in his Annual Reports to the Board of Education to the increase of scabies among schoolchildren. For instance in Dudley, and in Yorkshire, North Riding, the number infested more than doubled during 1938, while Heston and Isleworth had an increase of nearly 90 per cent., Coventry over 50 per cent., Sunderland 30 per cent., and many other areas reported considerable increases.

Hence, at the outbreak of war scabies was rapidly increasing and this increase was augmented first by evacuation and mobilisation, and, later, by overcrowding, shifting of the industrial population, shelter life and the ever-increasing shortage of laundry facilities, soap, towels, underclothing and bedding. A severe epidemic of scabies ensued which was widespread throughout England and Wales.

ADMINISTRATIVE MEASURES

The Ministry issued a Memorandum on Scabies in January 1940, and, in November 1941, under the Defence Regulations, the Scabies Order was made which gave local authorities additional powers to deal with scabies and with verminous conditions generally. The medical officer of health, if satisfied that a person was in a verminous condition, could require the disinfection of the premises in which that person

had been living, and could have other persons who had been living in the same premises medically examined, and, if necessary, cleansed or treated; and, in addition, to avoid the spread of vermin he could have articles that had come in contact with these persons cleansed or destroyed.

The Advisory Committee on Scabies, convened by the Ministry with Dr. A. M. H. Gray (afterwards Sir Archibald Gray) as chairman and with representatives of the Services, Canadian and U.S. Armies, other Government Departments, the London County Council and the London School of Hygiene, in the light of the results of research carried out on behalf of the Ministry and the Medical Research Council by Dr. Kenneth Mellanby of the Sorby Research Institute, issued a revised memorandum in June 1942, and later modified it by a further amendment in February 1943. Many authorities took vigorous action, and made efficient scabies treatment centres, some in their clinics, and others by adapting their gas decontamination units to serve a dual purpose. In some cases (e.g. London from August 1943) the Minister allowed authorities to make scabies notifiable.

The Ministry of Information produced for the Ministry of Health an instructional film on the life history of the scabies mite, the best methods of diagnosis and treatment, and the paramount need to deal with contacts. This admirable film was widely shown to doctors, nurses, health visitors and social workers.

Treatment. Benzyl benzoate treatment had been introduced before the war. It was now improved and cheapened by the substitution of a watery emulsion (25 per cent. strength) for the previous spirit and soap emulsion, and possesses advantages over treatment by sulphur ointment, notably in not causing dermatitis. Its efficiency depends upon skilled application. A single application of benzyl benzoate renders the patient non-infective (children can return to school immediately after it) and it generally cures, although a second application within seven days is recommended to prevent a relapse.

Prophylaxis. The researches of K. Mellanby and others into the transmission of infection have confirmed the findings of Hebra in 1868 that clothing and bedding may occasionally transmit the disease. The part they play in this respect has been greatly over-estimated and K. Mellanby found that failure to disinfect fomites had no appreciable detrimental effect upon the relapse rate in scabies. It is better and simpler to treat again the few cases that do relapse than to expend manpower and material on routine disinfestation in all cases.

K. Mellanby found that the essence of successful prophylaxis lies in the following-up of the family contacts and in their simultaneous treatment. Here it is to be remembered that symptomless carriers may occur, and that scabies may have an 'incubation' period of two months; therefore all intimate contacts should be treated. 'In communities such

as schools or factories frequent inspections of the hands and wrists (where the vast majority of the parasites are to be found) by persons able to recognise scabies will greatly reduce the incidence, provided that patients, when found, are speedily and efficiently treated, and that the whole family of each patient is also treated'. During the war a number of local authorities set up special clinics for the prevention and treatment of scabies.

ERYSIPELAS

Erysipelas, England and Wales: Notifications and Deaths, 1938–45

Year	1938	1939	1940	1941	1942	1943	1944	1945
Notifications	16,671	14,141	13,123	12,232	11,598	11,833	11,148	9,853
Deaths	342	248	214	190	141	124	119	119

The above table shows a most welcome decrease in the incidence and deaths from erysipelas during the war years as compared with the notifications and deaths from this disease during the year 1938. This decrease can fairly be ascribed to the increased use of sulphonamide preparations. The modern treatment is not only efficacious but dramatic. One can almost see the red line of the erysipelatous patch receding as the sulphonamide drug is applied.

PEDICULOSIS

Inasmuch as the louse is the vector of typhus, relapsing fever and trench fever, special attention was paid to the prevention of pediculosis during the war years. At the outbreak of war, preventive measures mainly rested on the steam disinfestation of infected clothing and bathing with soap and hot water, but the search for a suitable insecticide which might be dusted inside the soldier's clothing and which would not irritate the skin and provoke dermatitis, was steadily pursued. The earlier anti-louse powders were preparations of derris root or of the South American substitute, cube or loncho-carpus. Their efficiency against the body-louse gradually improved, a preparation named A.L.63 being successfully used in the armies of North Africa and elsewhere. This was surpassed finally by the discovery of the persistent insecticidal power of dichlor-diphenyl-trichlorethane, or D.D.T., already described in connexion with the prevention of typhus fever.

Head Lice. In the meantime, evacuation, the subsequent investigation by Dr. Kenneth Mellanby and recruitment for the Women's Services had made it painfully clear that the head louse, unlike the body louse, was still excessively common in Britain.

K. Mellanby by an investigation based on approximately 60,000 cases examined on admission to hospital for other diseases, showed that there

was a very high degree of infestation with head lice in the industrial cities, but that body infestation was rare; that girls were more frequently infested than boys, and that the highest rate of infestation was among the children of pre-school age (this was an entirely unexpected finding). The percentage of children infested in the rural counties was very low; in the industrial cities infestation in girls reached a peak at three years of age (51·6 per cent. being then infested). There was little decrease before the fourteenth birthday, and even among the older girls a large proportion were infested. In boys, in industrial cities, the peak occurred in the fourth year, when over 40 per cent. were infested, but then steadily declined reaching a very low level with young male adults.

The Minister of Health appointed in 1942 a Louse Infestation Committee under the chairmanship of Dr. P. G. Stock, which submitted two reports, the final conclusions being embodied in Memo 230A/Med., which was issued in March 1943. This committee with the co-operation of the Directors of Hygiene of the Army and of the Royal Air Force, medical officers of health, school medical officers and pathologists conducted a number of experimental trials of various anti-head-louse preparations. They found that Lethane '384 special' hair-oil was the most effective preparation to remove the killed nits; the hair must be combed with a metal 'Sacker' or similar comb.

CHRONIC RHEUMATIC DISEASES

Chronic rheumatic disease with all its protean manifestations—fibrositis, rheumatoid arthritis, osteo-arthritis, etc.—like rheumatic fever is of unknown aetiology. These morbid manifestations are widely prevalent. Many victims have to lead a life of helplessness being bed-ridden or restricted to a wheeled chair; the patient is thus a burden to himself, his family and society. It has been estimated that rheumatic disease is responsible for ten times as much incapacity as pulmonary tuberculosis, and that the loss of working days through such disablement amounts in England to one-sixth of the total disability through illness. One-sixteenth of all the money expended on pensionable invalidism before the war was given to sufferers from these diseases. Although no comprehensive figures are available, chronic rheumatic diseases through absenteeism and invalidity undoubtedly handicapped industry during the war, or in other words the industrial war output would have been greater if these diseases had not been so prevalent. The subject properly engaged the close attention of the Ministry of Health and a special sub-committee of the Minister's Medical Advisory Committee was appointed in May 1944 to consider it. This sub-committee subsequently reported that in their view the chief obstacle to effective control of the chronic diseases included in the rheumatic group was lack of sufficient knowledge particularly as regards the causation of these diseases. They

recommended that any development of specialised treatment facilities for chronic rheumatism ought either to be located in teaching hospitals or to be closely linked to them so that the needed research could readily be undertaken, preferably under university auspices. Early in 1945 principal regional medical officers were instructed to approach a number of hospitals in various parts of the country with a view to promoting an extension of the available treatment facilities. Almost without exception the hospitals so approached intimated that for the time being little or nothing could be done owing to the shortage of doctors and nurses as well as, in some instances, the lack of suitable accommodation.

The Future. Undoubtedly, the first step should be an extension of the existing specialised treatment facilities for both in-patients and out-patients on the lines recommended by the special committee referred to above. It is to be hoped that voluntary organisations concerned with medical research will favourably consider the support of schemes of investigation in university teaching hospitals where specialised treatment facilities are established and a promising interest in the problems of chronic rheumatism can be expected to develop.

It is difficult at present to recommend any precise scale on which specialised treatment facilities should be set up. Experience in Sweden, a country which so far has paid more attention to these diseases than any other, suggests that for in-patients specialised units of 80 to 100 beds dispersed in a large number of general hospitals are preferable to a few large special hospitals, also that long-stay beds of a semi-convalescent type are necessary to ensure the best use of specialised beds in general hospitals. As regards out-patient treatment facilities, there is good evidence that a clinic employing two whole-time physiotherapists can be fully and usefully occupied in treating chronic rheumatic disorders in an urban industrial population of approximately 50,000.

The prominence of chronic rheumatism as a cause of sickness absence in industry has attracted the attention of Government Departments such as the Ministry of Labour, Ministry of Fuel and Power and the Medical Research Council through its Industrial Health Research Board. The Ministry of Health, which by the publication in 1924, of Dr. J. Alison Glover's report on the 'Incidence of Rheumatic Diseases' initiated co-ordinated research into the industrial aspects of chronic rheumatism, might promote a more clinical and therapeutic approach at a number of hospital centres in different parts of the country. It is, however, unlikely that there will be much effective progress on these lines, until the existing facilities for special treatment, and, in particular, special in-patient accommodation where investigation as well as treatment can be carried out, have been considerably extended. An account of chronic rheumatism and its treatment during the war by C. W.

Buckley, M.D., F.R.C.P., and W. S. C. Copeman, O.B.E., M.D., F.R.C.P. is given in Chapter 4 of the Medicine and Pathology Volume.

INFECTIVE JAUNDICE

There are three types of communicable jaundice in Great Britain.

1. *Weil's disease* (infective jaundice) due to a spirochaetal organism, *Leptospira icterohaemorrhagica.*
2. *Epidemic hepatitis*, sometimes known as catarrhal jaundice, and now recognised to be a necrosis of the hepatic parenchyma, probably due to a heat resistant virus.
3. *Homologous serum jaundice*, conveyed from man to man by parenteral injection and probably due to a heat resistant virus similar to, but not necessarily identical with, that of epidemic hepatitis.

Historical Note:

For many years outbreaks of jaundice in the civil population, with a comparatively negligible mortality, have been described in this and other countries. At the same time, outbreaks of greater severity not uncommonly in the same places as the milder outbreaks, have occurred in the British Isles, France, Germany, Austria, Switzerland, the Scandinavian countries, Africa, India and Japan. Jaundice has been a constant concomitant of war. Larrey described outbreaks of contagious jaundice with haemorrhage occurring amongst the troops in the Egyptian campaign of 1812. Jaundice was common in the American Civil War. It occurred also in the Franco-Prussian War of 1870; in the South African War 30 years later, in the Great War and again in the recent campaign in North Africa. Such clinical descriptions as were available suggested to Cockayne (1912) that two diseases or two groups of diseases of different aetiology were concerned. From the general confusion Weil's disease was recognised in 1886 and the discovery of its causal organism, *Leptospira icterohaemorrhagica*, by Inada and Ido in 1915 served to complete the evidence that it is a definite clinical infective entity, probably identical with the seven-day fever of Japan, the slime fever of Eastern and Central Europe and the infectious jaundice of the Mediterranean Basin, and that it bears no relation to the welter of conditions out of which it has emerged. The communicability of the other and more common disease—epidemic hepatitis or catarrhal jaundice—has not been generally recognised by practitioners and many cases are still diagnosed 'catarrhal jaundice'. Repeated investigations failed to advance our knowledge of the aetiology of epidemic hepatitis or epidemic catarrhal jaundice, of which at least sixteen outbreaks were reported to the Ministry of Health in the period 1925–34 and many more since.

Obstructive, haemolytic and toxic cases excepted, no jaundice arising other than from the two infective diseases seems to have been reported

until the introduction of salvarsan and allied compounds for the treatment of syphilis.

WEIL'S DISEASE

Weil's disease is not rare in this country and abortive attacks, usually diagnosed as 'pyrexia of unknown origin', sometimes occur in river-bathers. In certain circumstances sufferers were entitled to compensation under an extension (S.R.O. 1940 No. 221) of Section 43 of the Workmen's Compensation Act, 1925. In the six years to 1945, Gardner and Wylie (1946) examined serum from 1,120 patients suspected of leptospirosis and obtained serological evidence of the disease in 182. From other laboratories they obtained histories of 488 cases with a fatality rate of 8·8 per cent. during the same period, and they called attention to anicteric cases which passed undiagnosed, but which were probably as numerous as cases with jaundice.

Mortality. The deaths certified as due to Weil's disease were:

1938	—	1942	18
1939	—	1943	19
1940	20	1944	24
1941	18	1945	29

Incidence. The disease has a characteristic occupational incidence. In Gardner and Wylie's series the largest group were coal-miners (18 per cent.); sewer men (6 cases only) amounted to 4·0 per cent.; and 8·0 per cent. (12 cases) gave a history of immersion at a material time in rat infested streams.

Symptoms. The cardinal physical signs of Weil's disease—jaundice, haemorrhage and coma—are present terminally in most cases of acute hepatic necrosis, irrespective of the cause, but the high fever, sometimes simulating enteric fever, and the orderly development of the syndrome in a person exposed to leptospiral infection by his occupation or through bathing in rat infested rivers should assist the correct diagnosis.

Recognisable occupational hazards account for about half the cases of Weil's disease only, and it seems that the *leptospirae* can pass from man to man without the intervention of the rat. A probable example of such transmission was reported to the Ministry of Health from Barnet during 1945, where Weil's disease occurred in both husband and wife resident in good urban conditions. Doeleman (1932) has described transmission by sexual intercourse. The *leptospira* is present in the urine of infected subjects. Recently it became obvious that *Leptospira canicola* can be communicated to man from dogs and produce a disease clinically indistinguishable from *Leptospira haemorrhagica* infections.

Serological diagnosis. This is generally unequivocal. During the war it was provided by the special reference laboratory under the direction of Professor A. D. Gardner at the Pathological Department, Oxford University. 'Anyone with a recent history of bathing or involuntary immersion who develops malaise, myalgia, headache and fever (not

necessarily with jaundice and bleeding) should be considered a possible case of Weil's disease and an agglutination test should be done at once.' (See Medicine and Pathology Volume, Chapter 31.)

EPIDEMIC HEPATITIS (See also Medicine and Pathology Volume, Chapter 9.)

The term 'epidemic hepatitis' is used in reference to the synonym 'infective hepatitis', in order to emphasise the distinction from infective jaundice, which is the common synonym for Weil's disease. The latter, although it can be conveyed by contact, is unlikely to assume epidemic proportions, except possibly in prolonged trench warfare. Epidemic hepatitis occurred in epidemic form in the autumn of every year of the war since 1941, and became a disease of major importance. Although under war conditions the autumnal epidemicity at first appeared to be characteristic, outbreaks may occur at any time of the year.

Incidence. On November 17, 1943, 'jaundice' was made compulsorily notifiable in Region 4, which roughly comprised East Anglia. In the year ending November 17, 1944, 3,552 civilian cases were notified; for that ending November 17, 1945, only 1,626; for that ending November 17, 1946, 1,980. The notification rates per thousand of the population were therefore 1·3, 0·6, 0·7 in the years 1944, 1945, and 1946 respectively.

The incidence in 1945 was mainly limited to rural districts. The 1946 notifications have been included as they represent to some extent the after-effects of war conditions, for in some cases the infection appeared in people who had returned from service with the Forces or from prisoner-of-war camps in Europe and the Far East. Although epidemicity varies in persons in contact with the disease, a second and a third case in a family were not infrequent. The figures, on the whole, suggest a waning of incidence since the cessation of hostilities, for it will be observed that the number of cases notified in 1945 in Region 4 fell by more than one half. In 1945 and 1946 the autumnal periodicity, previously regarded as characteristic of epidemic hepatitis, was not observed. Thus, in the first four months of 1945, 716 cases, and, in the last four months, 486 cases were notified, that is, the peak of incidence occurred in the first four months of the year. In 1946 the highest figures appeared in April and May. In East Anglia the decline in notification was most marked in rural districts, while in the towns the disease tended to become endemic. The raised figures in the second quarter of the year 1946 largely reflected an increased notification rate from Southend-on-Sea, where there had also been a high level of notifications in the previous summer, a lull during the winter and spring and an exacerbation in the summer, followed by a gradual decline in the succeeding months. Throughout 1945 and 1946, the disease continued to attack more adults than usual. In 1946 there were a few small

isolated outbreaks in rural districts in Norfolk during the autumn in areas not previously affected. The general pattern of the disease suggested a slow geographical spread from areas involved in the previous year or so.

Mortality. The mortality of epidemic hepatitis in Region 4 has not yet been determined, but in the war years and in 1946 the disease continued to be relatively benign. Those responsible for the investigation of the disease had reason to believe that Region 4 formed a fairly representative sample of the epidemiological features of epidemic hepatitis in the country as a whole.

In 1946 reports were received by the Ministry of Health that a fatal form of epidemic hepatitis had appeared in Denmark and Sweden, and the Chief Medical Officer requested medical officers of health to be on the watch for more virulent types of the disease in this country and to bring such cases to his notice.*

It is admittedly difficult to calculate the mortality from communicable jaundice. A death from epidemic hepatitis may be certified under one of several headings, the more important of which are shown in the following table.

Deaths (including non-Civilians) assigned to Hepatitis and Jaundice in each quarter of 1945 *and* 1946

	International List Groups and Sub-divisions		1945				1946			
			Mar.	June	Sept	Dec.	Mar.	June	Sept	Dec.
741	Weil's disease	M.	7	3	7	10	4	5	3	2
		F.	1	–	1	–	–	–	1	1
680	Acute yellow atrophy	M.	19	18	12	11	18	9	12	15
	Acute yellow atrophy (without pregnancy)	F.	16	11	10	18	13	20	20	9
766 & 792	Acute yellow atrophy (with pregnancy)	F.	8	14	19	16	13	10	10	21
681/1	Hepatitis (in No. 125b)	M.	37	24	49	46	49	42	32	30
		F.	32	42	28	49	35	36	29	32
681/2	Jaundice (in No. 125b)	M.	3	2	1	1	4	4	2	3
		F.	3	2	1	5	3	2	3	2
684/1	Catarrhal jaundice (in No. 127b)	M.	7	4	6	4	3	2	2	4
		F.	7	12	13	4	3	5	1	5
681/3	Other diseases of liver (in No. 125b)	M.	7	4	1	4	2	4	9	6
		F.	4	9	4	8	6	2	7	6
	Total acute yellow atrophy, hepatitis, jaundice, catarrhal jaundice		132	129	139	154	141	130	111	121
	Combined annual totals		554				503			

Most modern authorities consider acute yellow atrophy of the liver not to be a distinct aetiological entity but commonly, and indeed largely, to result from the endemic form of communicable jaundice previously called catarrhal jaundice.

* (Annual Report of the Ministry of Health for the year ended March 31, 1947, p. 43.)

The aggregate of deaths from acute yellow atrophy, hepatitis, jaundice (no other statement), and catarrhal jaundice, exceeds 500 a year. If half these deaths be due to infection, which is by some authorities considered a conservative estimate, communicable jaundice has of late been killing more than scarlet fever, the dysenteries, and enteric fever.

OTHER FORMS OF JAUNDICE

There are other forms of jaundice which have to be considered in the diagnosis of Weil's disease (leptospiral jaundice) and epidemic hepatitis. These are (1) jaundice following arsenotherapy; (2) serum jaundice; and homologous serum jaundice.

(1) JAUNDICE FOLLOWING ARSENOTHERAPY

Many examples of both early and late jaundice occasionally proceeding to acute yellow atrophy of the liver following the administration of arseno-benzol preparations are to be found in the Report of the Salvarsan Committee of the Medical Research Council (Special Report Series, No. 66, 1922).

An appreciable increase in the incidence of jaundice after the administration of arsenical preparations was noted in the first years of the War of 1939–45. Bigger (1943), MacCallum (1943) and Paget (1943) suggested that post-arsphenamine jaundice might result from the fortuitous contamination with blood of the syringes and needles used in venereal clinics. Late jaundice also occurs in other clinics in which therapeutic injections are habitually employed, irrespective of the nature of the intended inoculum. Thus it has been recorded after the injection of insulin, gold, bismuth and acriflavine; in anaemia and diabetes clinics; after injections during the induction of hyperthermia; while a series of cases at a tuberculosis sanatorium was attributed by Sheehan (1944) to transmission by syringes used for bleeding patients for the periodic determination of sedimentation rates.

In January 1944, the Ministry of Health sent a memorandum to the authorities of venereal disease treatment centres requesting that all cases of jaundice or dermatitis arising in the course of arsenical treatment should be reported to the Ministry instead of, as previously, only those whose illness was so severe as to require admission to hospital.

The collective observations on the possible rôle of syringes in the transmission of jaundice were sent by the Ministry early in January 1945 to a Committee on 'The Sterilisation, Use and Care of Syringes' appointed by the Medical Research Council, whose report was published (War Memorandum No. 15) in June 1945. Subsequently, these observations were extended, revised and published as a memorandum on 'The rôle of Syringes in the Transmission of Jaundice' by the Ministry of Health (*vide Lancet*, 1945, ii, 116). This memorandum was issued in December 1945 to all medical officers in charge of clinics. Evidence was

adduced showing that rigorous precautions in the sterilisation of syringes and needles, and in the technique of intravenous injection prevented subsequent jaundice. There was also a reduction in the number of cases of jaundice reported from venereal disease clinics month by month as compared with the year 1944.* The reduction was regarded as significant, even if, particularly in the first six months of 1946, due allowance be made for the fact that, in the present treatment of syphilis the total number of injections given is greatly reduced by the use of penicillin in oil wax—though jaundice has been reported after penicillin injections.

(2) SERUM JAUNDICE

In the Annual Report of the Chief Medical Officer of the Ministry of Health for 1937 (pp. 38–39), Sir Arthur MacNalty drew attention to a disquieting series of thirty-seven cases of late jaundice occurring among about one hundred persons who had been inoculated with the same batch of measles convalescent serum, at varying periods from sixteen to a hundred days before. Later the same sequence of events in another area followed the inoculation of adult serum. For the most part the symptoms and signs resembled those displayed by a so-called epidemic catarrhal jaundice which had been prevalent in the districts mainly affected. A small number of patients, however, were very ill with moderate pyrexia, vomiting, abdominal pain, diminished area of liver dullness, bleeding from the nose or mouth, urticaria, restlessness, delirium and increasing drowsiness. Fatal cases died with the classical symptoms of acute hepatic necrosis and this was confirmed by post-mortem examination. The unused serum of the particular batch was at once recalled and was found to conform to modern therapeutic requirements, in that it was sterile, non-toxic and contained a satisfactory quantity of antiseptic. No record could be found in the literature of any similar occurrence, nor was it known to the largest users of serum on the Continent of Europe and in America of whom inquiry was made.

The Medical Department of the Ministry of Health at once instituted systematic inquiry into a number of deaths from acute necrosis of the liver or from other causes which were suggestive of it. In 1937 they received a noteworthy report on a child of ten years who in July had been given 1,500 units of anti-tetanic serum following an injury from which he made a good recovery. On October 6, 75 days later, he became acutely ill with jaundice and died on October 28. The post-mortem report was 'Acute haemorrhagic necrosis of liver and pancreas and some degree of same condition of other viscera. Cause entirely unknown.' The significance of the previous inoculation of horse serum had naturally not been appreciated.

* Ministry of Health Report for 1946. Chief Medical Officer's Report, p. 41. Cmd. 7119, H.M.S.O., London, 1947.

Soon after the reports of serum jaundice arising in England, G. M. Findlay and his co-workers (1937, 1938, 1939) in a series of papers described a severe hepatitis following immunisation with yellow fever virus administered in pooled human serum. Yellow fever and Weil's disease were excluded, and the evidence suggested that the source of the jaundice was a hepatotoxic agent having the characteristics of a filtrable virus.

A similar condition was also observed to occur amongst horses immunised with various antigens suspended in horse serum. Because jaundice in horses followed the injection of horse serum and might occur in man after injection of human serum, the condition has been termed *homologous serum jaundice*. Its characteristic feature is a late development, so late indeed, that its association with inoculation, weeks and sometimes months earlier, might be, and often is, overlooked.

During the mobilisation of the American Army early in 1942, all troops received injections of yellow fever vaccine containing human serum. A number of them developed late jaundice and Colonel J. E. Gordon, U.S.M.C., as a result of a survey in Northern Ireland, concluded that the patients he saw were suffering from homologous serum jaundice. The capacity to produce jaundice was confined apparently to certain batches of vaccine and the factor common to the implicated batches was human serum. In America, outbreaks were first seen in March 1942, and Sawyer and his co-workers (1944) immediately began investigations among U.S. troops in California and elsewhere. They were aware of an earlier outbreak of yellow fever vaccine jaundice in Brazil (Fox *et al*) where the evidence was not convincing, and where, largely because of the conclusions drawn by Findlay and his associates, contamination of the seed virus was suspected. Sawyer's work however, and that of the Surgeon-General exonerated the seed virus because all the vaccine used was derived from the same seed, but the icterogenicity was confined to a few batches. The use of human serum was discontinued and the outbreak, which had reached its peak in June 1942, terminated abruptly, but not before there had been more than 28,000 cases with 62 deaths. In 1941, Beeson, Chesney and McFarlan (1944) had attempted to control an outbreak of mumps by the passive inoculation of susceptibles with the plasma of convalescents from that disease, with the result that 44·7 per cent. of the inoculated developed late hepatitis.

The causal agent of homologous serum jaundice possesses a high degree of resistance to destructive agents. The power to infect remains after repeated Seitz filtration, storage for months in the frozen dry state with subsequent reconstitution, storage for four months at minus 20 degrees centigrade in the liquid state, inactivation for one hour at 50 degrees centigrade and extraction with ether.

Risk of Jaundice in Blood Transfusion. Since the inoculum used for the prophylaxis of measles in no way differed in essentials from that

employed by the Blood Transfusion Service, the risk of jaundice arising in persons receiving a blood transfusion was obvious. In 1941, Dyke of Wolverhampton called attention to a patient 'deeply jaundiced and in a state of profound cholaemia' who, seven weeks before, had been transfused with whole blood and plasma. The Medical Department of the Ministry of Health considered it therefore highly important to acquaint the Blood Transfusion Service at once, with their findings on homologous serum jaundice. These were collated and placed before a meeting of the principal blood transfusion officers in August 1942, and a memorandum on the subject was published in the *Lancet* (1943).

Jaundice Incidence after Blood Transfusion. During the year 1945 no example of hepatitis following the administration of a prophylactic or therapeutic human serum was reported to the Ministry of Health, but investigations into 'post transfusion jaundice' continued. It was found that the condition, when it arose, appeared two to four months after transfusion with an icterogenic blood or serum, and was clinically and pathologically indistinguishable from epidemic hepatitis. A large number of cases occurred in 1945 as an aftermath of the last battles of the war. An estimate of the incidence of jaundice in transfused battle casualties can be made from the following figures obtained during a search of the records of every fifth admission to Emergency Medical Services Hospitals from 1940 to 1945.

Jaundice Incidence after Blood Transfusion

Group whose hospital records were examined	Total patients whose records have been examined	Number in whom jaundice developed during observations	Number of those who died subsequently to jaundice	Jaundice rate per 1,000 (and standard error)
Service patients under observation 3 months or more after transfusion or injury (or who developed jaundice within that period)				
(*a*) Injured patients who were transfused .	1,316	124	17	94 ± 8
(*b*) Sick patients who were transfused .	82	16	7	
(*c*) Injured patients who were not transfused .	6,350	6	0	0·9 ± 0·3
All male patients from Services aged under 35 in the United Kingdom in 1942–43	About 63,000 coded for all diseases and injuries	About 1,050 admitted with jaundice and no history of transfusion	Not ascertained	About 2 per 1,000 in 3 months

These figures, provided by Dr. Percy Stocks and Miss E. M. Brooke, require correction because factors other than transfusion may have

produced icterus, but, after scrutiny of the hospital records of 140 cases of hepatitis in transfused persons, one of the Ministry's medical officers (Bradley 1946) concluded that blood transfusion was the most probable cause in 82 per thousand transfused persons and that the fatality rate was 12 per cent. There were probably other factors in this high mortality, for whereas Spurling, Shone and Vaughan (1946) in a 'follow-up' of civilian patients transfused by the staff of one of the London transfusion depots found an incidence of hepatitis of 79 per thousand, death from jaundice, which may have been due to other causes, occurred only in two elderly persons.

Crossman, Stuart and Stokes (1945) report an incidence of like magnitude in a hospital in the United States. Among battle casualties admitted between February 1 and April 30, 1945, 51 cases of jaundice appeared among 538 men who had been transfused (95 per thousand); while during the same period there was only one case of jaundice among 322 who had not been transfused.

Rigorous precautions in the technique of blood transfusion, as advocated for intravenous injection in arsenotherapy are the best safeguards against the risk of serum jaundice following blood transfusion. (See Chapter 2, Blood Transfusion, in the Surgery Volume.)

ADMINSTRATIVE ACTION AND SPECIAL INVESTIGATION

It is clear from this general account of the three types of communicable jaundice occurring in Great Britain that the subject demanded systematic and intensive investigation. Furthermore, during the course of the war, epidemic hepatitis had become widespread in Europe and there had been a high incidence of the disease among troops engaged in the North Africa campaign. The Medical Research Council was asked by the Ministry of Health and the Army Council to undertake a special investigation, and they appointed a Jaundice Committee for this purpose. At the same time in order to facilitate the committee's work, which was conducted from Cambridge, the Minister of Health issued the Jaundice Regulations, 1943, which made 'jaundice' compulsorily notifiable in East Anglia (Region 4).

This new departure has borne fruit. The epidemiology of the disease has been clarified, and human transmission experiments in volunteers have shown that the cause of the disease is a heat-resistant filter-passing agent present in the faeces, blood and urine of patients early in the disease, and even during the incubation period (MacCallum and Bradley, 1944.) The presence of the infective agent in faeces should be borne in mind for the possibility of alimentary infection has not always received due weight in previous investigation. There is no longer any doubt that in some outbreaks the disease is waterborne (Neefe and Stokes, 1945) and in others milk has been suspected as the vehicle (Health Bulletin of Department of Health for Scotland, 1943).

Even when the symptoms and jaundice are insignificant, the liver may be seriously damaged and recent experience has led to an appreciable change in treatment. Rest in bed is imperative and should continue so long as there is any anorexia and until the liver appears to be working normally. It is essential to support all liver functions, particularly the protein function, by forcing a high protein and high carbohydrate diet made palatable with a moderate allowance of fat. In severe cases protein hydrolysate given intravenously may save life; and arrangements were made to supply it through regional transfusion officers (Magee 1946).

REFERENCES

BEESON, P. B., CHESNEY, G., and MCFARLAN, A. M. (1944). *Lancet*, **1**, 814.
BIGGER, J. W. (1943). *Lancet*, **1**, 457.
BRADLEY, W. H. (1926). *Proc. roy. Soc. Med.*, **39**, 649.
Department of Health for Scotland (1943). *Health Bulletin*, **2**, 64.
DOELEMAN, quoted by WALCH-SORGDRAGER, B. (1939). *Quart. Bull. Hlth. Org. L. o. N.*, **8**, 143.
FINDLAY, G. M. (1940). *J.R.A.M.C.*, **74**, 72.
——, and MACCALLUM, F. O. (1937). *Trans. roy. Soc. trop. Med. Hyg.*, **31**, 297.
—— ——, (1938). *Proc. roy. Soc. Med.*, **31**, 799.
—— ——, and MURGATROYD, F. (1939). *Trans. roy. Soc. trop. Med. Hyg.*, **32**, 575.
FOX, J. P., MANSO, C., PENNA, H. A., and PARA, M. (1942). *Amer. J. Hyg.*, **36**, 68.
GARDNER, A. D., and WYLIE, J. A. H. (1946). *Lancet*, **1**, 955.
GROSSMAN, E. B., STUART, S. G., and STOKES, J., Jr. (1945). *J. Amer. med. Ass.*, **129**, 991.
Homologous Serum Jaundice. Memo prepared by Medical Officers of the Ministry of Health. *Lancet* (1943). **1**, 83.
MACCALLUM, F. O. (1943). *Brit. J. Ven. Dis.*, **19**, 63.
——, and BRADLEY, W. H. (1944). *Lancet*, **2**, 228.
MAGEE, H. E. (1946). *Proc. roy. Soc. Med.*, **39**, 657.
Min. of Health (1943). The Jaundice Regulations, 1943. November 17, 1943. Provisional Rules and Orders, 1943. London: H.M.S.O.
Min. of Health Circular 2883, November 27, 1943.
Min. of Health 'On the State of the Public Health during six years of war'. Report of the Chief Medical Officer of the Min. of Health, 1939–45. London: H.M.S.O., 1946.
Min. of Health. Report of the Ministry of Health for the year ended March 31, 1946. Cmd. 7119. London: H.M.S.O., 1947.
Min. of Health. Report of the Ministry of Health for the year ended March 31, 1947. Cmd. 7441. London: H.M.S.O., 1948.
NEEFE, J. R., and STOKES, J., Jr. (1945). *J. Amer. med. Ass.*, **128**, 1063.
PAGET, P. (1943). *Proc. Harvard Unit* ARC (unpublished).
SAWYER, W. A., MEYER, K. F., EATON, M. D., BAUER, J. H., PUTMAN, P., SCHWENTKER, F. F. (1944). *Amer. J. Hyg.*, **40**, 72.
SHEEHAN, H. L. (1944). *Lancet*, **2**, 8.
SPURLING, N., SHONE, J., and VAUGHAN, J. (1946). *Brit. med. J.*, **2**, 409.

CHAPTER 3

SPECIAL DISEASES

TUBERCULOSIS

INTRODUCTION

THE following account of tuberculosis deals chiefly with the mortality and incidence of the disease in war-time, the administrative arrangements made by the Ministry of Health for maintenance of the tuberculosis service under the stress of war conditions, the various problems that arose, the important recommendations of the Tuberculosis Committee of the Medical Research Council and other matters. So far as can be judged, the clinical character of tuberculosis did not present any new or remarkable features; but an account is given of mass radiography and its value in diagnosis and of the advances in chemo-therapeutic treatment of the disease.

MORTALITY FROM TUBERCULOSIS IN THE WAR YEARS

TABLE I

England and Wales: Deaths from Tuberculosis per annum including those of non-Civilians

Year	Respiratory			Other forms			Total all forms
	Males	Females	Persons	Males	Females	Persons	
1938	12,445	8,837	21,282	2,261	1,996	4,257	25,539
1939	12,702	8,840	21,542	2,229	1,852	4,081	25,623
1940	13,920	9,740	23,660	2,381	2,103	4,484	28,144
1941	13,985	9,648	23,633	2,652	2,385	5,037	28,670
1942	12,511	8,478	20,989	2,426	2,134	4,560	25,549
1943	13,064	8,278	21,342	2,216	2,091	4,307	25,649
1944	12,226	7,878	20,104	2,110	1,949	4,059	24,163
1945	12,077	7,936	20,013	2,072	1,870	3,942	23,955

The deaths are those registered in England and Wales inclusive of non-civilians.

In the First World War, there was a general rise in the incidence of tuberculosis throughout Britain as indicated by the annual deaths from the disease. The increase was mainly caused by contact infection, overcrowding and breaking down of bodily resistance to infection by prolonged physical or mental strain. These are difficult things to prevent in war-time, and it was expected at the beginning of the Second World War that there would be an increase in the incidence and mortality of tuberculosis. In the years between the two wars great strides had been made in developing and extending the tuberculosis services of local

authorities, and almost every year from 1920 to 1938 had shown a decline in tuberculosis mortality. Tuberculosis mortality in England and Wales in 1938 was about half that experienced in 1913, namely 26,000 as against 50,000 deaths from all forms, in spite of an increase of nearly 13 per cent. in the population. It will be seen from the above table that in 1939 the deaths from tuberculosis were 25,623; in 1940 they had risen to 28,144, and in 1941 to 28,670. At the same time, there was evidence of a certain increase of the disease among the Fighting Services. The figures of deaths for 1942, 1943, 1944 and 1945 showed a decline, being 25,549, 25,649, 24,163 and 23,163 respectively. The most disquieting feature was that deaths among children from pulmonary tuberculosis and from tuberculous meningitis increased substantially during the years 1940 to 1942. In contrast to the previous war, young women were not predominantly affected by pulmonary tuberculosis. It was the older male age-groups who were most affected throughout the war and during the short influenza epidemic at the end of 1943. It is difficult to explain this decline in the mortality of tuberculosis during the later years of the war to a level in consonance with the pre-war trend of reduced mortality. Some explanation is afforded by the education of the people in hygienic precautions, the fact that no severe epidemic of influenza occurred as in 1918, the arrangements made for adequate and physiological nutrition of the nation, a most important factor, and the maintenance of a good tuberculosis service, as far as possible. Important as these things are in preventing tuberculosis they do not furnish a complete explanation of the favourable picture during the war years, nor of the different incidence on age and sex in the two wars. There are still many problems to be elucidated in the epidemiology of tuberculosis.

NOTIFICATION

The notification of diagnosed cases of tuberculosis is not a true measure of the incidence of tuberculosis in the population of England and Wales, for on account of persons moving from place to place many notifications are reduplicated and cases erroneously diagnosed are not always removed from the registers. The purpose of notification is, first, ascertainment of a person suffering from tuberculosis in an administrative area and, secondly, the setting in motion of machinery designed to prevent the spread of the disease and to benefit the patient.

Table II on the following page shows the notification figures for the war years.

Over the five-year period 1939–43 the yearly average number of primary notifications of respiratory tuberculosis was 39,571. After a slight decrease from the figure for 1938 (37,879) during 1939 and 1940 the number increased annually to 44,664 in 1944. The drop in notifications for the year 1939 (35,965) was probably due to the initial impact of the war on all medical and lay procedure for notification.

TABLE II

England and Wales: Formal Notifications of Tuberculosis (all forms) and Deaths from Tuberculosis of Persons not Notified before Death in the years 1939–45

Year	Formal notifications			Deaths of tuberculous persons not notified before death
	Males	Females	Persons	Persons
1939	25,355	20,851	46,206	2,901
1940	26,260	20,312	46,572	3,395
1941	28,966	21,998	50,964	4,383
1942	29,560	23,059	52,619	3,971
1943	30,121	24,221	54,342	3,780
1944	30,044	24,269	54,313	3,468
1945	29,124	22,986	52,110	3,603
Totals	199,430	157,696	357,126	25,501

By 1940 a certain war-time stability had been secured, and in the subsequent years recruitment of large numbers of the civil population for national service, and the advent of mass miniature radiography brought to light many cases of respiratory tuberculosis that would not otherwise have been found until a much later stage. Mass radiography among the civil population began in 1943 and made great progress in 1944. One unit examining 1,000 persons a week for fifty weeks in a year may reveal as many as 600 hitherto unsuspected cases of tuberculosis amongst the civil population, quite apart from the work on similar lines in the three Fighting Services. It seems a justifiable assumption that the increase in notifications of respiratory tuberculosis in the earlier years may be attributed to the arrears consequent upon the opening phases of the war, to which in the latter years were added the new cases ascertained by the mass radiography of civilians. Yet, in spite of a considerable increase in the number of persons so examined in 1945, the total primary notifications for this year fell by 1,414 to 43,250, which approximates to the total for 1943. One cannot assume, however, for the reasons previously given concerning the machinery of notification, that this figure represents the beginning of a decline in incidence. Primary annual notifications of the non-respiratory forms of tuberculosis averaged 11,700 over the five-year period 1939–43, reaching a peak of 12,430 in 1943. During the next two years a rapid decline occurred to 10,712 in 1944 and 10,213 in 1945.

THE STANDING ADVISORY COMMITTEE ON TUBERCULOSIS

On October 27, 1939, the Minister of Health met in conference representatives of the National Association for the Prevention of Tuberculosis, the Joint Tuberculosis Council and the Tuberculosis Associa-

tion, together with representatives of the Society of Medical Officers of Health and the London County Council. These representatives of tuberculosis services, both official and voluntary, presented a memorandum urging that the maintenance and possibly the extension of tuberculosis schemes, so far as war necessities permitted, were an essential part of national defence. The outcome of the conference was that, at the suggestion of the Minister, the three tuberculosis organisations set up a small standing committee to report to him on the progress of the anti-tuberculosis service in reference to war conditions. This committee first met on December 13, 1939, and continued to meet at regular intervals throughout the war. It advised the Minister on a number of tuberculosis problems, but special mention must be made of the work of two sub-committees. The Mass Radiography Sub-Committee was set up in the autumn of 1942, and its 'Advisory Report on the Working of a Mass Radiography Unit' was presented and adopted in the autumn of 1944. Reference to the subject of mass radiography will be made later.

The Tuberculin Test Sub-Committee was appointed in August 1944, to consider and report on standards for tuberculin testing in regard to technique, interpretation of the results and, so far as possible, the administrative action that should follow from the various readings of the test in connexion with the staffing of tuberculosis institutions. Four meetings were held and the report was submitted in November 1944. The most important recommendation concerned the special care which should be taken of Mantoux-negative nurses working in sanatoria or general hospitals, particularly when the tuberculin test is converted from negative to positive.

MEDICAL RESEARCH COUNCIL COMMITTEE ON TUBERCULOSIS

At the request of the Ministry of Health, the Medical Research Council appointed the Committee on Tuberculosis in War-time, in the autumn of 1941; the chairman was the late Viscount Dawson of Penn and the secretary, Dr. P. D'Arcy Hart. During the first two years of the war, a reversal of the favourable pre-war trend of mortality had already become apparent; the committee was charged, therefore, 'to assist in promoting an investigation of the extent and causes of the war-time increase in the incidence of tuberculosis, particularly among young women, and also to advise the Council regarding possible preventive measures'.

The committee's report was published in 1942 (*Report of the Committee on Tuberculosis in War-time*, M.R.C. Special Rep. Series No. 246. H.M.S.O. London, 1942): its survey of the position up to the early part of that year, showed that all age-groups had been involved to some extent in the increased mortality from tuberculosis; that the increase was common to both pulmonary and non-pulmonary forms, and that those affected included not only young women, but also children and

the older male age-groups. A particularly disturbing feature was the increased mortality of children from tuberculous meningitis. After a critical review of the available evidence, the committee made a number of practical recommendations, a summary of which follows:

SUMMARY OF RECOMMENDATIONS

(1) *Mass Radiography.* Subject to limitations of apparatus, the controlled use of mass radiography before, or as soon as possible after, employment, should be extended, especially (*a*) in the Services, (*b*) among men, and particularly women, entering the war industries, and (*c*) among those taking up certain other occupations.

(2) A single mass X-ray examination should be carried out, where practicable, upon those already employed in certain industries, e.g., munition factories.

(3) As an extension of the preceding, but probably practicable to a much less extent in war-time, X-ray examinations should be repeated at regular intervals upon certain groups of the population, including employees in factories which contain large numbers of young adults, nurses and medical students, and merchant seamen.

(4) Where speed and cost dictate, the miniature method is the one of choice for mass radiography. In certain circumstances it may be practicable to make use of existing full-size apparatus.

(5) *Institutional Accommodation.* Accommodation for institutional treatment of tuberculosis is urgently required. A good deal is now available but cannot be used because of lack of nursing and domestic staffs. Until these staffing problems are solved, no advance can be made in institutional control of the disease.

(6) *Financial Provision.* In view of the special character of the disease and the prolonged treatment usually required, special financial provision greater than that obtainable under the National Health Insurance Scheme should be made for persons with tuberculosis.

(7) *Rehabilitation.* Rehabilitation should be considered an essential part of the treatment of tuberculous persons, and arrangements should be made for the gradual return to industry of such patients on a basis of part-time or modified work. During the period of rehabilitation a supplement to wages should be provided, in order that an adequate standard of living can be maintained by the patient and his family.

(8) *Examination of Contacts.* The examination of all home-contacts must be energetically pursued, a first examination being the chief requirement. The re-examination of children under five years of age, and of young adults, is highly desirable.

(9) *Examination in Special Cases.* X-ray examination, and re-examination at intervals, should be undertaken for all cases of pleurisy and *erythema nodosum* in young people, whether institutional treatment has been given or not.

(10) *Mental Hospitals.* The special conditions prevailing in mental hospitals make it desirable that an effort should be made as soon as practicable to X-ray periodically all residents of such institutions.

(11) *General Working Conditions.* It is of the first importance that continued watchfulness should be maintained upon the working conditions of young employees, particularly in regard to hours of work, transport difficulties, rest periods, factory canteens and hostel arrangements, and their relation to sickness absence.

(12) *Milk.* The pasteurisation of milk should be extended throughout the country, and, where this is not practicable, all milk consumed by children should be boiled or dried milk should be provided.

(13) *Propaganda.* The implementing of these recommendations should be accompanied by information and propaganda both to the medical profession and to the general public.

This account of tuberculosis administration shows, especially in relation to X-ray examinations, that several of these recommendations were rapidly implemented by the Ministry of Health, and the Medical Research Council Report, 1939–45 considers—no doubt rightly—that 'their adoption may well have contributed to the gratifying fall in the general mortality rate from tuberculosis which occurred in the later years of the war'.

CARE AND TREATMENT OF TUBERCULOUS SOLDIERS AND AIRMEN

In September 1939, at the onset of the war the Chief Medical Officer, with the approval of the Minister of Health, offered to assist the Medical Directors-General of the Services in the care and treatment of tuberculous patients. The Admiralty found its own scheme sufficient, but the Ministry's offer was readily accepted by the War Office and the Air Ministry. With the ready co-operation of local authorities and the governing bodies of voluntary institutions for tuberculosis, 'clearing sanatoria' were assigned throughout the country in which beds were allocated to Service patients under the scheme.

The purpose of the scheme was twofold, first to relieve accumulations of tuberculous persons in, and remove infective patients from, military hospitals, and, secondly, to bring the patients under expert treatment as soon as possible within a reasonable distance of their homes, pending their discharge from the Service. In the early stages of this scheme, when the numbers were small, no difficulty was experienced. The Service medical officer communicated directly with the most convenient of these 'clearing sanatoria', and the patient was admitted promptly. As the numbers increased, however, it was found that this method of direct approach led to confusion, reduplication of work and slowing of the stream of admissions. It was therefore agreed to establish a central allocation scheme under the control of one medical officer of the

Ministry, which came into force at mid-summer 1941, and by mid-summer 1945, about 10,000 Service cases had been so allocated. This modification was a great improvement on the original scheme and would have continued to meet the need without undue delays, had it not been for the diminution of the number of beds available due to closure from lack of nursing and domestic staff.

Large numbers of Allied Service patients were included in the scheme, but special mention must be made of the ex-prisoners-of-war. Top priority was asked for and cheerfully accorded to these men. Fortunately the numbers of tuberculous repatriated ex-prisoners-of-war fell very far short of expectation. Between October 1943 and May 1945, the total was 781. Of these, 420 men were allocated to beds in sanatoria or hospitals and their allocations were effective in about 7 days; 258 proceeded home on leave; 55 were the responsibility of Scotland, Wales, Northern Ireland, the Isle of Man and Eire; 48 were Allied and Dominion personnel who were dealt with under special arrangements.

PULMONARY TUBERCULOSIS IN RECRUITS

It was the experience of the previous war that much pulmonary tuberculosis was reactivated by military service in men whose disease had been previously arrested. In the patriotic rush to the Colours in 1914 many men were passed as medically fit for military service with no regard to their tuberculosis history. Later on, when this risk was realised, as the result of a report on tuberculosis in soldiers made to the Local Government Board by Dr. A. S. MacNalty in 1915 (unpublished), arrangements were made with the medical examination boards whereby a recruit's past history of tuberculosis, if such had occurred, was communicated in confidence to the examining medical officer. In 1939, at the outset of war, the Chief Medical Officer of the Ministry of Health sent a minute to the Secretary urging that similar arrangements should be made forthwith. There was, unfortunately, some delay, and it was not until six months later that the Chief Medical Officer's representations were endorsed by Lord Horder's Advisory Committee, and the recommendation put into force. Such information is an additional safeguard against the admission of tuberculous recruits, who are a serious liability to the fighting forces.

TUBERCULOSIS IN MENTAL HOSPITALS

The patients in mental hospitals are always subject to a heavy death-rate from tuberculosis. Schizophrenics, for example, are considered to be particularly vulnerable. In peace-time the rates of mortality from tuberculosis among patients in mental hospitals has been approximately eight or nine times that of the general population; the rate varied between 15 and 17 per 1,000 resident patients between 1910 and 1914. During the First World War it rose to 37 per 1,000 in 1917 and to as

much as 52 per 1,000 in 1918. In 1923 the rate had fallen to 10, i.e. below the pre-war level.

In the Second World War the same adverse trend was noted. A large relative increase in tuberculosis mortality took place in 1940, and an even greater increase in 1941. The observed deaths in the county and county borough hospitals in England and Wales exceeded in 1940 the expected deaths (on the basis of 1937–9) by about 40 per cent. for both sexes, and in 1941 the excess was 141 per cent. for males and 76 per cent. for females. The rates remained roughly static for a further year after which they began to decline and in 1946 the excess had fallen to 29 per cent. for males while for females the observed deaths were slightly less than the expected deaths. Although the relative trend was similar to that in the previous war, the actual deaths involved were much less, being about one-fourth of the figure of twenty years ago.

An increase in tuberculosis mortality in mental deficiency institutions was also noted. In ten of the larger institutions, with an aggregate population of nearly 11,000 patients (6,000 males, 5,000 females) the tuberculosis death-rate in 1941 exceeded that in 1937–9 by 170 per cent. for males and 110 per cent. for females, and in 1942 the excess was 200 per cent. for males and 100 per cent. for females. In 1946 the excess had fallen to 20 per cent. for males while for females the rate was below the 1937–9 average. In all the institutions of England and Wales taken together (22,000 males, 22,000 females) the excess was 80 per cent. for males and 33 per cent. for females in 1941 and 150 per cent. for males and 50 per cent. for females in 1942. In 1946 the excess was 44 per cent. for males and the rate for females was below that for 1937–9.

Lack of protective foods may have had some influence, but overcrowding and case-to-case infection were probably mainly responsible for this increase of mortality in mental institutions. The blackout by reducing ventilation had an adverse effect. Circumstances necessitating the transfer of a large number of beds in mental hospitals for the Emergency Medical Services and for military and other Service mental units, led to overcrowding of civilian mental patients. Many mental patients suffering from tuberculosis are not diagnosed until the disease is often in a hopeless and highly infective stage. The Medical Research Council Committee recommended that efforts should be made so far as possible to take periodical radiographs of the chests of all inmates of mental institutions, whether they have symptoms or not, in order to discover and treat early cases. In such case-finding the co-operation of tuberculosis officers was sought.

In this way the tuberculosis in the subjects of mental disorder was controlled and its further increase during the war limited. Tables relating to deaths from tuberculosis in mental hospitals will be found at the end of the section on tuberculosis (see pp. 112, 113).

INDUSTRIAL AND OTHER CAUSES

As in the previous war there was an increased prevalence of tuberculosis in workers in armament and other factories.

In speaking of tuberculosis in industrial workers, it must be remembered that the worker on the average only spends fifty-six hours a week in the factory or at the most sixty to seventy hours a week, so that the conditions in the home or billet are probably more responsible for tuberculous infection in workers than their industrial environment. Working conditions in factories have undoubtedly improved of recent years; standards of cubic space, ventilation, etc., have to be maintained, protective appliances have been installed and there is now an increasing medical supervision. It is admittedly hard to distinguish between home and factory conditions in causing tuberculosis among workers. It is known, however, that the higher rates occur in certain industrial occupations, and the highest in industrial processes exposing the worker to the inhalation of siliceous dust, e.g. sand-blasting and pottery workers.

The effects of war in favouring tuberculosis in industrial workers—not only those in factories but those in shops, offices and other occupations—may be thus summarised:

(1) The average number of employees working in factories and war industries is increased, giving greater opportunities for infection by tubercle bacilli and widening the range of infectivity.

(2) To meet the demand for more labour, persons suffering from undetected tuberculosis, and who in peace-time would have little chance of employment, are being employed and thereby multiply the foci of infection.

(3) People, who led a sheltered or comparatively isolated life before the war, for patriotic and economic reasons enter industry and office work, where they meet for the first time conditions peculiar to herd life; not only are they more susceptible on being exposed to infection, but instead of being fed at home they cater for themselves, often indifferently, and thus lower their resistance. The provision of canteens in factories is a valuable counter-measure.

(4) Fatigue is one of the most predisposing factors in tuberculosis, and general resistance in all callings is lowered by an inadequate amount of rest and recreation resulting from increased hours of war work.

Other working conditions liable to reduce resistance were deficient ventilation and, sometimes, inadequate lighting due to blackout conditions; difficulties of transport, which added to the length of the worker's day; and housewives' difficulties in the feeding and care of their families. In addition to these must be mentioned air raids, shelter-life, and the duties of Home Guards, fire-watchers and other civil defence occupations, all of which tended to encroach on the hours of sleep, and rendered an undisturbed night's rest more difficult to secure.

Most of these conditions, it will be noted, are common to all forms of active war work, but they have their repercussions upon the factory workers. Dr. L. Banszky, works medical officer at Mitcham Works, in 1937, found the proportion of active tuberculosis among new employees to be 8·3 per 1,000. This gave some guide to the degree of incidence of tuberculosis in factory workers, and was likely to be a higher figure owing to war conditions. The general rise of tuberculosis noted in the present war among adults of both sexes must necessarily have included a large number of workers in industry. The point to be emphasised is that war conditions, for the reasons stated, favoured tuberculosis among all callings. In this increased incidence the factory workers shared, but the primary causes of it lay for the most part outside the factory.

NUTRITION AND TUBERCULOSIS

Tuberculosis is favoured by malnutrition, and under-nourishment and food rationing in relation to the disease gave rise to considerable discussion during the war. It is probable that the increased supplies of the so-called 'protective foods'—fruits, vegetables, eggs, cheese and milk—in the pre-war years aided the decline in the mortality from tuberculosis. In war-time, limitation of these supplies may help to lower resistance. In fact, liability to tuberculosis must be increased if fatigue, irregular hours, anxiety and lack of the essential foods be present. While these unfavourable conditions undoubtedly existed under war conditions to a limited extent and often only temporarily, the rationing system, the introduction of British Restaurants and factory canteens, together with more mid-day meals for school-children, helped to maintain the national level of nutrition.

The medical advisers of the Ministry of Food stated that it was possible under the food-rationing system to build up a well-balanced diet containing the necessary vitamins and mineral salts. In sanatoria and hospitals such a diet by careful planning was probably secured, but doubt was expressed by a number of authorities, including Dr. Frederick Heaf, as to whether the consumptive, unemployed or living at home or in lodgings, could secure such a diet. Dr. Heaf suggested that extra nourishment, particularly in the protective foods, should be granted in proportion to the energy output of the worker. This could be done on a graduated scale of rations, as in the case of the cheese ration for agricultural labourers. Dr. Heaf also considered that reduction in the supply of milk might have a bad effect, and that therefore rationing should be done on the principle of giving different quantities of milk to particular groups of the population. He (the consumptive) should have his one and a half to two pints of milk a day and should thus rank with the expectant mother, only with the difference that his expectation period is indefinite. Tuberculosis being so largely a nutritional disease, many held that a special case could be made out for extra nourishment in the case of its

victims. There was much cogency in the plea, but the Ministry of Food after careful consideration decided that no general exception for a particular disease could be allowed, but that each case must be considered on its merits.

NON-PULMONARY TUBERCULOSIS AND MILK

Before the war the diminutions in the deaths from non-pulmonary tuberculosis (bone and joint disease, meningitis, glandular disease) were even more remarkable than the decline in mortality from the pulmonary form. In England and Wales in 1911 these deaths were 14,698; in 1938 they had fallen to 4,246. The prevention of contact infection, the increased pasteurisation of milk, earlier ascertainment and skilled surgical treatment, all no doubt had their effect in this remarkable result.

During the war years the annual mortality from non-pulmonary tuberculosis in England and Wales was as follows:

1939	4,081 deaths
1940	4,484 ,,
1941	5,037 ,,
1942	4,560 ,,
1943	4,307 ,,
1944	4,059 ,,
1945	3,942 ,,

It will thus be seen that there occurred a marked rise in 1940 which was accentuated in 1941 to 119 per cent. of the pre-war level, falling again gradually in the next two years to a little above the pre-war level in 1943. In 1944 and 1945 the deaths decreased further and were appreciably below the pre-war annual figures.

About half of these deaths were from tuberculosis of the central nervous system and the increase in deaths of young children from tuberculous meningitis during the early years of the war has already been mentioned. This form is usually due to the human type of the tubercle bacillus.

But a considerable proportion of these deaths from non-pulmonary tuberculosis were undoubtedly due to the bovine type of bacilli. The Cattle Diseases Committee in 1931 estimated that about 2,000 human deaths in England and Wales were due to bovine tuberculosis conveyed by milk.

In relation to tuberculosis, milk is like a mercenary captain of the Middle Ages who changed sides from time to time. Being so nearly a complete food it helps the anti-tuberculosis campaign by building up bodily resistance to infection. Hence the nutritional needs of children have been largely met by priority supplies of milk. Milk, on the other hand, can be a potent source of tuberculous infection when it is contaminated by the bovine tubercle bacillus, which chiefly causes tuberculosis of the glands and may attack the bones and joints. W. T. Munro and A. S. Griffith demonstrated that occasionally the bovine tubercle

bacillus may give rise to pulmonary tuberculosis. Before the war about 40 per cent. of cattle reacted to the tuberculin test; about 40 per cent. of cattle slaughtered in abattoirs were found to be tuberculous; and about 0·5 per cent. of milch cows were suffering from tuberculosis of the udder and were excreting virulent tubercle bacilli in the milk. In addition to the mortality in human beings there is a large amount of suffering, illness, crippling and economic loss for which tuberculous milk is responsible.

Much work has been done to encourage milk producers to eradicate tuberculous infection from their herds, but it has come to be realised that the most practicable method of prevention of bovine tuberculosis in man is to subject the milk to a degree of heat treatment sufficient to destroy tubercle bacilli without causing any material change in the nutritive qualities of the milk. As Professor G. S. Wilson observes: 'If all milk for human consumption were pasteurised in licensed plants under adequate supervision, it is no exaggeration to say that tuberculosis of bovine origin would be eliminated'.

In London and certain other cities a large proportion of the milk is pasteurised and this aided the decline in non-pulmonary tuberculosis before the war.

During the first three years of the war conditions altered. One result of the evacuation policy was to transfer considerable numbers of children from London and other large towns, where most of the milk is heat-treated, to small urban or country districts, where practically all of it is supplied raw. This undoubtedly caused a rise in non-pulmonary tuberculosis in children. Evidence on this point was difficult to obtain but Mr. A. Elliot Smith, F.R.C.S., Surgeon to the Radcliffe Infirmary, Oxford, contributed the following note in 1942 on cases of glandular tuberculosis admitted to that institution:

> 'In 1938 and 1939 the cases were 35 for each year; in 1940 they were 29 and in 1941, 46. On analysis I found that of these 46 cases, 30 of them were natives of Oxfordshire and 16 cases occurred in children or adults evacuated to this area. Therefore, it seems there is no increase in the local glandular tuberculosis rate, but that the evacuated population seems to be unduly susceptible to tuberculosis. Possibly this is due to children fed entirely on pasteurised milk coming into a district with non-pasteurised milk, which is the usual variety here. The striking thing about the case notes of these evacuated children is that their glandular trouble seems to commence about nine to twelve months after reaching this district. My orthopaedic colleagues tell me there is a similar increase in bone tuberculosis.'

If reference be made to the section on milk, it will be seen that H.M. Government published in May 1942, a White Paper on Milk Policy and that a scheme was set up, known as the National Milk Testing and Advisory Scheme, operated by the Ministry of Agriculture through an

Advisory Committee, on which the Ministries of Food and Health were represented, as well as producers' and distributors' organisations. In July 1943 the Government issued a further White Paper on 'Measures to Improve the Quality of the Nation's Food Supply'. The Defence Regulation (No. 55 G) issued in January 1944 gave the Minister of Food power to specify areas in which only certain milks might be supplied or sold by retail. These milks were (*a*) tuberculin tested milk or accredited milk derived wholly from one herd, these being the only raw milks allowed, and (*b*) heat-treated milks, including pasteurised and sterilised milk. It was also part of the policy of the White Paper that every effort should be made to supply either heat-treated milk or tuberculin tested milk under the Milk in Schools Scheme, as accredited milk was not considered safe for this purpose.

These measures marked a distinct advance; they, and the interest evoked by the publication of the White Papers and the suggestions there offered must have helped to lower the mortality from non-pulmonary tuberculosis in the latter years of the war from 1943 onwards. The return of children from the country to their home towns where pasteurisation of milk was in force was another contributing factor.

The prevalence of bovine infection and the danger of such milk, particularly for children, have been pointed out in successive annual reports of the Ministry of Health, by the Medical Research Council and by numerous medical organisations. Nevertheless, the people of this land still fail to appreciate the tragic issues involved, or public opinion would have insisted on milk being made universally safe for human consumption. It is gratifying to note that a certain progress was made towards this desirable goal in the latter years of the war period.

THE NATIONAL TUBERCULOSIS SCHEME IN WAR-TIME

The Dispensary Service. The tuberculosis officers of local authorities encountered great difficulties in maintaining this Service in war-time. Many of them were also employed in air-raid precaution work and other emergency duties, while the younger and more active men were called to the Services in increasing numbers. Enemy action destroyed some dispensaries and made others temporarily useless; the blackout during the winter months severely limited the usefulness of afternoon and evening sessions; and evacuation introduced many complications. These difficulties were mainly experienced at the beginning of and in the first year of the war. Foreseeing a time of pressure on medical man-power, the Ministry in 1940 curtailed the detailed reports on work of the dispensaries. The quarterly returns on the subject [Form T.145 (revised 1940)] have enabled Table III to be compiled.

Institutional Accommodation. At the outset of war it was a national necessity that as many beds as possible in the country should be held available for the heavy air raid casualties which were expected. One of

the ways adopted perforce to meet this need was to convert a certain number of sanatoria into casualty hospitals. Many of the patients who could bear removal to their homes were discharged to make room for the large number of expected casualty cases. The majority of these patients had been trained to guard against infecting others and were not likely to spread their disease. Unfortunately, in the excitement of war conditions, in many instances, patients in an advanced and infective condition were also sent home. This was contrary to the instructions of the Ministry of Health and, as far as possible, the error was rectified as soon as instances of it came to the Ministry's notice. As the expected bombing did not materialise, the Ministry were able later in the year to release 600 beds for the treatment of tuberculosis. The number of beds for tuberculosis in England and Wales at December 1938 was 30,792 and at December 1939 was 26,433. Thus the number of beds provided was reduced to 86 per cent. of the 1938 figure, the loss of 4,000 beds being due to the closure of beds in unsafe areas and the taking over of accommodation by the Emergency Hospital Services.

TABLE III

England and Wales: Number of New Cases diagnosed to be Tuberculous (both Pulmonary and non-Pulmonary) by the Dispensary Service

Year		*Year*	
1935	41,737	1940	38,259
1936	41,070	1941	40,835
1937	41,430	1942	44,453
1938	40,742	1943	46,366
1939	(Returns interrupted by outbreak of war)	1944	46,872
		1945	45,641

Embargo on Building of Hospitals and Sanatoria for Tuberculosis. Although the residential institutional accommodation for tuberculosis was provided for in most areas, there were still a certain number of county and county boroughs whose provision was inadequate or insufficient for their growing populations. Institutions in which the buildings were approaching completion were allowed to proceed but, as in the previous war, a general embargo had to be placed upon hospital and sanatorium construction in 1939.

During the course of the war many factors were concerned in the fluctuations of accommodation, which after the return of further beds originally set aside for the Emergency Hospital Services did not fall appreciably below the figure given for December 1939. Evacuation provided other problems, for many of the evacuees were tuberculous. The billeting of the tuberculous child or the contact child was naturally difficult, and it was found more satisfactory to accommodate such children in suitable country houses under the care of nurses and teachers. This plan also met the difficulty arising from the closure of the open-air

schools. Arrangements were made to meet evacuated patients' need for continuation of treatment, e.g. refills in artificial pneumothorax.

From the spring until the late autumn of 1940 the threat of enemy invasion prevailed, and, as a wise precaution, tuberculous patients in hospitals and sanatoria in the eastern and southern coastal areas were removed inland. In some areas ambulant patients were allowed to remain. This war necessity caused great pressure on inland sanatorium beds. In the latter years of the war some of these restrictions were relaxed.

During the intensive bombing of London and other cities, many tuberculosis wards in general hospitals were put out of commission by direct hits, delayed-action bombs or flying or rocket bombs. Some patients who had completed their treatment could not be discharged from sanatoria, because their homes had been bombed or their families evacuated. All these war conditions further added to the difficulties of adequate residential accommodation for tuberculous cases.

Shortage of Nurses and Domestic Staff. The main problem was not a shortage of beds, for beds were made available out of the Emergency Hospitals pool for the increased number of tuberculous patients detected by mass radiography and other diagnostic methods, but one of shortage of nurses and domestic staff for the tuberculosis service. The nursing problem was not one of magnitude, for it was estimated in 1942 that only 1,200 additional nurses were required. Nurses were naturally interested in nursing war casualties and in gaining the varied experience which the work of a general hospital provides; others again were deterred by the fear that nursing in a sanatorium involved a greater risk of contracting tuberculosis than nursing in other hospitals, although all experience tends to show that the risk of members of the medical and nursing staff contracting tuberculosis in institutions where proper hygienic conditions are observed is lessened rather than increased. Work in munitions and high rates of pay attracted the domestic staff of sanatoria and hospitals and largely explains the shortage. Every effort short of compulsion (for, as Mr. Ernest Brown remarked, 'who would like to be nursed by a "compulsory" nurse ?') was made by the Ministry and local authorities to overcome this shortage, but, nevertheless, the anomalous position arose of beds being empty but not available for use. The return of tuberculous men and women from the Fighting Services (including latterly prisoners-of-war) and the operations of civilian mass radiography further increased the demand for beds and increased the waiting lists as Table IV indicates.

In 1945 it was possible to provide 1,535 more beds for tuberculous patients, but this benefit was offset by an increase of 1,550 in the number of beds empty but temporarily not available. The table indicates how the number of these empty but non-available beds increased from 1944 onwards, with a corresponding rise in the waiting list. The shortage

of nursing and domestic staffs thus impeded successful treatment of pulmonary tuberculosis and provided a serious problem in war-time as well as afterwards.

TABLE IV

England and Wales: Institutional Accommodation

Date	Beds provided	Beds empty but temporarily not available	Beds empty and ready for use	Waiting list
December 31, 1944	29,265	1,911	1,815	4,273
March 31, 1945 .	29,327	2,111	975	4,628
June 30, 1945 .	29,660	2,473	908	4,972
September 30, 1945	29,999	3,225	1,198	5,294
December 31, 1945	30,800	3,461	997	5,382

MASS MINIATURE RADIOGRAPHY

It has long been known and has been repeatedly stated in the Reports of the Chief Medical Officer of the Ministry of Health and elsewhere that the diagnosis of pulmonary tuberculosis is often made late in the course of the disease, and that, taking all cases together, the fatality rate is consequently high. Lateness of diagnosis was illustrated by the fact that, of 35,000 patients suffering from pulmonary tuberculosis, who were discharged from or died in hospitals and sanatoria in England and Wales, during 1938, as many as 65 per cent. had been classified at the time of admission as intermediate or advanced cases, although at that time waiting-lists were much shorter. The high fatality rate was also indicated by the fact that out of 3,446 adult patients discharged from the London County Council's tuberculosis hospitals and sanatoria in 1933, only 43 per cent. were alive five years later. Against these records must be placed those of King Edward VII Sanatorium, Midhurst, where the five-year survival rate for B1 cases has improved by 20 per cent. since the introduction of collapse-therapy: for those in residence between 1933 and 1935 it was 93 per cent.

It is therefore axiomatic that the earlier a case of pulmonary tuberculosis is diagnosed the greater is the patient's chance of recovery. The great stumbling-block is that pulmonary tuberculosis is so insidious in its onset that the disease may be moderately or even far advanced before the victim has symptoms which lead him to seek medical advice. To overcome this difficulty miniature or indirect radiography has been devised. This makes possible the routine examination of selected groups of supposedly healthy persons in a short space of time and at moderate cost by an apparatus which can be transportable. It may represent a turnover of say, 3,000 examinations a week compared with perhaps 500 by the ordinary method. The results, however, are less detailed, so that every abnormal miniature film should be followed by a full-size direct

radiograph. The recommendations of the Medical Research Council's Committee on Tuberculosis in War-time concerning the controlled use of mass radiography among the civilian population have previously been recorded. These recommendations were accepted by H.M. Government.

Before routine mass radiography could be introduced by local authorities as a check to pulmonary tuberculosis, it was necessary that a standardised instrument of high quality should be available. The transportable sets ultimately sponsored by the Ministry of Health and the Department of Health for Scotland embodied the essential recommendations on design made by a technical sub-committee of the Medical Research Council's Committee on Tuberculosis in War-time; the sub-committee's findings were recorded in an appendix to the committee's report. The first set to be produced was used for a pilot survey on selected civilian groups by a special unit formed by the Council: the members of the unit were Miss Kathleen C. Clark, of the staff of Ilford, Limited, Dr. D'Arcy Hart, Dr. Peter Kerley and Dr. B. C. Thompson. The objects of this investigation were to establish standard technical and administrative methods so as to assist those responsible for the national scheme; to estimate the incidence of tuberculosis during war-time in various civilian groups, and thus to assess the demands likely to be made on the tuberculosis services as a result of mass radiography; and to throw further light on the epidemiology of the disease. The survey took place during 1943, and it covered approximately 23,000 persons from two factories, a large office group and a mental hospital, all of which were in Greater London. The report of this work (*Mass Miniature Radiography of Civilians for the Detection of Pulmonary Tuberculosis*. M.R.C. Special Rep. Series No. 251. H.M.S.O. London, 1945) was issued by the Council in 1945; it is, in effect, a valuable guide to the administration and technique of civilian mass radiography, as well as containing the statistical results of the unit's survey.

Results of Mass Radiography in War-time. The number of civilian mass radiography units operating in England and Wales during the whole or part of the war was eighteen. These were under the control of six county and ten county borough councils in England and the Welsh National Memorial Association in Wales, in their capacity of tuberculosis authorities. One unit in London was operated by the Ministry of Health for training and research.

The total number of persons examined in England and Wales by means of mass-radiography up to December 31, 1945, was approximately 797,000 (417,000 males and 380,000 females). In this number were represented all the 31 basic occupational classifications forming the Registrar-General's standard code, with the addition of some 29,000 children of school-leaving age. Among the largest groups represented were clerical, metal and transport workers, makers of textile goods, and persons engaged in public administration.

Approximately 759,000 persons or 95 per cent. of the examined were found to have normal chests, while 2,915 persons or between 3 and 4 per 1,000 had previously unsuspected active pulmonary tuberculosis. This figure applies to the whole population and accords with the results of previous surveys conducted on a smaller scale. Mass radiography was also responsible for uncovering 15,655 cases of quiescent or inactive tuberculosis, exclusive of those showing merely calcified primary lesions.

Rheumatic heart disease was detected in the same proportion as active tuberculosis. Experience has shown that many cases of this disease cannot be found by mass radiography; such as those without enlargement or alteration of heart shape. Therefore, the incidence is probably higher than that of active tuberculosis. This cardiological aspect of mass radiography merits serious attention. When it was realised that the numbers of rheumatic hearts were large a survey was carried out, a full history taken and a clinical examination made of every person having a history of rheumatic fever, chorea or scarlet fever. As a result of this survey a number of individuals, who by reason of certain auscultatory signs had been regarded as suffering from organic heart disease, were assured that such was not the case.

Apart from tuberculosis and heart disease, approximately 1,000 cases of other pulmonary conditions were detected and placed under medical supervision. Some 200 of these were intrathoracic new growths. Of these, however, only 70 proved to be malignant. By this method of examination we are unfortunately unable to detect many early cases of intrathoracic new growths, but the number is increasing with experience and improved technique. It may be possible at a later date to correlate the incidence of many of the conditions discovered with occupations or other factors in the life history of the subjects concerned.

Some 1,000 persons whose chests could not be classed as normal on the radiographic evidence were referred for clinical examination but failed to appear. It is consoling however to record that a re-examination of the results suggests that not more than one half of the 1,000 would have required medical treatment or supervision.

Observations on the Value of Mass Radiography. It is of course highly important that this valuable aid to diagnosis should not be regarded as an infallible method for the detection of pulmonary tuberculosis. The interpretation of a radiograph requires skilled knowledge and should not always be the sole criterion of the presence or absence of the disease. In a radiograph of the lungs lesions may show which simulate those of tuberculosis, but which are really due to some other cause, and calcified tuberculous lesions may be quite inactive. The clinical diagnosis of tuberculosis is reinforced but not supplanted by X-ray examination. The technical sub-committee on mass radiography evidently appreciated this important consideration, for they advised that a radiologist with special experience of chest work should work in conjunction with

a chest physician. (*Medical Research Council Report of the Committee on Tuberculosis in War-time*—Appendix, p. 36.) For accurate diagnosis as well as treatment the tried and proven methods must be kept while the new method is added to the clinical armamentarium. R. R. Trail in his address *The Problem of Phthisis*, read at the Medical School, Aberdeen University, April 15, 1947, while admitting that mass radiography is a gain in diagnostic procedure and the first step towards the discovery of an unsuspected but established lesion, pointed out that the method is only in its beginnings. As yet there are all too few units in the country, and it will be a long time before they discover every early case of pulmonary tuberculosis. He added:

> 'If mass radiography is to act as a preventive measure, by segregating or controlling previously unknown sources of massive infection, it requires beds immediately following diagnosis, or intensive work by increasing dispensary staffs, who must visit the patient's home and see that he has not only the education on how to prevent such massive infection, but also the means to use it'.

Unfortunately, the conditions set out by Dr. Trail could not be satisfied by the end of the war. The introduction of mass radiography, as already shown, coincided with a decline in the number of institutional beds and with a shortage of both nursing and domestic staffs. When these drawbacks are overcome, the value of mass radiography in anti-tuberculosis measures under the National Health Service will be proportionately increased.

ALLOWANCES TO TUBERCULOUS PATIENTS

In the course of discussions about the institution of mass radiography it became clear that it would be useless to ascertain the presence of pulmonary tuberculosis in breadwinners who did not yet feel unwell, since they would naturally be reluctant to suspend their earning capacity and to submit to treatment for a disease of which they had hitherto been unaware, and of which many would be imperfectly convinced without this evidence. It was therefore decided that a scheme for the financial assistance of persons under treatment for pulmonary tuberculosis was a necessary corollary to mass radiography; and in October 1942, a committee was set up by the Minister to devise such a scheme to provide adequate maintenance for persons undergoing treatment and their dependants, and to enable specific standing charges associated with the maintenance of the home to be met while the breadwinner is undergoing treatment. It was considered important that the assistance given for this purpose should be associated with, and indeed form part of, the treatment, its administration, therefore, being entrusted to the authority responsible for providing treatment. The membership of the committee included, besides officials of the Ministry and of the Department of Health for Scotland, representatives of the London County Council, the

County Councils Association, the Association of Municipal Corporations and the Assistance Board. Three of the medical members were also chief administrative tuberculosis officers.

In May 1943, Memorandum 266/T was issued, dealing with mass radiography and with maintenance allowances. The allowances scheme was a war-time measure which did not purport to be comprehensive, but was framed primarily to assist patients, who undertake early treatment instead of continuing to work at the risk of breakdown, to meet their necessary financial commitments during a limited period of treatment. The decision whether, and in what form, the treatment should be provided in any particular case was placed on the shoulders of the tuberculosis officer and subsequent experience has proved its wisdom. It was not overlooked that a dilemma would arise in some cases between official obligation and professional duty to the patient, but the Minister to whom Parliament had given the money for war services, could not spend it in ways that could not possibly be regarded as war service. This very real administrative difficulty was part of the price of doing something immediately for the tuberculous rather than doing nothing at all, until something better could be done when the war was over.

The first authority to implement the scheme, in June 1943, was the Hertfordshire County Council.

This new war-time provision was not intended to eliminate the activities of existing Care Committees, but rather to bring them into close relation with the new arrangements through the tuberculosis officer. In some areas, for instance, it was found convenient to arrange for the almoner or social worker of the Care Committee to carry out duties also under the new scheme of allowances.

In brief, the assistance was intended to form an integral part of the Government's policy of attacking tuberculosis by early diagnosis and treatment, with a view to the care of the individual and the removal of sources of infection. The main medical criterion of eligibility was conformity to the prescribed treatment, and the prospect of ultimate restoration to full working capacity.

CHEMOTHERAPY IN TUBERCULOSIS

Ever since the discovery of the tubercle bacillus by Koch in 1882, mankind has hoped for the discovery of a serum, vaccine or drug, which will kill this bacillus. Tuberculin aroused great enthusiasm but is no panacea. It is possible that the wished-for remedy may eventually come through chemotherapy. Koch used gold cyanide in experimental tuberculosis. The results were disappointing and none of the salts of gold, including sanocrysin (sodium gold thiosulphate) appears to exert a specific chemotherapeutic effect against the tubercle bacillus.

In the years immediately preceding the war the discovery of the sulphonamides as powerful therapeutic agents in a number of diseases

caused by bacteria, led to trial of a number of these preparations in the treatment of experimental tuberculosis. It was found that sulphanilamide and a few of its derivatives were capable under certain specified experimental conditions of exerting a limited but definitely retarding effect on experimental tuberculosis. The results were insufficient to justify a clinical trial.

Attention was next turned to the group of synthetic chemical compounds known as sulphones. Certain of these compounds were studied by a number of observers during the war years, particularly by W. H. Feldman and H. C. Hinshaw at the Mayo Foundation, Rochester, Minnesota. The results with these compounds were encouraging to a certain extent.

Promin is the trade name for p, p-diaminodiphenyl-sulphone-N, N^1-didextrose sulphonate. It was synthesised in 1937 by E. W. Tillitson in the Research Laboratories of Parke, Davis and Company. Its trade name in Britain is 'promanide'. Feldman and Hinshaw found it active against the tubercle bacillus both *in vitro* and *in vivo*, and Tytler of the Welsh National Memorial Association found it to be an effective chemotherapeutic agent for tuberculous guinea-pigs. Sulphones tested in the laboratory and on clinical cases of human tuberculosis were diasone, promizole, and various other derivatives of the parent compound 4, 4^1-diaminodiphenyl sulphone.

Promin was the first sulphone to be used clinically. In local application to cutaneous lesions it was reported to be efficacious. Unfortunately, when promin is administered orally to man in doses exceeding 1 to 2 g. per day serious toxic reactions occur. These manifestations include headache, vague muscular discomfort, loss of appetite and haemolytic anaemia. These symptoms are readily controlled by discontinuing the drug. In 1943 F. R. G. Heaf and his co-workers were able to control the anaemia to some extent by the administration of iron. In 1942 they applied promin solution to lesions of laryngeal tuberculosis with good results but as regards pulmonary tuberculosis the results were indefinite. The toxic reactions already mentioned were seen to a greater or lesser extent in cases of clinical tuberculosis treated with the other sulphones. Although then the sulphones which have been tried are of doubtful efficacy in human tuberculosis, the work has been of great value. It demonstrated at long last that the disease produced by the tubercle bacillus has proved to some extent vulnerable to chemotherapy.

The possibility of obtaining an antibiotic agent active against the tubercle bacillus has been recognised for many years and during the war the search for such an agent was greatly accelerated.

Fleming's discovery of penicillin in 1929 opened a new era of therapeutic research and practice in the use of microbial antagonists in the treatment of infectious diseases. During the war Florey, Chain and their collaborators at Oxford succeeded in obtaining active preparations of

penicillin which were effective *in vivo* against certain Gram-positive bacteria, though not against the tubercle bacillus.

This work naturally stimulated research on various moulds and allied organisms directed towards their inhibitive or destructive action on tubercle bacilli. In January 1944, Schatz, Bugie and Waksman of New Jersey announced the important discovery of streptomycin. This substance is obtained from an actinomycete, *Streptomyces griseus*. It was found first by Schatz and Waksman that human tubercle bacilli had a moderate sensitivity to streptomycin and both bacteriostatic and bactericidal effects were recorded.

Feldman and Hinshaw were the earliest to study the effects of streptomycin in tuberculosis. They found that the human and bovine types of the tubercle bacilli were definitely inhibited by streptomycin *in vitro* and *in vivo*. Their important conclusions were as follows:

> 1. Streptomycin, under the conditions imposed, was effective in resolving or suppressing established experimental tuberculosis in guinea-pigs.
>
> 2. Although capable of undeniable deterrent effects in combating or preventing anatomic changes due to *Mycobacterium tuberculosis*, streptomycin in most instances exerted a suppressive rather than a sterilising effect on the infective agent.
>
> 3. In more than a third of the treated animals there occurred a reversal of a previously demonstrated sensitivity to tuberculin.
>
> 4. The unquestionable ability of streptomycin to reverse the potentially lethal course of inoculation tuberculosis in guinea-pigs and the relatively low toxicity, and corresponding safety of purified streptomycin satisfy the prerequisites of a chemotherapeutic agent worthy of a clinical trial.

Clinical trials of streptomycin were made by a number of investigators in the United States and at certain approved centres in Great Britain under the auspices of the Medical Research Council.

The position in 1946 was ably summarised by H. C. Hinshaw, W. H. Feldman and K. H. Pfuetze in *The American Review of Tuberculosis* (Volume LIV, No. 3, September 1946) as follows:

> 'Streptomycin is a therapeutic antibiotic substance highly effective against tuberculosis of experimental animals and is of low toxicity for man. We have used this drug in treatment of a variety of tuberculous lesions in a series of 75 patients. The results observed are consistent with the hypothesis that streptomycin exerts a suppressive effect on the progress of tuberculous infection in man. Limitations to the intensity of the antibacterial activity and possibly to its duration have been demonstrated.
>
> Streptomycin may represent the first clinically feasible antibiotic remedy for tuberculosis, but at this time it cannot be recommended as a substitute for accepted therapeutic procedures, the efficacy of which have been proved by long experience.'

At all events, it can be said that the years of the war witnessed a great advance in specific therapeutic treatment of tuberculosis, which is of good augury for the future.

Note: References to the authorities quoted in this section will be found in The Harben Lectures on *The Chemotherapy of Tuberculosis*, 1946, by William H. Feldman, D.V.M., M.Sc., D.Sc., *J. Roy. Inst. of Pub. Hlth and Hyg.*, (1946), **9**, 287, 322, 361. These lectures give a full account of the subject of the chemotherapy of tuberculosis before and during the war years.

TABLE V

ENGLAND AND WALES

County and Borough Mental Hospitals

Deaths from Tuberculosis

Year	Average daily number of patients resident			Number of deaths						Rate per 1,000 patients resident		
				Respiratory		Other forms		All forms				
	Males	Females	Total	Males	Females	Males	Females	Males	Females	Total	Males	Females	Total
1942	55,299	72,487	127,786	685	392	37	37	722	429	1,151	13·1	5·9	9·0
1943	54,900	72,710	127,610	513	278	40	22	553	300	853	10·1	4·1	6·7
1944	54,575	72,615	127,190	476	252	14	31	490	283	773	9·0	3·9	6·1
1945	54,302	72,237	126,539	381	213	27	11	408	224	632	7·5	3·1	5·0
1946	54,739	72,703	127,442	352	206	24	14	376	220	596	6·9	3·0	4·7

TABLE VI

ENGLAND AND WALES

Deaths from Tuberculosis among Patients in Mental Deficiency Institutions and under Guardianship

Year	Average daily number of patients resident			Number of deaths							Rate per 1,000 patients resident		
	Males	Females	Total	Respiratory		Other forms		All forms			Males	Females	Total
				Males	Females	Males	Females	Males	Females	Total			
1942	22,585	22,463	45,048	87	46	14	14	101	60	161	4·5	2·7	3·6
1943	22,968	22,818	45,786	52	30	19	10	71	40	111	3·1	1·8	2·4
1944	23,424	23,067	46,491	56	47	9	2	65	49	114	2·8	2·1	2·5
1945	23,921	23,407	47,328	53	40	18	19	71	59	130	3·0	2·5	2·7
1946	24,434	23,710	48,144	46	28	18	8	64	36	100	2·6	1·5	2·1

TABLE VII

ENGLAND AND WALES

Deaths from Tuberculosis in Ten of the Larger Mental Deficiency Institutions with an Aggregate Population of some 12,500 *Patients (males* 7,000*; females* 5,500*)*

Year	Average daily number of patients resident			Number of deaths							Rate per 1,000 patients resident		
	Males	Females	Total	Respiratory		Other forms		All forms			Males	Females	Total
				Males	Females	Males	Females	Males	Females	Total			
1942	6,823	5,212	12,035	38	18	3	6	41	24	65	6·0	4·6	5·4
1943	6,975	5,284	12,259	29	5	4	1	33	6	39	4·7	1·1	3·2
1944	7,148	5,338	12,486	24	8	2	1	26	9	35	3·6	1·7	2·8
1945	7,275	5,438	12,713	14	13	9	3	23	16	39	3·2	2·9	3·0
1946	7,360	5,495	12,855	11	6	7	2	18	8	26	2·4	1·5	2·0

VENEREAL DISEASES

By Colonel L. W. HARRISON
C.B., D.S.O., M.B., F.R.C.P. Ed.

INTRODUCTION

The Venereal Diseases Scheme for England and Wales, established in 1916 by Regulations of the Local Government Board, made counties and county boroughs responsible for a venereal diseases health service with a 75 per cent. exchequer grant of total cost of approved schemes. This grant was later, in 1929, merged in the block grant paid to local authorities for all grant-aided services.

By the end of 1938 the facilities for the diagnosis and treatment of venereal diseases comprised 188 treatment centres, 13 hostels for the social rehabilitation of girls who had contracted venereal diseases, one hostel for the care and maintenance of children suffering from vulvo-vaginitis and 99 approved laboratories for pathological work.

It was estimated from the returns from treatment centres that the anti-venereal scheme had reduced the incidence of early syphilis in England and Wales to less than a third of the incidence in 1920. The incidence of gonorrhoea could not be so clearly estimated because many cases of this disease are treated by private practitioners or otherwise. The soft chancre patients averaged about a thousand a year, less than 20 being female.

As further evidence of the progress made, it may be mentioned that the deaths of infants certified as due to syphilis had dropped from 1·57 per 1,000 live births in 1916 and a peak of 2·03 in 1917 to 0·18 in 1938 and 0·17 in 1939. In the Fighting Services stationed at home the admissions for fresh syphilis had fallen thus: *Royal Navy*: from 8·1 per 1,000 per annum in 1921 to 1·96 in 1936; *Army*: from 9·8 per 1,000 per annum in 1921 to 0·9 in 1937; *Royal Air Force*: from 4·1 per 1,000 per annum in 1921 to 0·7 in 1937.

According to Brigadier T. E. Osmond, Adviser in Venereal Diseases to the Army during the War of 1939–45, the general rate for venereal diseases in the Army stationed at home had fallen from an average of about 30 per 1,000 in the War of 1914–18 to 11·3 per 1,000 in 1938.

Altogether, before the outbreak of the war, the great fall in the incidence of fresh syphilis in this country, coupled with the fact that adequate treatment of the disease had become well established and that the sulphonamide drugs promised to be efficacious in the treatment of gonorrhoea, gave good grounds for hope that the two principal venereal diseases would soon become a minor public health problem in this country.

ADMINISTRATIVE ACTION IN VIEW OF THE WAR

War, as is well known, favours the spread of venereal diseases. The general state of heightened nervous tension and excitement in persons

lacking in self-control is one reason, and the shifting of large numbers of people, for instance in military camps, in the neighbourhood of munition works, or through evacuation to areas hitherto sparsely populated may be associated with outbreaks of venereal disease in places unprovided with treatment centres. The War of 1939–45 was no exception in this respect, and the problem was accentuated by the importation of infection from men on leave from abroad, from foreign refugees and by the presence of Allied troops stationed in this country.

Mindful of this danger the Ministry of Health took the following precautions:

Provision for Medical Officers at the Centres. A census was taken of the medical officers working in V.D. treatment centres. It was found that of 357 medical officers then working in the centres only 63 were primarily specialists in venereal diseases, and of these only 44 were in charge of centres. The remainder professed many other branches of medicine, and in order to prevent the existing service from being denuded by the calling up of these officers under their other specialities, the help of the Central Emergency Committee of the British Medical Association was obtained. This committee in its Circular D.67 on *Procedure for the Allocation of Medical Personnel*, dated March 21, 1939, included the following instruction to Local Medical Emergency Committees:

> 'In making allocations Local Emergency Committees are asked to bear in mind the importance of maintaining a sufficient supply in each area of practitioners with skill and experience in the treatment of venereal diseases.'

The secretary of the Central Emergency Committee was also supplied with a list of the medical officers working in treatment centres, so that, whenever practicable, the Medical Department of the Ministry should be informed when it was proposed to call up for duty elsewhere any officer whose name was on this list, in order that arrangements could be made for his replacement if necessary. In the course of the war a certain number of these medical officers were called up, but their places at the centres were filled by local arrangements and in a few cases by the Army Medical Authorities supplying a specialist to take charge. Through these arrangements medical staffing of the centres was maintained.

Conferences with Medical Officers of Health and Medical Officers. Early in 1939, the Ministry's Adviser in Venereal Diseases, Colonel L. W. Harrison, C.B., D.S.O., F.R.C.P.(Ed.) held a number of regional conferences with medical officers of health and medical officers of treatment centres on arrangements to be made in the event of war. An important suggestion made related to the provision of mobile units staffed by a specialist, a nurse, an orderly, a driver and perhaps a clerk, with equipment to be transported in a light covered motor van. The equipment was to be of a simple character necessary for modern diagnosis (exclusive of serum tests) and treatment of venereal diseases.

VENEREAL DISEASES DURING THE WAR YEARS

The following table shows the number of cases of syphilis and gonorrhoea (in all stages) in males and females dealt with for the first time at treatment centres in England and Wales from 1938 to 1945. The figures for 1938 are given for comparison:

TABLE I

Year	Syphilis			Gonorrhoea			Total cases
	Males	Females	Total	Males	Females	Total	
1938	7,832	4,986	12,818	27,947	7,746	35,693	48,511
1939	7,273	4,605	11,878	24,811	6,489	31,300	43,178
1940	7,093	4,226	11,319	21,057	5,882	26,939	38,258
1941	7,790	4,972	12,762	20,572	7,314	27,886	40,648
1942	8,529	6,542	15,071	17,956	8,413	26,369	41,440
1943	8,790	7,960	16,750	18,215	10,043	28,258	45,008
1944	7,667	8,251	15,918	16,629	10,646	27,275	43,193
1945	8,134	8,508	16,642	21,280	11,603	32,883	49,525
Totals	63,108	50,050	113,158	168,467	68,136	236,603	349,761

As regards syphilis, it is believed that the majority of civilian cases coming under medical care within a year of infection were dealt with at the treatment centres. These figures do not represent the true incidence, for they were affected by the large numbers of young people, particularly males, who had been drafted into the various Forces of the Crown, as well as by the numbers who were sent overseas. By 1939 the incidence of early syphilis had reached the lowest point on record, the number (4,986) being over 45 per cent. less than the corresponding figure for 1931. After 1939, the numbers rose only slightly in 1940 and then more rapidly, to reach a peak of 9,642 in 1943, the number falling in 1944 to 9,318. The trends were apparently different in the two sexes. The figure for males reached its peak of 5,472 in 1942 and then began to decline, being 4,384 (about 53 per cent. more than in 1939) in 1944. The figure for females, on the other hand, rose steadily from 1,412 in 1939 to 4,934 in 1944, an increase of over 249 per cent. over the figure for 1939. This great increase in female syphilitic infections was reflected to some extent in the increase in congenital syphilis in infants under the age of one year who came to the treatment centres. From 1939 to 1944 the number increased from 217 to 346 or by over 59 per cent. In gonorrhoea there was in males a decline from 24,811 cases in 1939 to 16,269 in 1944, but in females an increase from 6,489 to 10,646. The figures are probably not representative, for in this disease there is a greater tendency to seek private treatment, especially since the introduction of treatment by sulphonamides. Venereal diseases increased more rapidly in the ports than in the inland towns.

Soft Chancre. The number of cases of soft chancre dealt with for the first time at any treatment centre during the war years in England and Wales and compared with the figures for 1938 were as follows:

TABLE II

Year	Males	Females	Totals
1938	889	15	904
1939	827	11	838
1940	887	21	908
1941	1,017	20	1,037
1942	969	27	996
1943	773	32	805
1944	628	28	656
1945	589	29	618
Totals	6,579	183	6,762

Congenital Syphilis. As already observed, the great increase in female syphilitic infections was reflected to some extent in the increase in cases of congenital syphilis in infants under the age of one year that were dealt with in the treatment centres. This is shown in detail in the following table:

TABLE III

Year	Under 1 year	1 and under 5 years	5 and under 15 years	15 years and over	Totals
1938	216	123	448	951	1,738
1939	217	125	406	866	1,614
1940	191	101	357	709	1,358
1941	223	90	321	746	1,380
1942	245	122	309	788	1,464
1943	310	129	348	940	1,727
1944	346	113	271	822	1,552
1945	326	83	210	736	1,355

The death rates, per 1,000 live births, of infants certified as due to congenital syphilis in 1940 had reached the lowest figure since 1917; they increased slightly in 1941, 1942 and 1943, but in 1944 and 1945 they were 0·16 and 0·15 respectively, that is, lower than the rate for 1938 which was 0·18. Here are the details:

Year	*Rate*
1938	0·18
1939	0·17
1940	0·16
1941	0·21
1942	0·19
1943	0·23
1944	0·16
1945	0·15

After-effects of Syphilis. The deaths in England and Wales from general paralysis of the insane, tabes dorsalis and aneurysm of the aorta (including non-civilians) from 1938 to 1945 are given in the following Table:

TABLE IV

	G.P.I.		Tabes dorsalis		Aneurysm of aorta	
	Males	Females	Males	Females	Males	Females
1938	546	202	362	93	757	351
1939	564	183	361	76	689	311
1940	558	195	334	88	687	279
1941	581	184	303	97	658	286
1942	508	166	241	58	643	277
1943	426	159	253	60	603	298
1944	371	134	221	53	583	339
1945	326	133	221	53	592	261
Totals for 1940–5	2,770	971	1,573	409	3,766	1,740

The 1938 and 1939 figures are given for purposes of comparison.

The increase in the number of deaths from aneurysm of the aorta in females may be a late effect of the incidence of syphilis in females during the War of 1914–18, and the fact that they were largely untreated. The absence of a corresponding increase in deaths from aneurysm among males may be attributable to the fact that, being for the most part in the Services, males contracting syphilis in the period 1914–18 were efficiently treated during the early stages of their disease, and so were more protected against the incidence of late effects than were the females. The above table shows great decreases in the deaths from general paralysis and tabes dorsalis in both males and females. This may be explained by the fact that much more can be done to prevent death after diagnosis of these diseases than is possible in the case of aneurysm of the aorta.

ADMINISTRATIVE ARRANGEMENTS DURING THE WAR

Treatment Facilities. To deal with the increases in the numbers of cases, their wider dispersion and the greater difficulties of travel to the 188 peace-time centres, 41 new centres were set up and the numbers of sessions increased as seemed appropriate.

In addition, under the Ministry of Health Circular 2226 of December 17, 1940, a new service was established in which private practitioners possessing certain special qualifications—summed up in experience of taking specimens for laboratory tests and of giving anti-syphilitic injections—were enrolled to treat patients in their own surgeries at the public expense. The number of such practitioners in the middle of 1945 was 168, and they were situated chiefly in the rural areas

where it was inexpedient to set up treatment centres. The work of these practitioners has been under the supervision of county consultants, and they have been helped, when they requested it, by having the diagnosis and tests of cure done for them at the regular treatment centres. Under such an arrangement, although a patient might have to travel a number of miles in the first instance for confirmation of the diagnosis and later for tests of cure, he was saved the trouble of a long weekly or more frequent journey for treatment purposes.

Although the number of cases dealt with by these practitioners has not been large, 600 in England in 1944, this service may serve a very useful purpose in peace-time, as it is a means of bringing treatment facilities close to patients in rural areas and of avoiding the multiplication of small and uneconomical centres.

These expansions of diagnostic and treatment facilities were encouraged by the Ministry's reimbursing the local authorities to the extent of 75 per cent. of their cost.

The treatment facilities have been used by the medical services of the Forces chiefly for continuation treatment according to the programmes laid down by the respective services. In the later years of the war this use of civilian treatment centres by Service patients had decreased considerably, especially since the intensification of the treatment of syphilis and of gonorrhoea, the latter first with sulphonamides and later with penicillin, and the former with penicillin.

'A Guide for Practitioners working under the Provisions of Ministry of Health Circular 2226 and Department of Health for Scotland Circular No. 50/1941' was prepared by Colonel L. W. Harrison. It contained directions for the care of instruments and for taking specimens for laboratory tests; and described schemes of treatment for syphilis, gonorrhoea and soft chancre.

Laboratory Arrangements. At the outbreak of the war there were 99 laboratories in England and Wales approved for the examination of pathological specimens under the Venereal Diseases Regulations.

War conditions made it impracticable to continue the comparisons of serum test methods by Dr. G. M. Richardson in the special laboratory which the Ministry of Health had established for this purpose in 1924. But the laboratory did good work throughout the war in continuing the preparation of antigen and haemolytic amboceptor for the Wassermann test, in providing complement serum preserved by a method elaborated by Dr. Richardson (*Lancet*, 1941, **ii**, 696) and in issuing antigen for the Kahn test. Preserved liquid complement was supplied not only to approved laboratories but also to those working under the Emergency Medical Service, the Navy, Army and Air Force and the Canadian Army. The issue of this important product is considered to have improved greatly the average standard of the Wassermann test in this country. The Ministry of Health laboratory also continued to act as a

'Court of Appeal' in the case of sera giving equivocal reactions. At the conclusion of the war it was transferred to the control of the Medical Research Council.

Defence Regulation 33B. *Tracing of Contacts and Social Service.* In October 1940, at a conference of representatives of interested governmental departments at the War Office, it was shown that there was no satisfactory means of bringing under treatment a number of girls and women who were responsible for venereal infection of Service men. It was also pointed out that D.O.R.A. 40D, which had been enacted in the War of 1914–18, to deal with a similar problem, had proved entirely unsatisfactory in working and that D.O.R.A. 13A was much too limited in scope to be of practical value. After the conference, continued discussion of the problem by officers of the Ministry resulted eventually in the enactment, on November 5, 1942, of Defence Regulation 33B. This provided broadly that any person who had been reported by one or more special practitioners (recognised as specialists in venereal diseases) as being suspected of having infected two or more of their patients might be compelled to undergo examination by a special practitioner and to remain under the direction of the latter in respect of examination and any necessary treatment until pronounced free from venereal disease 'in a communicable form'. The requirement of two reports before legal action could be taken was to guard against blackmail and against the compulsory examination of persons who had been mistakenly reported by patients as the sources of their infections.

While Regulation 33B could be expected to deal effectively with the class of person whose infection of Service men 'by the dozen' had occasioned the conference in October 1940, it could not be used to apply compulsion to more than a small proportion of the sources of infection. Nevertheless, it led to the examination of large numbers of such persons. Almost from the first the Ministry encouraged local authorities to empower their medical officers of health to urge many of those reported to them under Regulation 33B as suspected sources of infection to submit to examination without waiting for a second report. At first there was some hesitation by a number of local authorities, but the legal position was clarified by the issue of Circular 2896, dated December 28, 1943, and in 1944, out of 8,339 contacts, of whom 246 were men, reported once under the Regulation, 3,696 (including 109 men) were traced, and of these 2,858 (including 84 men) were persuaded to undergo examination. The number in respect of whom two or more reports were received by medical officers of health was 827 (4 male, 823 female). Of these 235 were persuaded to be examined and 417 were served with Form 2 requiring them to submit to examination; the remainder could not be traced. The number of persons prosecuted under the Regulation was 82, of whom 43 had failed to comply with the order to undergo examination in the first instance, and 39, after complying with the order,

had discontinued attendance before being pronounced free from venereal disease in a communicable form.

The Regulation stimulated considerably the work of contact-tracing, and a large number of local authorities have engaged social workers not merely to find and persuade persons reported under the Regulation, but also to persuade voluntary patients to induce their contacts to submit to examination. Such workers also followed up patients who had discontinued attendance prematurely, and they expended much effort on removal of social difficulties which are often responsible for premature discontinuance of attendance. Towards the approved expense of all this social work that was begun after the issue of the Ministry's Circular 2896, a grant of 75 per cent. was made.

Committees on the Question of Compulsory Treatment. The question of widening the scope of compulsion to be applied to persons suffering, or suspected of suffering, from venereal disease to undergo examination and any necessary treatment, was considered by two committees. The first was a Joint Committee, under the chairmanship of Sir Weldon Dalrymple-Champneys, Deputy Chief Medical Officer of the Ministry of Health, on which were represented the Admiralty, War Office, Air Ministry, Ministry of Health, the Department of Health for Scotland, the Home Office, the Metropolitan Police, the Canadian and the United States Armies. It was appointed in June 1943, and recommended that parents and guardians of children suffering from congenital syphilis should be compelled to continue taking their charges for treatment, and that parents of congenital syphilitic children and of infants with gonococcal ophthalmia should be compelled to undergo examination and any necessary treatment; but it did not recommend any general measure of notification and compulsory treatment.

The second was a sub-committee of the Minister's Medical Advisory Committee, which was appointed in March 1944, solely to consider the question of notification. Its recommendations (dated September 1944), with which the Medical Advisory Committee concurred, were to the following effects:

> (i) It is premature to seek at the present time to introduce any system of general notification of the venereal diseases whether by code or otherwise.
>
> (ii) The value of a system of notification of defaulters is doubtful and development of a comprehensive scheme of social work in every area is an essential prerequisite of any such system.
>
> (iii) The principle of the notification of congenital syphilis in children is approved, but it is doubtful whether the elaborate legal and administrative arrangements necessary would be justified by the results obtainable. The same consideration applies with even more force to other suggested partial forms of notification (e.g. gonococcal vulvovaginitis).

(iv) Some form of regular return which would provide information about the number of patients treated by private practitioners should be adopted. The Ministry of Health should discuss with the medical profession the most appropriate form of this return with a view to early action.

(v) The following measures are essential prerequisites of any general system of notification, and the Ministry of Health and others concerned should take immediate action accordingly so far as present circumstances allow:

(*a*) The development in every area of a comprehensive service of social workers in association with treatment centres in order to assist patients with their social problems, to bring defaulters under treatment, and to trace contacts.

(*b*) The continuance and development by every appropriate method of the educational campaign in relation to venereal disease.

(*c*) The improvement and development of facilities for diagnosis and treatment.

In addition the sub-committee recommended the encouragement of routine Wassermann testing of expectant mothers.

Circular concerning Men Demobilised. The danger of the spread of infection in this country by men returning after demobilisation was foreseen and as a result of negotiations by the Ministry of Health with the War Office, the following circular, which is self-explanatory was addressed by the Chief Medical Officer of the Ministry of Health, to the medical officers of health of counties and county boroughs and the Common Council of the City of London, on December 31, 1945:

Medical Officers of Health are now receiving from the War Office forms as in the enclosed specimen [24/Gen/2854 (A.M.D.5)], signed by men released from the Army while under treatment or surveillance for venereal disease. The object of this arrangement is explained in the instructions of which a copy is also enclosed issued by the War Office to Directors of Medical Services of all Commands.

'A soldier who is under treatment for venereal disease when he leaves the Forces may become negligent in continuing treatment on return to civil life. The Army authorities explain to each man before his release that the Medical Officer of Health of his home area will readily offer him the necessary facilities for continuing treatment, and I am sure that you will do everything possible to ensure that any man concerned in your own area is put in the way of receiving all necessary further treatment and observation, both for his own benefit and to prevent the spread of infection. I should be glad, therefore, if, on receiving one of the forms referred to above, you would take appropriate steps to follow up the case. A visit to the man's home by a medical officer or a health visitor may be impracticable, or even undesirable, and it may be preferred to send him a personal letter. This might be to the effect that you understand that he is now demobilised and that if he needs treatment (other than treatment for

which he prefers to go to his own doctor) for any illness which he had while serving you will be glad to advise him and to furnish particulars of available facilities. If framed in these general terms the letter should obviate untoward consequences if it chances to be seen by another person. A follow-up in this way will not be of questionable propriety since the names you will receive will only be of men who have voluntarily given written consent to the notice being sent to you and to whom its purpose has been explained.'

Notwithstanding the precautions which are obvious in the above letter, trouble did arise in men's families when some of these letters reached the men's homes before the men did, and special steps had to be taken to prevent this happening.

Education of the Public. An intensive campaign for education of the public on the perils of venereal diseases began in October 1942 with a broadcast talk by the Chief Medical Officer of the Ministry of Health. In 1943 the Ministry of Health, the Ministry of Information and the Central Council for Health Education collaborated in press advertisements, posters, films, lectures and a pictorial exhibition in munition works and factories; this campaign continued for the remainder of the war years at a cost of approximately £150,000 per annum. It had the effect of increasing considerably the numbers of persons who attended at the treatment centres, including many who were found not to be suffering from any venereal disease.

COMMENT

As was expected, the incidence of venereal diseases greatly increased during the war years. Steps were taken by the medical department of the Ministry of Health both before and at the outbreak of war to prepare for this eventuality, and on the whole the arrangements, reinforced by a campaign for the education of the public, met with a fair share of success.

Difficulties experienced in maintaining the staffs of treatment centres at an efficient level, and in providing for diagnostic and other help for private practitioners enrolled under the scheme, would have been much less if the service had been organised on an area basis, with small centres dependent for their staffs on large centres. The staffs of the large centres would also have been able to provide the supervision of practitioners' work envisaged in the Ministry of Health Circular 2226. Apart from this criticism, the work done in coping with a great influx of new patients at the centres, in adopting new methods of treatment and in maintaining an efficient service in the perils and vicissitudes of the war are deserving of the highest praise. Administrators, medical officers of health and above all the medical officers of the treatment centres and private medical practitioners enrolled under the scheme all share in this encomium. The help given by the Services and by the Allied medical officers stationed

in this country, including those of the British Dominions and United States, was an admirable example of co-operation against this scourge.

The war years will always be memorable for the advances made in the treatment of syphilis and gonorrhoea. During the war sulphathiazole largely superseded sulphapyridine in the treatment of gonorrhoea. In the five years 1934–8, immediately before sulphonamides became the treatment of choice in gonococcal ophthalmia, of 20,726 cases of ophthalmia neonatorum notified in England and Wales, 157 resulted in impaired vision and 38 in blindness. In the five years 1939–43, during which sulphonamides were improved and treatment with this class of remedy became a matter of routine, out of 21,326 notified cases, 55 (24 of them in 1939) resulted in impaired vision and only 9 in blindness.

There were indications that the proportion of sulphonamide-resistant gonococcal infections had increased after 1939, as might be expected from the gradual extermination of the sulphonamide-sensitive strains of the gonococcus. Fortunately, in this country the increase of sulphonamide-resistance by no means reached the extent reported by Lieut. Colonel D. J. Campbell, R.A.M.C., and others as found in Service men in Italy. It was, however, to be expected that the value of the sulphonamide group of remedies in gonorrhoea would gradually diminish. The position was changed by the arrival of penicillin, potent both in syphilis and gonorrhoea, and as soon as penicillin became more freely available the centres were encouraged to use it as a matter of routine. Thereby the treatment of gonorrhoea could be completed in eight hours or less and the total treatment of syphilis (exclusive of observation following treatment) was reduced from about a year to approximately ten weeks.

For further details the article entitled 'Technical Developments in the Management of Venereal Diseases' in the Volume on Medicine and Pathology, Chapter 5, should be consulted.

It can be said then that the years of the war not only increased the magnitude of the problem of venereal disease in this country but witnessed great advances in overcoming the effects of the disease.

CANCER

Mortality. The following table shows the mortality from cancer in England and Wales (excluding non-civilians) from 1938 to 1945.

The number of cancer deaths of civilians in 1945 was 73,753. This showed an increase of 2,065 on the figures for 1944, the increase being from 34,881 to 36,258 for males and from 36,807 to 37,495 for females. The crude death rate was 2,209 per million males and 1,724 per million females. When the best possible allowance is made for changes in age distribution of the population, mortality in terms of that of 1938 as unit (i.e. the comparative mortality index) was 1·025 for males and 0·936 for females. The average index in the five years 1933 to 1937 was 0·990 for males and 1·006 for females; and comparison of the 1945 figures with

these levels of ten years previously shows an increase of 3·5 per cent. for males and a decrease of 7·5 per cent. for females. The index for males had not changed consistently since 1940; but the index for females had fallen steadily from 0·984 in 1940 to 0·940 in 1944 and then to 0·936 in 1945.

Year	No. of Deaths			Crude death rate per million living		Comparative mortality index (1938 basis)*	
	M.	F.	Total	M.	F.	M.	F.
1938	31,899	34,685	66,584	1,612	1,619	1·000	1·000
1939	32,077	35,056	67,133	1,629	1,626	·983	·984
1940	33,135	35,605	68,740	1,816	1,645	1·011	·984
1941	33,486	35,488	68,974	1,944	1,649	1·014	·968
1942	34,011	36,128	70,139	2,024	1,685	1·013	·963
1943	34,952	36,862	71,814	2,140	1,716	1·023	·960
1944	34,881	36,807	71,688	2,155	1,704	1·007	·940
1945	36,258	37,495	73,753	2,209	1,724	1·025	·936

* Mortality in terms of that of 1938, adjusted for changes in age-constitution of the population at risk since 1938.

STATE PROVISION FOR THE DIAGNOSIS AND TREATMENT OF CANCER

The Cancer Act was passed in 1939 a few months before the outbreak of war. The intention of this Act was to set up a National Cancer Service with the Ministry of Health acting in a supervising, co-ordinating and advisory capacity. The actual work of administration and provision of facilities for diagnosis and treatment was placed under the control of the chief local authorities (county councils and county borough councils) with their medical officer of health as medical administrative officer of the scheme. Each council, within a specified time, after consultation with representative members of the local medical profession, was to submit a scheme for the diagnosis and treatment of patients suffering or suspected to be suffering from cancer in its area for the approval of the Minister of Health.

The intention of this Act was to make modern facilities for the diagnosis and treatment of cancer generally available throughout Great Britain. There was a similar Act for Scotland. This Act had perforce to remain largely in abeyance during the war. It was realised that war problems would occupy so much of the time of the major local authorities that they, with their depleted staffs, could not prepare schemes for a new service, while the hospitals were fully occupied with preparation for the reception of casualties. Nevertheless, in the later stages of the war most local authorities either increased the facilities for cancer diagnosis and treatment in their area, with the approval of the Ministry of Health, or began to consider how such facilities might be increased. After the war the Cancer Act was repealed, as provision for cancer was merged in the National Health Service.[1] [2]

Sub-committee on Cancer. The Minister of Health, in May 1943, appointed a sub-committee of his Medical Advisory Committee to advise him on matters connected with the diagnosis and treatment of cancer, and schemes submitted to him for approval were referred to this committee. The committee formulated certain principles to which all schemes should conform, but a rigid model was not laid down. The first requirement was that a satisfactory scheme must cover a large population, i.e. between 1½ and 4 millions. The area organisation for such a population should be based on a teaching hospital with its associated medical school, laboratories and research facilities. Associated with this centre would be the general hospitals serving the whole region or area. The district hospitals participating in the Cancer Scheme must themselves possess full consultant staffs, resident medical staffs, and training schools for nurses.

MODERN FACILITIES FOR THE DIAGNOSIS AND TREATMENT OF CANCER

The reasons for the establishment of a National Cancer Service in Great Britain were as follows. They summarise briefly the advances made in knowledge of cancer in recent years:

1. The increased knowledge available concerning the clinical manifestations, course, behaviour and treatment of cancer and other forms of malignant disease generally.

2. The statistical and other investigations conducted by the Ministry of Health, including the effects of this disease upon the community.

3. The advance in modern diagnostic methods, for example biopsy and X-ray examination.

4. The advances in treatment, comprising surgery, deep X-ray therapy and radium.

5. The application of these methods had shown that a large proportion of cancer in accessible sites, if diagnosed and treated early enough, was curable; also that the condition in later stages could be ameliorated and much needless suffering obviated by skilled treatment.

6. This knowledge of the curability and amelioration of cancer was not sufficiently widespread among the public; many persons through ignorance or fear delayed to seek treatment at a stage when cure was possible.

Educational methods are important in imparting knowledge of the curability of cancer to the public. The British Empire Cancer Campaign had helped considerably in this direction.

7. Before the war the British Radium Commission had set up treatment centres at a number of hospitals, but the facilities in the country for the specialised treatment of cancer were too few. Consequently a large number of patients suffering from cancer in treatable parts of the body could not get the treatment which would either save their lives or mitigate their sufferings.

8. Lastly, the advances made during the war into atomic energy, the work of experimental physicists with the cyclotron or betatron and other researches into radio-activity offered hope that in the future it would be possible to treat successfully deep-seated cancers with rays of greater penetration than had hitherto been practicable. From time to time rare instances of deep-seated cancers, which had unexpectedly and surprisingly yielded to deep radio-therapy, were recorded in the medical journals. If experimental work of the kind mentioned were found to have practical application in the future, it was clearly desirable that it should be available as soon as possible for all persons suffering from deep-seated cancers; this could only be done through a national scheme and with State aid and regional organisation.

Records. In 1939 a national system of records for all cancer patients was instituted. Forms of records were drawn up by the Ministry of Health and the Radium Commission and were used by all authorities whose interim arrangements under the Cancer Act had been approved. In addition they were used by other hospitals and authorities with the Ministry's permission. By this system every cancer patient was to be registered, irrespective of whatever stage of the disease he came under medical attention or whether or not the disease were capable of treatment. In this way not only would it be easier to secure continuous treatment for sufferers from cancer, but also valuable information on the morbidity of cancer and the size of the cancer problem would be obtained. A new system of keeping these records was instituted in January 1945. The Radium Commission continued to advise on the system for a year, after which the analysis of cancer records was taken over from the Commission by the General Register Office.

REFERENCES

[1] Min. of Health Report "On the State of the Public Health." *Ann. Rep.* of the Chief Medical Officer for the year 1938, pp. 114–122. London, H.M.S.O., 1939.
[2] MacNalty, A. S. (1939). "The Cancer Act, 1939, and the Duties which will be Imposed on Local Authorities." *J. roy. san. Inst.*, **60**, 278.

CHAPTER 4

MATERNITY AND CHILD WELFARE

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EVACUATION

Of the many novel problems with which the Ministry of Health and local authorities were called upon to deal on the outbreak of war, some of the most difficult were those arising from large scale movements of population under the Government Evacuation Scheme. From populous evacuation areas, generally well supplied with hospital and other facilities, special groups of inhabitants were transferred, on a voluntary basis, to more rural and sparsely populated reception areas in which such facilities had not been developed to the same extent. This invasion necessitated the strengthening of existing local health services in the reception areas and their expansion by improvising maternity homes, sick bays for minor ailments, residential nurseries for healthy children and hostels for difficult children and other purposes in connexion with billeting. For such developments local authorities had been prepared beforehand. The general intentions of the Government in regard to evacuation were already known, and the special requirements for certain priority classes, including expectant mothers and children under five had been outlined and circulated in May [1] and June 1939.[2] It is only necessary here to give a brief account of the effect of the scheme on Maternity and Child Welfare Services.

EFFECTS OF EVACUATION ON NORMAL SERVICES

The maternity and child welfare work of welfare authorities was affected by four factors which operated to a varying extent in different areas:

(*a*) the closure of infant welfare and ante-natal centres in evacuation areas;

(*b*) the use of centre premises as first-aid posts;

(*c*) the diversion of health visiting staff to A.R.P. duties in connexion with (*b*);

(*d*) the transfer of health visiting personnel from the evacuation to the reception areas.

As a result of these measures there was inevitably some initial disorganisation in the evacuation areas, but the impact of war upon this branch of the Public Health Services soon proved to be less serious than was at first supposed. Infant welfare centres converted into first-aid

posts were, as soon as practicable, re-opened, and the curtailment of activities in the evacuation areas was to some extent balanced by increased facilities for the care of mothers and young children in the reception areas, where evacuees attended existing clinics and additional sessions were held as and when required to meet their needs. A review of the position at the end of the first year of the war revealed that, with few exceptions, reasonably adequate maternity and child welfare services were being provided.

In the earliest days of the war, local authorities were advised that health services should be placed at the disposal of evacuated persons equally with the normal population of receiving areas[3] and in April 1940 the attention of welfare authorities was again drawn to the need for bringing within the scope of their services all mothers and young children in their area, whether evacuated under the Government Scheme or privately.[4] These services were to include health visiting, facilities at clinics or centres, and the provision of milk and meals, etc. The importance of co-operation and economy between evacuating and receiving authorities was recognised from the outset, and many of the former were able to transfer, on loan, medical and health visiting staff for work in the reception areas, at the same time maintaining facilities in their own districts for unevacuated persons and for the many evacuees who, despite every inducement by the Government to the contrary, returned to London and other evacuation areas during periods of respite from air raids.

The additional expenditure incurred by receiving authorities in extending their services to evacuated mothers and young children was, in the first instance, to be met by welfare authorities in evacuation areas for persons normally resident in their districts; but it was not intended that evacuation should increase the burden of local rates, and the Minister of Health was therefore prepared to recognise for exchequer grant any irrecoverable additional expenditure incurred by welfare authorities, whether in reception or evacuation areas, as a result of evacuation under the Government scheme.

Maternity and child welfare services were quickly adapted to war conditions and by the second year of the war had become stabilised. Welfare authorities in reception areas accepted and discharged their responsibilities for evacuated mothers and children under five without impairment of existing schemes. But during the following year the maintenance of efficiency became increasingly difficult owing to the general shortage of medical and nursing personnel, and it was fortunate that no need arose for further extension or development of emergency measures at that time. Steps were taken, however, to improve existing arrangements for the maintenance of emergency maternity homes and residential nurseries, which continued to play a valuable part in maternity and child welfare activities of the areas which they served.

NUTRITION

To safeguard the nutrition of expectant mothers and young children a National Milk Scheme was introduced in 1940 by the Ministry of Food in consultation with the Ministry of Health to supply liquid milk free or at a reduced price, to expectant mothers and children under five who were entitled to receive one pint daily or, in the case of infants under one year, its equivalent in dried milk. During the winter months the supply was secured by restricting the allowance of milk to the general public. In April 1941, arrangements were made to supply a half cream as well as a full cream dried milk under the National Scheme.

The Ministry of Food, in consultation with the Ministry of Health, also introduced a scheme for supplying cod liver oil and fruit juices sufficient to meet the needs of all children under two, so far as vitamins A, D and C were concerned, and the co-operation of the welfare authorities was obtained in overcoming difficulties of distribution.

The original fruit juices comprised blackcurrant syrup for infants under six months and blackcurrant purée for those between six months and two years. These were superseded early in 1941 by lend-lease supplies of concentrated orange juice.

During the winter of 1941–2, egg allocations were made in the proportion of four to each expectant and nursing mother and child under five, against one to the ordinary consumer; in 1942 a child under five was also allocated two packets of dried egg compared with the ordinary allocation of one. Oranges were reserved for children under six years of age. Many welfare authorities also provided meals for necessitous expectant mothers in recognised communal centres.

Some time elapsed, however, before the value of vitamin supplements was sufficiently recognised by parents. In the early part of 1942 it was found that only a comparatively small percentage of eligible children were being given the benefit of these preparations, the distribution of which was extended later in that year to children up to five years of age, as well as to expectant mothers during the last six months of pregnancy. The supplements were placed on sale at maternity and child welfare centres and local food offices and an intensive publicity campaign was undertaken by the Ministries of Health and Food to impress upon mothers the importance to the health of their children of cod liver oil and fruit juice, particularly in the winter months.[5]

Following reports of an increased deficiency of iron in young children, tablets of ferrous sulphate were issued to all residential and war-time nurseries, both for prophylactic and therapeutic use.

During 1943, expectant mothers during the last six months of pregnancy were supplied with tablets of concentrated fish oil instead of the national cod liver oil compound, made available through the antenatal clinics, hospital maternity departments and food offices, as was the concentrated orange juice.

In spite of all the efforts to make mothers realise the importance of obtaining these supplements for themselves and for their children, the take-up of the vitamin supplements continued to be disappointing. The average percentage take-up in England for fruit juices did not exceed 45·7 per cent. of the potential issue if all expectant mothers had drawn their full allowance; for cod liver oil the corresponding figure was only 21 per cent.; and for vitamin A and D tablets 34·3 per cent. whilst the Welsh averages were even lower.

The daily food value of the expectant mother's rations and priority allowances (i.e. exclusive of unrationed food) was as follows:

	Protein	Calories	Calcium	Vitamin A	Vitamin C	Vitamin D
	g.		mg.	I.U.	mg.	I.U.
Rations . . .	34	910	320	970	2	55
Priority allowances .	33	540	710	4,640	37	845
Totals	67	1,450	1,030	5,610	39	900

If, therefore, the mother did not consume her priority allowances in full she lost the benefit of the extra calcium and vitamins A, C and D specially provided for her requirements, and could not get the balanced and supplemented diet so necessary for maternal and infant health.

Allowance must be made for the ebb and flow in the evacuation of many beneficiaries who in consequence found it harder to draw supplies. That more fresh oranges were available in the shops may partly account for the small take-up of orange juice, and some mothers no doubt preferred to buy proprietary vitamin preparations. After publicity by means of posters, leaflets, films and advertisements, and in the home, the advocacy of midwives, health visitors, district nurses and women's organisations, much still remained to be done to educate mothers as to their own and their children's nutritional needs.

The national provision of milk and vitamin supplements to the priority groups did more than any other single factor to promote the health of expectant mothers and young children during the war, and this scheme, together with rationing and the improved nutritional qualities of the national loaf, contributed to the gradual decline in the maternal, neonatal and infant mortality and stillbirth rates. It resulted in the consumption of more milk per head by these priority groups to whom milk is of vital importance, particularly those 'necessitous classes' who, before the war, could not afford enough milk.

MATERNAL CARE

Evacuation of Expectant Mothers to Reception Areas. The Government Scheme for the evacuation of this priority group provided for the establishment of improvised maternity homes for the reception of

normal cases; arrangements for hospital treatment of abnormal cases, and for patients who developed pyrexia during the puerperium; adequate midwifery staff; arrangements for the medical supervision of the maternity homes; a service of consultant obstetricians; and arrangements for ante-natal billets and ante- and post-natal hostels.

Emergency Maternity Homes. These were established in reception areas throughout the country by the adaptation of dwelling houses, convalescent homes, hotels and boarding houses and by the extension of existing maternity units in homes and hospitals. In selecting suitable houses for this purpose, their accessibility to existing hospitals, where facilities were available for the treatment of abnormal cases, was one of the primary considerations. Patients who developed puerperal pyrexia were immediately transferred to the nearest infectious diseases hospital or to other suitable institutions.

Midwives. The Central Midwives Board gave invaluable assistance in providing midwives to staff the maternity homes and undertook their general allocation in the reception areas on behalf of the Ministry. Arrangements were made between the evacuation and reception authorities for the supply of midwives and in certain cases where the maternity departments of hospitals in the evacuation areas were closed down, the staff were transferred as units to maternity homes in the country. Additional staff was obtained by the employment of local practising midwives or through the Central Midwives Board.

Medical Supervision. In emergency maternity homes where the number of beds exceeded forty, resident medical officers with special experience in obstetrics were appointed. Some of these officers were supplied by the evacuation authority, while others were obtained through the local medical war committee. In some cases, medical officers were transferred with maternity units from the parent hospital. For the smaller homes, medical practitioners with special obstetric experience were selected as visiting medical officers.

Arrangements for the provision of the services of consultant obstetricians varied according to the needs of reception areas. For homes in those counties around London to which large numbers of expectant mothers were evacuated, full-time consultant obstetricians were appointed, but in the provinces, where the numbers were considerably less, the existing consultant services of the county council were usually sufficient.

The honorary obstetric consultants appointed were: Professor Farquhar Murray, M.D., F.R.C.S., F.R.C.O.G., (North-eastern Region); Professor W. Fletcher Shaw (afterwards Sir Fletcher Shaw) M.D., F.R.C.P., F.R.C.O.G., (North-western Region); Professor Sir Beckwith Whitehouse, M.S., F.R.C.S., F.R.C.O.G., (Midland Region); Eardley Holland, Esq., (afterwards Sir Eardley Holland), M.D. F.R.C.P., F.R.C.S., F.R.C.O.G., (South-eastern Region); Dame

Louise McIlroy, D.B.E., M.D., F.R.C.P., F.R.C.O.G., (South-western Region, Counties of Bucks., Berks., Oxford and Wilts.); H. L. Shepherd, Esq., Ch.M., M.B., F.R.C.O.G., (Remainder of South-western Region); Professor G. I. Strachan, M.D., F.R.C.P., F.R.C.S., F.R.C.O.G., (Wales).

Billets and hostels. Once the improvised maternity homes had been established, evacuation officers were asked to direct expectant mothers to billets within easy reach of the homes. This unavoidably meant that too many expectant mothers (many of whom were accompanied by one or more children under five) were billeted in particular areas, in some of which difficulties of finding suitable accommodation for this type of evacuee became so acute that some means other than billeting on householders had to be found. The establishment of ante-natal and post-natal hostels for the reception of expectant mothers before confinement and after discharge from the maternity homes proved to be the best solution of the problem.

These emergency arrangements for maternal welfare worked well. Great credit was due to those concerned in the administration of the improvised maternity homes and to their staffs, who adapted themselves to the new conditions and did much to contribute to the successful results subsequently reflected in the continual fall of the maternal mortality rate.

The scheme for the evacuation of women in the last month of pregnancy operated continuously throughout the five years from the outbreak of war in 1939 to 1944, an average of 250 per week being evacuated from the London area. In the quiet intervals which occurred from time to time during those years, only a trickle evacuation was maintained, but during periods of sustained aerial activity such as occurred in 1940–1, the numbers reached approximately 500 per week. In the summer of 1944 the volume again increased, when intensive flying-bomb attacks gave impetus to the exodus, and weekly parties of between 750 and 800 expectant mothers were leaving the London area, in which only 490 births per week were taking place as compared with the normal pre-war figure of 1,000 to 1,120.

After consultation with the London County Council and voluntary hospitals, it was decided to reduce maternity accommodation in London by 50 per cent. Accommodation in the safer areas, on the other hand, was greatly expanded and served not only the officially evacuated but also the increased number of women who left London in the earlier stages of pregnancy, for whom provision had to be made in the districts to which they went. By the end of August 1944, in addition to the emergency maternity homes established at the beginning of the war, nearly 800 extra maternity beds had been provided by (a) the acquisition and adaptation of premises; and (b) the release of E.M.S. beds in hospitals where there were existing maternity units. This rapid provision

of additional beds, which were served by newly established ante- and post-natal hostels, was made possible by the loan of staff and equipment from local authorities and voluntary hospitals in the London region, from which nearly 200 midwives, in addition to pupil midwives and assistant nurses, were transferred to the new maternity units.

Here a tribute should be paid to the admirable way in which the machinery of the London County Council for evacuating parties of expectant mothers was adapted and expanded to meet the extra load. Evacuation of these special parties took place smoothly under extremely trying conditions and everything possible was done to overcome the unusual difficulties which arose during the peak of the flying-bomb period. Equal credit is due to the welfare authorities in the provinces for the helpful way in which they responded to London's needs at this critical time. The rapid expansion of the scheme was entirely dependent on the whole-hearted goodwill and tireless co-operation of all concerned, both at the evacuating and receiving ends.

The results in these emergency maternity homes were as follows: Up to the end of December 1944, 151,936 mothers had been confined in them. Medical aid was summoned in 27,891 cases (18·3 per cent.); 2,943 stillbirths occurred, a rate of 19·3 per thousand; 128 maternal deaths, that is 0·8 per thousand, and 1,454 infant deaths, a neo-natal rate of 9·6. The number of cases of puerperal pyrexia notified was 3,413, i.e. only 2·2 per cent of the total number of cases. It must be remembered that normal cases only were selected for admission to the emergency maternity homes and that, therefore, the rate must be expected to be lower than in hospitals admitting both normal and abnormal cases. In the nine emergency maternity homes "upgraded" to admit abnormal cases, the figures, although higher, were reasonably good. In all, 29,828 patients were confined in these nine homes; 794 cases of puerperal pyrexia were notified, that is 2·6 per cent., the still-birth rate was 25·6 per 1,000 births (765 cases), and the maternal and infant mortality rates were 1·9 per 1,000 (59 cases) and 13·9 (415 cases) respectively.

The general opinion of those working in the emergency maternity homes was that the mothers benefited considerably by the enforced rest during the last few weeks of pregnancy and that as a result the confinements were easier; uterine inertia was practically unknown and, therefore, less interference was required. Detailed statistics for the four years ending December 1944 are only available for two of the emergency maternity homes admitting abnormal cases, namely, Dilston Hall and Shardeloes. In these, the percentage of cases requiring interference is shown in the table on p. 135.

Towards the end of 1944, the number of confinements in emergency maternity homes fell from the peak of 860 per week reached during the height of the flying bomb period to a weekly average of 550 to 600,

which remained fairly constant until May 1945, when hostilities in Europe ceased. The Government Evacuation Scheme remained in operation, however, until the end of August for the sake of women for whom arrangements thereunder had been made in advance. During the period January 1 to August 31, 18,513 mothers were confined in the emergency maternity homes, as many as possible of which were kept open thereafter owing to the acute shortage of home and institutional accommodation, especially in Greater London. Forty-six homes remained on September 1 with a total of 1,407 beds; but their use could no longer be regarded as a war emergency, nor their cost justified as a charge on the exchequer. From that date, therefore, the expenditure became the responsibility of the 'sending' local authority and a flat-rate charge of 14s. a day was made for each mother in emergency maternity homes, in which 4,876 confinements took place during the four months ending December 31, 1945.

	Confinements	Percentage of forceps cases	Percentage of cases of Caesarean section	Percentage of cases of breech deliveries	Percentage of cases of post-partum haemorrage	Percentage of cases requiring manual removal of placenta
Dilston Hall	3,850	5·3	2·8	1·9	1·7	0·7
Shardeloes	2,814	6·6	1·2	2·2	2·8	0·9
Totals	6,664	5·9	2·1	2·1	2·3	0·8

These figures compare favourably with ordinary maternity units admitting normal, abnormal or emergency cases.

Maternity Accommodation. As the war advanced, the demand for institutional confinements (which had already shown an upward trend) was increasingly felt. In the years immediately preceding the war about two-thirds of the total births were domiciliary confinements while the remaining one-third took place in institutions. The change in the trend can be attributed to:

(*a*) the reduction or destruction of maternity units in London and elsewhere owing to enemy action, aggravated by the closure of maternity beds in the upper storeys of maternity hospitals and other institutions;

(*b*) overcrowding in the homes, by evacuees, transferred workers and relatives who had been bombed out of their own premises;

(*c*) the absence on war service of husbands, friends and relatives, who normally would look after the mother in the home between the visits of the midwife night and morning;

(*d*) lack of domestic help in the home.

In spite of the efforts made to develop the scope of the Home Help Services to meet the needs of women who were unable to make satisfactory arrangements of their own at the time of the confinement,

many welfare authorities experienced great difficulty in finding suitable women to act as home helps. There was need for additional maternity beds in many parts of the country, but the restriction on building due to shortage of labour and materials precluded the erection of new maternity units at this time. Expansion of maternity provision in areas where it was a matter of urgent necessity took the form of extension of existing accommodation and adaptation of dwelling houses. Many hospitals had to restrict bookings to first confinements, complicated cases, and those whose home conditions were unsuitable for confinement. By the end of 1943 the total number of beds provided was sufficient to cater for approximately 50 per cent. of the total births. This was a distinct improvement, but as the distribution of beds was unavoidably unequal, it did not ease the situation in all areas and the shortage of maternity beds remained acute. The emergency maternity homes not only accommodated mothers evacuated from vulnerable areas, but also helped to augment maternity accommodation for local cases and thus were of material assistance in meeting the ever-increasing demand for institutional confinements.

At the end of May 1943, 4,000 additional maternity beds had been provided since the war began, and by the end of 1944 nearly 5,000. The demand for more institutional accommodation continued throughout 1945, in which year some 300 additional beds were made available.

Shortage of Midwives. The difficulties which arose from the inadequacy of available maternity accommodation were aggravated by the shortage of midwives. This shortage was due to a variety of causes, in particular, the call-up to military nursing of reserve members and the attraction of midwives to other and more spectacular branches of nursing. Some slight relief resulted from the action of the Ministry of Labour and National Service in 1943 in requiring pupil midwives to practise midwifery for a year after passing the examination of the Central Midwives Board, but the position was difficult in many homes and hospitals: there were beds in maternity units which could not be fully used for lack of midwifery staff. It is hoped that the better salaries and improved status resulting from the recommendations of the Rushcliffe Committee will help to attract more recruits into the midwifery profession in the future.

MATERNAL MORTALITY

With the exception of a slight rise in 1941 to 2·79 per thousand total births, the maternal mortality rate, including abortion, fell gradually from 3·10 in 1939 to 2·62 in 1940, 2·47 in 1942, 2·30 in 1943, 1·92 in 1944 and 1·80 in 1945, the lowest ever recorded. The rate was still too high for complacency, but it is at least satisfactory to record that, despite the difficulties of shortage of staff for both hospital and domiciliary midwifery services, the rate was on a decreasing scale throughout the

war years and that in the fifth and sixth years of war new record low levels were reached.

The decline in the sepsis rate was even more remarkable. The introduction of treatment by sulphonamides undoubtedly contributed largely to the improvement. In 1941 the figures for infection during childbirth and the puerperium reached the low level of 0·48 per thousand births. The decline continued with a fall to 0·42 in 1942, 0·39 in 1943, 0·28 in 1944 and 0·24 in 1945. The stillbirth rate fell in each year of the war until the record figure of 28 per thousand births was reached in 1944 and 1945.

The rise in the birth rate to 15·6 in 1942 was continued. In 1944 it reached 17·7 per thousand total population, the highest since 1926, but declined to 15·9 in 1945 after the departure of large forces oversea during the previous year.

The effective reproduction rate representative of the birth experience in England and Wales in 1944 was provisionally assessed as 0·996, a figure within 1 per cent. of a full par replacement standard and one not equalled since 1923. This was a remarkable increase on the corresponding rate in 1941 (0·761) which was the lowest but one ever recorded. It is important to bear in mind that in war years both marriage and birth rates are liable to wide fluctuations.

CHILD CARE

The infant mortality rate in 1944 was 45 per 1,000 related live births. This constituted a new record as compared with 49 in 1943, 51 in 1942, 60 in 1941, 57 in 1940 and 51 in 1939. It is gratifying to be able to record that after five years of war the infant mortality rate was six points below that of the year in which hostilities began and the lowest ever recorded. There was only a slight increase in 1945, when the rate was 46. This delicate index of the nation's health is perhaps one of the most valuable indications we have that the special efforts made to safeguard child health during the war years achieved some measure of success. But the infant mortality rate was still too high in comparison with some other countries and there was no room for complacency. We could, however, reasonably hope to effect an even greater reduction in the years that lay ahead when the country, which had seen the advantages of measures for child health preservation during the war years, could settle down to an even greater concentration on the many problems which concern the health and welfare of the child community.

It has been a matter of concern for some years that the neo-natal mortality rate has not shown the same rate of decrease as the infant mortality rate. Approximately 50 per cent. of neo-natal deaths are due to prematurity. Accordingly, the medical and professional subcommittee of the Minister's Advisory Committee on the Welfare of Mothers and Young Children was asked to investigate and advise

regarding the care of premature infants. The Minister accepted their Report, and a circular was issued in which the attention of welfare authorities was drawn to the need for improving the facilities provided for the care of premature infants, both in hospital and in the home.[6] In order to secure early and accurate information regarding the occurrence of premature births, welfare authorities were asked to provide notification of birth cards designed to indicate when the birth weight was 5½ lb. or less.

Although it was impossible to provide new and specially designed institutional accommodation at that time, much could be done in maternity hospitals to improve and adapt existing accommodation for premature infants. Suggestions were also made for the provision of equipment and domiciliary services for the care of infants nursed at home. Widespread interest was aroused in the problem and the response to the measures suggested was most encouraging. One of the most important recommendations on which a number of welfare authorities acted, was to make available the services of a paediatrician for consultation in the home as well as in the special units attached to maternity hospitals.

WAR-TIME DAY NURSERIES FOR CHILDREN UNDER FIVE

The problem of the care of young children of women war workers was one of considerable difficulty, towards the solution of which welfare authorities were asked in 1940 to contribute by establishing, in areas determined by the Ministry of Labour and National Service as being in need of such provision, day nurseries for the children under five of women engaged on work of national importance. Suitable and adaptable premises for the purpose were hard to find. In some areas nursery school premises were available, but in most instances the nurseries were established in private houses in which many disadvantages had to be overcome by improvisation.

Not the least of the difficulties was that of staffing the nurseries with experienced and suitably trained personnel. It was considered essential that the matron-in-charge should be a state registered nurse with either general or children's training and that her deputy should be similarly qualified or be a certificated nursery-trained nurse with institutional experience. A ratio of staff to children was recommended on a basis of one to five, made up by nursery-trained nurses, members of the Child Care Reserve and probationers. At that time some teachers with nursery school qualifications and experience were available and were appointed to undertake the occupational training of the children over two years of age. Grant up to 100 per cent. on approved expenditure for the adaptation and equipment of premises was made by the exchequer. For each child accommodated in the day nurseries, the mother made a contribution of one shilling per day. This was raised to

1s. 6d. for the 24-hour nurseries which were established in 1941 when, owing to the operation of the shift system in factories in which mothers were employed, it was found that nurseries were needed for a proportion of children who remained overnight in the care of competent staff. The number of 24-hour nurseries increased rapidly during the following year and eventually reached about a hundred.

A further noteworthy development in the provision made for children of war workers was primarily due to *The News Chronicle* which, with generous financial support obtained from the Save the Children Federation of the United States, took a leading part in providing certain residential nurseries for children whose needs could not be met by day nurseries. During 1942, three of these were opened in the Stoke-on-Trent area, one in Newcastle-under-Lyme and one in Reading. Grant was paid by the Ministry of Health at the rate of one shilling a day per child.

The first of the war-time nurseries was established in Lancashire, where the original need was greatest, but with the increasing demand for women war workers, nurseries were gradually opened in industrial and rural areas throughout the country. The responsibilities of welfare authorities with regard to these nurseries were outlined in a circular issued jointly by the Ministry of Health and Board of Education in May 1941,[7] and in December of that year, when the needs of our own Forces and the promise of substantial aid to Russia necessitated rapidly increased production and, therefore, the employment of still more women in key factories, further provision was made for the care of children from two to five years by extending the financial arrangements for war-time nurseries to cover additional expenditure by local education authorities on the extension of nursery classes in public elementary schools.[8] By the end of the following year, 538 new nursery classes with places for 19,465 children had been provided. In addition, between 400 and 500 ordinary nursery classes were admitting children over two years of age and extending their hours both morning and evening to meet the mothers' requirements. Adaptable houses continued to be used as nurseries, but as not enough of these were available, recourse was made to the use of huts. These were specially designed as day nurseries for children under five years and were supplied by the Ministry of Works and Buildings. In 1942 an improved layout for nurseries in prefabricated huts was prepared and a more substantial type of hut was provided.

Meanwhile, in order to assist in securing the requisite type of staff, courses of training had been inaugurated in 1941, one for matrons, on the approach to the healthy child, and one for nursery nurses which included hospital experience to fit them for senior posts in the nurseries. During 1942 the courses for matrons were continued and several more for nursery nurses were started at various children's hospitals. But it

was recognised that success depended on the staffs as a whole and endeavours to ensure efficiency were not, therefore, confined to these senior posts. Short training courses, arranged by the Association of Nursery Training Colleges and designed to give an insight into the technique of institutional work, were held for the many children's nurses from private families who served in responsible positions in war-time nurseries, both day and residential. These women brought to the nurseries valuable experience of healthy normal children and a strong sense of duty and responsibility which were much appreciated. In this year there was also great expansion in the provision of instruction for the Child Care Reserve. Arrangements for enrolment in this Reserve had been made in 1941 by the National Council for Maternity and Child Welfare, in consultation with which body two courses of instruction were provided by local education authorities, under grant from the Board of Education. Both courses were open to women over the age of 18 and provided elementary instruction in the health, management and training of children under five, the one (course A) with special emphasis on the needs of children up to two years of age, and the other (course B) with emphasis on the requirements of children between two and five.[9] After taking either or both of these courses and satisfactorily completing 50 hours of practical work in a recognised institution, successful candidates were enrolled in the Child Care Reserve, from which many members were supplied to war-time nurseries, where they worked efficiently, usually as nursery assistants. In place of the combined A and B course, a new senior course was introduced in July 1942,[10] and a supplementary course was added which was designed to give further instruction to senior course members, after a period of service in nurseries, in order to prepare them specially for the post of warden. For girls from 16 to 18 who wished to serve as helpers in nurseries, a junior course was devised which was also available to existing helpers, including those who were taking the training for the diploma of the National Society of Children's Nurseries. These courses attracted a large number of candidates and by the end of 1943 over 6,500 had obtained Child Care Reserve membership cards.

Daily Minders. The number of day nurseries which could be provided and established was limited by a variety of factors, and it had always been appreciated that they would not completely solve the problem of the care of children under five whose mothers were engaged in industry and other forms of national service. Indeed, it was hoped that most of the women concerned would be able to make private arrangements with friends or relatives for the care of their children, this form of self-help being officially regarded as 'the greatest single contribution to the problem'.[8]

To care for children for whom day nursery accommodation could not be found, and for whom private arrangements had not been made,

welfare authorities in certain industrial areas were asked to draw up a rota of women willing to act as daily minders and to register them as such on the recommendation of health visitors, who had first to satisfy themselves as to the suitability of the foster mother and her home. Payments were to be arranged privately between the mother and the daily guardian but, in addition, the State paid the latter 4s. per week for each child under five. Registered guardians at the end of 1942 numbered some two thousand, and they daily cared for nearly five thousand children. Birmingham introduced an approved scheme on slightly different lines, worked entirely through the maternity and child welfare machinery, of which it formed a definite part. This involved more work for the welfare authority, but it proved so satisfactory that one or two other authorities adopted schemes on similar lines.

Health of Children in War-time Day Nurseries. During 1943 the health of children in war-time nurseries was made the subject of enquiries from medical officers of health in different parts of the country. It was satisfactory to find that opinions were unanimous on the beneficial effect to the toddlers of good diet, rest and fresh air together with the social life of a small community. There was some diversity of opinion of the benefits accruing to the younger age groups who do not respond so satisfactorily to nursery life, more particularly in the case of the cot infants who miss the individual care and mother-love so necessary to their existence at this dependent age.

The rate of incidence of infectious disease, particularly gastro-enteritis, was high in some nurseries, but the interesting figures shown below, which were submitted by one large county borough with approximately 78 nurseries, are evidence of a reduction in certain diseases in nursery children, as compared with those living at home and attending a welfare centre.

	Centre Children per cent.	*Nursery Children* per cent.
Respiratory diseases	33·9	11·2
Digestive diseases .	19·1	6·0
Skin conditions .	13·0	7·8

Risks of Infection. When day nurseries were first contemplated on a national scale, grave danger from infection was anticipated and certain steps were advocated in an attempt to minimise the risk of the introduction and spread of infection. These precautions included the appointment of a qualified, experienced nurse as matron, an adequate though minimal proportion of trained and untrained staff, careful examination of the children on arrival at the nurseries and facilities for the immediate isolation of children showing signs of infection. These safeguards would appear to have been successful as, although a certain amount of infection occurred, it was much less than was expected; the spread within the nursery was reduced and in most instances children who developed illness made a quick recovery.

The infections mainly responsible for lowering the attendances were measles, whooping cough, and rubella, with chickenpox and mumps to a lesser extent. Cases of gastro-enteritis, usually due to Sonne infection, occurred from time to time in many of the nurseries. Fortunately the infection was quickly recognised and surprisingly few outbreaks occurred. When, however, a number of children in a nursery were affected, the complaint sometimes proved difficult to eradicate.

Nasal catarrh, particularly during the winter months, was prevalent, but did not appear to affect appreciably the health of the children. Nasal catarrh proved resistant to treatment, although many matrons stated that it disappeared after a period of good feeding, fresh air and the general routine of nursery life.

It is exceedingly difficult to obtain statistical evidence of proved value regarding the liability to infectious disease of children in attendance at day nurseries. This is largely due to the fact that the children are only in the nursery twelve out of the twenty-four hours, so that there is no clear evidence as to where those who developed infectious disease became infected. Any comparison between the health of nursery children and those not in attendance at the nurseries is open to fallacy and controlled results are not available.

Despite these difficulties, efforts were made to secure the opinions of medical officers of health of welfare authorities responsible for the establishment and conduct of war-time day nurseries. It should be appreciated, however, that these views are based on general impressions and experience rather than on factual evidence and statistical data. There was general agreement that the risk of dissemination of disease tended to increase when young children were congregated together, but that it was mitigated by early detection and isolation. Experience showed that the dangers of outbreaks of infection in day nurseries were much less than was feared and usually synchronised with the presence of the disease in the locality. In some instances, evidence of increase in contagion was so lacking that those in charge came to the conclusion that in a nursery which is adequately staffed and efficiently run the danger of the young inmates contracting infection is no greater than that existing in their ordinary home environments.

The position with regard to infection might be briefly summarised as follows. When young children are gathered together there is always an increased risk of infection. The experience of the war nurseries showed that if the premises are suitable, if adequate and well-trained staff are provided and cases of suspected infection promptly isolated or removed, the risks can be reduced to a minimum. There seems little doubt that the majority of the children who attended war-time nurseries benefited from nursery life under war-time conditions. Fresh air, good feeding and regular rest periods resulted in improved physical condition and stamina, while the organised games and communal life helped to

develop the children mentally and to improve their social sense. Under war-time conditions, when disruption of life to a varying extent was inevitable in most homes, the advantages of attendance at war-time nurseries of children of mothers engaged in industry appeared to outweigh the disadvantages of early and late hours, loss of some home life and background and of full maternal care, and possibly increased exposure to infection.

The following table shows the development and expansion of war-time nurseries in 1941–4 and the numbers at the end of 1945:

Nurseries in Operation

Date	Whole-time		Part-time	
	No.	Places	No.	Places
May 5, 1941 . Date of issue of . Circ. 2388 . .	34	Not stated	83	Not stated
December 31, 1941	93	3,596	130	4,060
December 31, 1942	975	42,468	154	5,117
December 31, 1943	1,347	61,508	118	3,869
December 31, 1944	1,449	68,574	106	3,546
December 31, 1945	1,300	62,784	58	2,006

POST-WAR POLICY

After the war the Government policy favoured the provision of nursery schools for children of two to five rather than day nurseries, as it was generally agreed that young children under two should be in the care of their mothers. Welfare authorities had the opportunity of securing premises, either those adapted or erected for war-time nurseries, for the use of young children when day nursery provision was considered desirable as a permanent feature in particular areas.

RESIDENTIAL NURSERIES FOR CHILDREN UNDER FIVE IN RECEPTION AREAS

In the original evacuation in September 1939, 150 parties of 'under fives' were evacuated to reception areas where they were accommodated mainly in large houses placed at their disposal. With a total accommodation of 4,800 places, practically all the parties remained in existence throughout the year; but it later became necessary to move many to premises more conveniently adapted to the requirements of a residential nursery. The co-operation of the welfare authorities was enlisted to undertake the administration and medical supervision of those nursery parties that were not still directly controlled by their own evacuation authorities.

Machinery was set up in the Metropolitan evacuation area for the pooling of all vacancies and for filling them with those children who would cause the greatest anxiety during air raids. These children were chosen by a selection board set up for the purpose and defined by the Minister, in a letter of March 31 1940, to the authorities and nursery committees concerned, as children who, in the event of heavy and sustained aerial bombardment, could not for some very strong reason be taken out of immediate danger by the mother or some other responsible adult and who were likely to be at a disadvantage in this respect for some considerable time. Up to the beginning of the aerial bombardment of London in 1940, the vacancies occurring in the original parties proved just sufficient to meet the steady demand for places for children satisfying this criterion; but the raids in the autumn of that year greatly increased the demand and produced many hundreds of cases where the family circumstances were such as virtually to deprive the young child of adequate parental care. It was essential to set up additional residential nurseries. By the end of the year, with the help of the American Red Cross, thirty new residential nurseries of varying sizes had been opened by the Church of England Waifs and Strays Society in co-operation with the Women's Voluntary Services and six by the Save the Children Fund, other organisations and private individuals.

The year 1941 witnessed a considerable expansion in the number of residential nurseries. Nursery places were also found in the case of the Metropolitan evacuation area for the following further cases:

> Children in respect of whom a medical certificate had been given for their compulsory evacuation under Defence Regulation (31c) as suffering or likely to suffer in mind or body as a result of enemy action.
>
> Children due for discharge from any of the London children's hospitals (then evacuated to the Home Counties) having been cured of war injuries or some ailment certified by the Medical Superintendent as likely to recur if they returned to bombing and shelter life.

In addition, selected billets supervised by the welfare authorities in reception areas were found through the Children's Country Holiday Fund for a considerable number of children nearing school age who would hardly have had time to settle down in nursery parties before it became necessary for them to leave on reaching the age of five.

A number of short-stay residential nurseries were established by welfare authorities in reception areas to receive young children who, after being evacuated with their mothers, had been deprived temporarily of a mother's care, e.g. by her admission to a maternity home or hospital.

At the end of 1941 there were 354 residential nurseries with 10,637 places. Of these, 195 with 6,500 places were conducted by welfare authorities; 93 with 2,160 places by the Waifs and Strays Society; 10

with 300 places by the Save the Children Fund; 8 with 500 places by the Anglo-American Relief Fund; 4 with 140 places by Priestley Nurseries Ltd.; 3 with 137 places by the British Red Cross Society; and 41 others with 900 places by other voluntary societies or private individuals.

Each phase of the war had its particular significance for residential nurseries. In 1941, the nurseries were in the main coping with the aftermath of continuous raiding on the Metropolitan evacuation area and the heavy, though less continuous raids of other big cities. The year 1942 was one in which the emphasis of the national effort shifted from self-preservation to increased production to build up striking power. Quite early in the year it became evident that the nurseries were likely to be asked to receive and care for the young children of mothers in vital war work for whose care no suitable alternative, except the abandonment of that work by the mother, existed. Arrangements were accordingly made to receive such children while still giving priority in allotting vacancies to 'social casualty cases'.

Later in the year vacancies were made available to children, not necessarily resident in evacuation areas but from any part of the country, whose mother had died or had to be admitted to hospital for a period exceeding three months while the father was serving in the Forces. Plans were also made to receive the babies when six months old of women discharged on pregnancy from the women's Services, if the Service concerned was anxious to re-enlist the mother. The total number of nurseries and their accommodation continued to expand throughout the year, and by December 31, 1942, had reached 415 nurseries with 13,007 cots. Pressure for vacancies, though continuous, was less than during the period of extensive raiding. The relief so afforded was used to improve the organisation and classification of the nurseries. For example:

(*a*) Teachers were appointed in order that the nurseries might more effectively fulfil their dual function regarding the physical health and well-being of the children, while at the same time giving them guidance in their daily activities, their play, their attempts to express themselves and their emotional life.

(*b*) The assistance of the British Red Cross Society was enlisted in the establishment of twenty-five new nurseries to which the child with an unsatisfactory medical history could be sent in the knowledge that special nursing attention would be available.

(*c*) Units were formed in such special nurseries where particular supervision could be given to children requiring regular examination for some particular defect, e.g. squint.

(*d*) A specially staffed nursery was started by the Waifs and Strays Society in co-operation with the Mental Health Emergency Committee for the observation and special care of young children who had been found ill-adapted psychologically to the routine of an ordinary residential nursery.

(*e*) With the co-operation of a number of welfare authorities in reception areas, small nursery units of 4, 8 or 12 children were established with private householders, the welfare authority supervising the unit and providing the staff. These small units proved among the happiest of the experiments made in the evacuation of children under five and were of especial value for the type of child who does not settle happily in a larger unit or for those cases where it was desirable to keep together a number of children belonging to the same family.

From the inception of this residential scheme, endeavours were made to provide adequate medical supervision by placing the nurseries under the administrative medical care of the county medical officers of Health and their staffs and by appointing local general practitioners to be available for emergency calls. Notwithstanding a number of outbreaks of infectious diseases, notably catarrhal jaundice, measles and Sonne dysentery, all of which were effectually controlled, the health record of the nurseries was remarkably good and there was a general improvement in the condition and physique of the children.

Throughout the year 1943, reports from the residential nurseries bore witness to the fact that the majority were satisfactory and were meeting a demand which remained more or less constant, though there were sharp increases of new entrants after a series of air raids. The nurseries had by this time become well established. Due attention had been paid to maintaining the physical health of the children and it was now possible to devote more time and thought to problems of their mental development and to occupational therapy, which is such an essential part of nursery life. Matrons were appreciating the need for 'mothering' these children, who were separated from parents and home, by encouraging emotional attachments to individual members of the staff. This was achieved by dividing into small family groups each in the charge of a particular nurse. Many nurseries occasionally met with the difficult child who not only became a problem in a small community but was in need of special management at a malleable age. It was for such children that the special nurseries mentioned in (*d*) above were established. From experience it was found that these difficult children fall into several recognisable categories:

(*a*) the possessive, self-centred, dominating type usually found where a child has never experienced any affectionate relationship with an adult;

(*b*) the type where some strong emotional relationship, e.g. with the father or mother, has been shattered by separation and where the child will remain unstable until such a relationship can be re-established;

(*c*) the clumsy, retarded type who quickly become despondent over their failures and the butt of other children;

(*d*) the dull and untrained child deficient in concentration and motorability;

(*e*) rare cases where peculiarities of temperament and conduct are due to some physical cause or some degenerative disease of the brain.

From this list it will be appreciated that careful management, time and patience were required to effect improvements in such children, but this experiment with an evacuation nursery proved of great interest; and provided experience and lessons which it was hoped might be applied to the prevention of juvenile delinquency at a later stage.

Throughout the early months of the year 1944, the number of Government Evacuation Scheme nurseries remained constant at about 400 with approximately 13,000 places, but in the light of the Prime Minister's warnings much thought was given to possible ways of securing additional nursery places in an emergency. As it seemed to be safer and more practicable to increase the accommodation in existing nurseries than to attempt to find, adapt, equip and staff a number of entirely new houses, it was decided, if the need arose, to increase by 20 per cent. the number of cots already provided in certain selected nurseries. In this way 1,600 additional places became available in July 1944, and this, with the vacancies which had been allowed to accrue in the earlier months of the year, enabled the Ministry of Health to deal expeditiously with all the under fives accepted for evacuation by the expert selection panel which during the flying bomb period dealt with an average of 344 applications weekly (as compared with the previous peak of 171 in 1941), and, of these passed out an average of 133 children weekly to the receiving nurseries, as compared with 83 in 1941.

With this increase of long-stay nursery accommodation came a demand for the rapid expansion of short-stay provision in the reception areas to deal with those small children of evacuated, expectant mothers who would otherwise have been left without parental care during the mother's absence in a maternity home. Certain twenty-four hour war-time nurseries were used for this purpose and a further fifteen short-stay nurseries with some 400 cots were opened.

An outstanding feature of the period was the removal from the path of the flying bombs to more peaceful surroundings of twenty-seven Government evacuation nurseries providing accommodation for over 1,000 children. Premises had to be sought at short notice and emergency adaptations completed within a month. It is notable that only one nursery—that at Weald House, Sevenoaks—was damaged before being moved, and there, unfortunately, twenty-two children lost their lives. Free transport and alternative accommodation was provided also for a large number of privately run nurseries and institutions containing children under the age of five.

Towards the end of 1944 certain provincial evacuation areas were declared as 'go home' areas, and the possibility of returning to their homes the nursery children evacuated from those areas had to be

considered. Though many of the children could not immediately be sent home, some of the nurseries were closed and the number in operation fell to 384 with 12,276 places by the end of the year. When the war in Europe ended there were 347 residential nurseries with accommodation still in existence for 11,179 children.

It was thought probable that by reason of the death of parents, the destruction or severe damage of homes, or the absence of fathers serving in the Far East, as many as 2,500 children would remain in the nurseries for two years after the end of the war in Europe, and provision was therefore made to retain some 80 nurseries for their use. This number, with accommodation for some 2,900 children, soon proved to be excessive. Parents found it practicable to take their children home sooner and in greater numbers than had been expected. By mid-October 1945, the total child population of the nurseries had been reduced to less than 2,000; by the end of the year only some 1,500 children remained and 70 per cent. of the premises which had been held during the year for use as nurseries had been relinquished and the staff set free for other work.

Although the rapid fall in the population of residential nurseries towards the end of 1945 was likely to be accelerated in the early months of the following year, it was known that a residue would remain of children who had no suitable homes to which to return. Arrangements were made for county and county borough councils of the areas containing the nurseries to safeguard the welfare of such children and maintain for them such nurseries as were not maintained by voluntary bodies. As and when the children attained the age of five years, the councils undertook to find accommodation for them in a foster home or hostel. Financial responsibility for the children was accepted by the local authorities of the areas from which they were evacuated, except that the Government continued to pay the equivalent of the billeting allowance in respect of every child and was responsible for certain expenditure to ensure adequate medical attention.

Health of Children in Residential Nurseries. There are undoubtedly many disadvantages in congregating young children together in residential institutions, the most serious being the risk of infection, to which the youngest members of the community are the most susceptible. The risk is increased when the children are found to be debilitated on admission to the nursery unit.

In many war-time residential nurseries, cases of gastro-enteritis occurred for which no cause could be found on bacteriological investigation. Sonne dysentery sometimes occurred but in most instances was of a mild type. Outbreaks of measles, chicken-pox, mumps and whooping cough occurred from time to time, but it is remarkable to note that in the majority of these outbreaks comparatively few children were affected. Occasionally, sporadic cases of scarlet fever and diphtheria were notified.

On the whole, septic skin conditions gave rise to more trouble than the ordinary exanthemata. Serious accidents were conspicuous by their absence. Accidents which occurred were few and of a minor nature.

Every effort was made by careful medical and nursing supervision to reduce the incidence of disease. Wherever possible, new admissions were isolated for a period of approximately three weeks, but the premises and staffing did not always permit of this being done. Prompt and adequate isolation of an ailing child was advocated as one of the best means of reducing the spread of infection.

In spite of difficulties of various kinds, the residential nurseries fulfilled the function for which they were established and proved their value, both to the parents and to the children whom they had served. The disadvantages of a communal, institutional life were more than offset by the fact that in these nurseries children were cared for in safe areas where the facilities provided resulted in the establishment of sound mental and physical health which might have been denied them under war conditions had they remained in the vulnerable areas.

Much of the success of this part of the evacuation scheme was due to the tireless devotion of the matrons and staffs who performed their arduous duties conscientiously and efficiently, often under trying and isolated conditions. Tribute is also due to those responsible for the organisation and administration of the residential nurseries at a time when increased difficulties and restrictions placed a heavier burden upon them than would otherwise have been the case.

Future Policy. When the need for evacuation of children under five terminated at the close of the war, the residential nurseries were gradually closed as the children returned to their homes. Welfare authorities desiring to retain the use of certain of the premises which were well adapted for the purpose were given the opportunity of acquiring them for peace-time provision such as convalescent holiday homes, short-stay nurseries or hostels for mothers and babies.

ADVISORY COMMITTEE ON MOTHERS AND YOUNG CHILDREN

In 1942, the Minister of Health appointed an Advisory Committee to advise him on matters affecting the welfare of mothers and young children. The committee included representatives of welfare authorities, the London County Council, voluntary maternity and child welfare societies, the Nursery Schools Association, nursery training colleges, Members of Parliament, general practitioners, a director of education, a consultant obstetrician and paediatrician and selected officers of the department, with the Minister as chairman. For ease of working the main committee was divided into the following four sub-committees; Medical and Professional, Health Campaigns, Personnel and General Purposes, each with a chairman and a secretary, the latter belonging to the staff of the Ministry.

The Medical and Professional Sub-committee considered several interesting subjects, namely, the incidence of rickets in war-time and the practicability of any further preventive measures; the value of schemes for supplying human milk and the practicability of extending them; the care of the premature infant; and the introduction into the training of pupil midwives of teaching on the subject of ante-natal and post-natal exercises.

The results of the inquiry into the incidence of rickets, undertaken by the British Paediatric Association on behalf of the sub-committee, were published in an official report[11] on which subsequent recommendations were made. These included the addition of vitamin D to national dried milk to the extent of 800 i.u. per reconstituted pint, the preparation of a leaflet for the medical and nursing profession on the modern views on rickets; increased publicity by means of broadcasting and the press on the importance of vitamin D in the form of National cod liver oil compound for children and of vitamin A and D tablets for expectant mothers; and the need for further education on parentcraft, good diet, and the value of sunshine and fresh air.

As an outcome of the inquiries into the value of schemes for the supply of human milk, it was agreed that further research should be undertaken into the drying of expressed breast milk by the freeze-drying method. This question was referred to the Medical Research Council which set up a special sub-committee for the purpose.

Full consideration was given to the care of the premature infant, and after a report on the subject had been presented to the main committee a circular was issued to all welfare authorities, the details of which have been referred to previously in connexion with neo-natal mortality.[6]

At the suggestion of the Central Midwives Board, the sub-committee considered the value of ante-natal and post-natal exercises in relation to the practicability of including some teaching of them in the training of pupil midwives. The views of the sub-committee on the subject were communicated to the Central Midwives Board following submission of the report to the main committee. The sub-committees considered such varied subjects as:

(*a*) Home Help Schemes and the need for increasing the supply of Home Helps under war-time conditions.
(*b*) Consideration of the question of recruitment and employment of junior staffs in war-time nurseries.
(*c*) Arrangements for publicity and propaganda in regard to immunisation against diphtheria and the need for any further action.
(*d*) Measures to promote cleanliness and good habits and the elimination of verminous conditions among mothers and young children.
(*e*) The care of illegitimate children.
(*f*) Consideration of action to be taken to intensify efforts to secure more breast feeding of infants.

(*g*) Matters relating to the care of the feet of expectant mothers and children under five.

(*h*) Existing arrangements for the teaching of parentcraft and how this might be extended and developed.

(*i*) Present arrangements for the provision and supervision of foster mothers and how these might be improved.

CONCLUSION

As the Chief Medical Officer of the Ministry of Health observed in his Annual Report *On the State of the Public Health during Six Years of War* (p. 6), in no section of the medical work of the Ministry were more urgent and difficult problems encountered than in that dealing with maternity and child care. That the work met with remarkable success is statistically apparent in the declining rates recorded during the war years for maternal mortality, still-births and infant mortality. No doubt these favourable reductions owed much to such important factors as the special arrangements for the nutrition of expectant mothers and young children and to chemotherapy in puerperal infection. They are also a convincing tribute to the loyal devotion and ready co-operation of all authorities and individuals in England and Wales concerned with maternity and child welfare during the war years.

During the war the Maternity and Child Welfare Service maintained its high traditions. Its efforts were directed to the needs of those members of the community on whom so much depends. This Service made a vital contribution to the work of the nation in war-time and played an important part in promoting the health and well-being of the post-war generation.

REFERENCES

[1] Min. of Health Memo. Ev. 4, H.M.S.O., 1939, and Circular 1800, May 1, 1939.
[2] Min. of Health Memo Ev. 5, H.M.S.O., 1939, and Circular 1841, July 28, 1939.
[3] Min. of Health Circular 1882, October 2, 1939.
[4] Min. of Health Circular 1998, April 19, 1940.
[5] Min. of Health Circular 2732, November 25, 1942.
[6] Min. of Health Circular 20/44, March 22, 1944.
[7] Min. of Health Circular 2388 (Board of Education Circular 1553), May 31, 1941.
[8] Min. of Health Circular 2535 (Board of Education Circular 1573), December 5, 1941.
[9] Min. of Health Circular 2435 (Board of Education Circular 1558), July 17, 1941.
[10] Board of Education Circular 1599, July 17, 1942.
[11] *Report on the Incidence of Rickets in War-time.* (Ministry of Health Reports on Public Health and Medical Subjects, No. 92) H.M.S.O., 1944.

CHAPTER 5

NUTRITION

Contributed by the Medical Department of the Ministry of Health

INTRODUCTION

THE Foods Branch of the Ministry of Health was concerned with two main interests. First, with the purity, composition and description of food, as controlled by the consolidated Food and Drugs Act, 1938, and various Orders and Regulations. The enforcement of this legislation was for the most part entrusted to local authorities, and the function of the Ministry consisted mainly in making regulations and in giving advice. Secondly, with the practical application of modern advances in the knowledge of nutrition.

Before the Second World War, the Ministry and the Medical Research Council had been active in promoting research and extending knowledge of nutrition. Information was acquired on the growth of children, the prevention of deficiency diseases, (for instance, rickets,) and the constituents of the blood; feeding tests had clearly shown the extent to which extra milk improved children's rate of growth, physical efficiency and mental abilities. An advisory committee on nutrition was appointed by the Minister of Health. This committee made a survey of the diet of the nation, and in 1937 reviewed the facts, as then known, and suggested further lines of investigation (see Annual Report of the Chief Medical Officer for the year, 1938). These activities were cut short by the outbreak of war.

THE WORK OF THE MINISTRIES OF FOOD AND HEALTH

It was appreciated that one of the enemy's military objectives would be, as in the previous war, the starvation of the British Isles. The Government long before the war studied the food position, and at the outbreak of war the Ministry of Food was set up with wide executive powers for the distribution and rationing of food and over the purchase of food from abroad on a vast scale. The Ministry of Health was made responsible for advising the Government on nutritional policy from the scientific standpoint, and advised other Government Departments on nutritional matters.

The essentials of the food policy were first, to minimise calls on shipping in order to free as many ships as possible for the transport of men and munitions; secondly, to arrange for the equitable distribution of such food as was available in quantities sufficient to ensure an adequate diet for all persons, whatever their income might be; and thirdly, to pay special attention to those on whom the future of the nation depended.

RATIONING

Rationing was based on the principle that all the essential foods should be equally available to everyone to the extent necessary to maintain health and at controlled prices. For this purpose, certain foods were rationed and most articles which were not scarce became subject to price control. Sufficient was known of the general principles of nutrition and of food values to make it possible to arrange a balanced diet for all.

Rationing began in January 1940, with butter, bacon and sugar, and was extended during the year to cover meat, margarine, cooking fat, tea, cheese and preserves. The quantities varied slightly from time to time according to the supplies available, but when the war ended they were only: butter and margarine 6 oz., bacon 4 oz., sugar 8 oz., meat about 16 oz. (1s. 2d.), cooking fat 1 oz., tea 2½ oz., cheese 2 oz., preserves 4 oz. a week. At no time was more than about one-third of a normal person's calorie intake derived from rationed foods.

In many families the rations were supplemented by gifts of food sent from friends in the Commonwealth countries and in the United States of America. These generous gifts provided a change in the monotony of the diet, especially at Christmas time. Much bottling of fruit was done in many households.

Towards the end of 1941 a 'points' system was started, by which consumers could choose between a number of different scarce articles, not all of which were considered necessary for health. Points covered a large range of articles, such as canned goods, biscuits, certain dried fruits and vegetables, syrup, breakfast cereals and the like. In 1942, a 'personal points' scheme was introduced, which enabled everyone to obtain a small allocation of sweets.

Milk and dried milk, eggs and dried eggs, and later, oranges, although not rationed, were controlled to the extent that consumers of different classes could only obtain the amounts advertised from time to time. In 1944 and 1945 milk was often as low as two pints a week. Shell eggs almost disappeared in many areas for long periods, though dried eggs were often available.

Even although shipping might have been saved by rationing bread, it was early decided that the unrestricted sale of bread, potatoes and vegetables gave everyone the chance of obtaining as many calories as was needed for the work they were doing.

British Restaurants and Canteens. Not only were many foods left unrationed, though controlled in price, but in the latter part of 1940, local authorities were encouraged to set up 'British Restaurants' at which substantial meals could be obtained at cost price. Similar arrangements (canteens) were extended to factories employing more than 200 workers, and were subsequently made compulsory. A substantial midday meal, including perhaps meat, cheese, or dried egg, fats and sugar, at restaurant or canteen, went far to relieve the rationed household

supply and was consumed in great part by workers who needed the extra food. At the same time a larger ration of cheese was made available for workers without canteen facilities, such as those working on the land or in coal mines, and special concessions were made to vegetarians, diabetics, orthodox Jews, Moslems and others, who obtained larger portions of some foods by sacrificing other foods.

Non-essential Foods. The importation of luxury and non-essential foods was prohibited, and the growing at home of such foods was discouraged. To the public, the most noticeable loss was imported fruits, though many other items disappeared from the menu. Fruit was the first to go, not only because it made a bulky cargo of comparatively little nutritional value (apart from its vitamin C content which was replaced by the increased consumption of potatoes and vegetables), but also because it required the use of cold storage ships which were needed for the transport of meat.

Home Production. The Ministry of Agriculture encouraged the home production of food on farms and on allotments on every available patch of ground throughout the whole country; many gardens were converted into vegetable plots. The foods recommended were not those which would bring the greatest profit, but those of which the country was in greatest need, particularly milk, wheat and vegetables.

National Flour and Bread. In 1942 a large quantity of shipping was saved, and at the same time the value of the diet was improved, by requiring millers to raise the extraction rate of flour from about 70 per cent. to 85 per cent., thus, in effect, leaving in the flour some 15 per cent. more of the wheat berry, rich in important nutrients. In 1944 when victory was in sight 85 per cent. was reduced to 82½ per cent., and in 1945 to 80 per cent. Improved milling made it possible to retain more nutrients than was once thought possible with such an extraction, and though the 80 per cent. loaf was of rather less nutritive value than the 85 per cent. it was whiter in appearance, of better keeping quality and easier to bake.

Special Diets. A Special Diets Committee of the Medical Research Council was appointed early in 1940 to advise on the rations needed by invalids, and to consider applications from persons for whom extra food had been recommended by their doctors. Though no doubt cases of hardship did occur, this committee did valuable work in keeping within manageable bounds the demands on certain foods, particularly milk and eggs.

Priority Classes. Special attention was given to expectant and nursing mothers, infants and school children, and in 1944 to adolescents working in factories. These provisions went beyond maintaining the pre-war diet and aimed at providing an optimum diet, regardless of purchasing power, for these special classes. The measures taken are referred to at greater length in Chapter 4 on maternity and child welfare,

and included the provision of extra milk, cod liver oil, concentrated orange juice (and before this was available, black-currant juice and rose-hip syrup), and later tablets of concentrated vitamins for expectant mothers.

The Ministry of Education took vigorous action to establish a widespread service of school meals, and for these meals the Ministry of Food granted exceptionally liberal allowances, especially of meat, liquid and dried milk, fats, preserves and sugar. Local authorities were advised on the standards and development of the service by an augmented staff of specialist inspectors of the Ministry of Education. From about a quarter of a million meals a day before the war, a figure of nearly one million was recorded in 1942 and one and three-quarter millions in 1945, i.e. 36·3 per cent. of the total attendance. In the later stages the Ministry of Works built and equipped standard kitchens and dining-rooms for local authorities. Of the elementary school children 3·5 per cent. received free dinners; the rest received dinners for a payment which just covered the actual cost of the food without including anything for cooking service, fuel or overhead charges. (See Part II, Chapter 1, The School Medical Service.)

MILK

The reduction of tinned milk imports and the Government's policy of ensuring an adequate supply of milk for the priority classes, particularly for mothers and children, increased the demand for liquid milk. The consumption per head before the war had been under half a pint per day. By the end of the war it had risen to about two-thirds of a pint, but the increase was not evenly distributed. The priority classes consumed more, even up to two pints a day, while healthy adults received less than they had before the war. Dried skim milk, known as 'household milk' was put on the market by the Ministry of Food and helped to relieve the shortage for adults.

Much increased use was made of the existing 'Milk in Schools Scheme' and by the end of the war three-quarters of all school children were receiving milk at school, either at about one-third of the market price or free. Of children in elementary schools 7·1 per cent. received free milk. One million and a quarter of them received two-thirds of a pint or more daily, one million and three-quarters received one-third of a pint.

Keeping quality. In the hot summer of 1940, large quantities of bulked milk were lost by souring, many 1,000-gallon road or railway tanks being soured by the addition of a few gallons of stale milk obtained from small farms where collection was slow and infrequent. The Government published in May 1942 a White Paper on Milk Policy which referred to this loss and other difficulties. Marketing arrangements were reorganised and a National Milk Testing and Advisory

Scheme established. This scheme was operated by the Ministry of Agriculture through an advisory committee, on which the Ministries of Food and Health were represented, as well as producers' and distributors' organisations. Fourteen provincial advisory dairy bacteriologists, with staffs of assistants trained in clean milk production, gradually built up an extensive service which eventually reached all but a few remote farms and some producer-retailers. By 1945, 83 per cent. of all producers had their milk sampled for keeping quality about twice a month. When bad samples were found, visits were paid to the farm and advice given. The scheme proved successful. Local authorities readily co-operated in the work which was complementary to their responsibilities for inspecting farms and dairies and for enforcing the regulations on clean milk production. The losses from souring milk in 1944 were about half those of 1940. In order to assist producers and others to avoid the souring of milk, the regulations were relaxed in 1943, so that producers and dairymen might use certain approved solutions of sodium hypochlorite for cleansing utensils. This applied specially to farms which did not and could not provide steam sterilisation.

Food and Drugs (*Milk and Dairies*) *Act*, 1944. In July 1943, the Government issued a further White Paper on 'Measures to Improve the Quality of the Nation's Milk Supply'. It was proposed, *inter alia*, to make the Ministry of Agriculture responsible, in place of local authorities, for supervising dairy farms, for matters of clean milk production, and for issuing licences to milk producers for 'Tuberculin Tested' and 'Accredited' milks. Parliament passed an Act in 1944, enabling these changes to be made, but it was not to come into force until a future date, which was mainly dependent upon recruitment of the necessary staff.

Defence Regulation, No. 55G. The war-time distribution of milk restricted the milk deliveries of each dairyman to a particular area. This placed upon the Government an obligation to ensure that milk supplied to consumers in the areas concerned should conform to proper standards. The main effect of Defence Regulation (No. 55G) in January 1944, was to give the Minister of Food a power to specify areas in which only certain milks might be supplied or sold by retail. These milks were (*a*) 'Tuberculin Tested' milk or 'Accredited Milk' derived wholly from one herd, these being the only raw milks allowed, and (*b*) heat-treated milks, including pasteurised and sterilised milk.

Heat Treatment. Pasteurised milk had hitherto been the only form of heat-treated milk to which statutory recognition had been given, and milk supplied under this name had been required to be treated either by a 'holder' process, or by a 'high temperature short time' process. During the war, it became increasingly difficult to obtain new plant of the prescribed types, or to replace that which had been worn

out or damaged. The Defence Regulation therefore permitted milk which complied with certain tests to be sold as 'heat-treated'. (Heat-treated Milk.) (Prescribed Tests Order, 1944, Regulations, Minister of Health.) The tests were the phosphatase test to show that the milk had been sufficiently heated to destroy disease-producing organisms, and a new form of methylene blue test to ensure that the milk would reach the consumer sufficiently fresh to remain drinkable until the following day. It was also part of the Government's policy that every effort should be made to supply either heat-treated or Tuberculin Tested milk to schools under the Milk in Schools Scheme, an effort which met with considerable success.

MEAT

Shortly after the outbreak of war, some 12,000 slaughter-houses were closed and slaughtering was concentrated in about 700, eventually reduced to about 550. The change caused many difficulties, as the burden of inspection fell on the district with the selected killing centre, where sufficient staff was seldom available, nor were the premises always suitable for the extra work. The legal position was complicated by the meat having become Crown property, and therefore not subject to inspection by local authorities. Local authorities readily agreed to co-operate with the Ministry of Food, and many districts which had been relieved of inspection by the closure of their slaughter houses, arranged to help their less fortunate neighbours. The Ministry of Food appointed a staff of technical advisers in meat inspection, mostly veterinary surgeons of long experience, who gave assistance and advice to the local inspectors and supervised the administration of the slaughter houses which were technically the property of the Ministry of Food, and whose managers acted as its agents. The standard of inspection rose noticeably, and almost all animals killed came under proper inspection, which before the war had only happened in the bigger centres of population. At the same time, by more exact examination large quantities of meat which would formerly have been condemned outright, were saved for manufacture or for industrial purposes, without incurring any risk to the public health. This centralisation also made it possible to save more of the offals and to collect valuable by-products, such as glands, for medicinal purposes.

The Ministry asked local authorities to make the best possible use of the available food supplies, by not condemning meat and other foods except where there was definite evidence of unfitness for human consumption. Arrangements were also made for local authorities to notify condemned food to the Ministry of Food Salvage Organisation so that it could make arrangements to use the damaged food to the best advantage, usually for feeding animals or for industrial purposes.

CONTROL OF QUALITY OF FOODS

Shortages of all kinds led to the appearance of innumerable food substitutes, many of them fraudulent and sold at exorbitant prices. Among the first to appear were egg substitutes, consisting mostly of baking powder coloured yellow, and milk substitutes composed of flour. These were followed by a large variety of so-called fruit drinks, lemon essences and tonic wines, widely advertised by misleading statements of their value in preventing vitamin deficiencies.

After consultation with the Minister of Health, the Minister of Food issued an Order in 1942 licensing and controlling food substitutes. In 1944 the Ministry of Food issued a Labelling Order requiring most pre-packed foods to bear certain information about the contents on the label, and to state the quantity of any vitamin or mineral salt said to be present. These Orders prevented most of the objectionable practices. Appropriate action was also taken by the Ministry of Food as occasion required, e.g., the manufacture of artificial cream, the sale of gelatine containing large quantities of lead, arsenic or zinc.

Preservatives. The Ministry of Food agreed to temporary relaxation of the preservative regulations when circumstances made it desirable and where no risk to health would follow. Small additions of borax and sulphur dioxide were allowed in margarine, bacon, jam and dehydrated vegetables with certain restrictions, and sodium nitrite was permitted in bacon and pickled meat. Many oranges were preserved by the use of tissue paper wrappers impregnated with diphenyl.

Fortified Foods. Margarine was fortified in January 1940, by the addition of vitamins A and D, vitamin A by 550 i.u. per ounce and vitamin D by 30 i.u. per ounce, raised to 60 in 1941 and to 90 in January 1945, which made margarine of approximately the same food value as English (summer) butter. Calcium was added to national flour at the rate of 1·6 parts per thousand in 1941, and vitamin D was added to National Dried Milk in 1945 at the rate of 800 i.u. per pint of reconstituted milk. These additions were not made because of any discovered deficiency in the diet as a whole, but in order to reduce the risk of too small a consumption of these particular nutrients by any class of the community.

Work of the Chemical Laboratory, Ministry of Health. In the early stages of the war Dr. G. W. Monier-Williams (Chemist, Ministry of Health), in conjunction with the Ministry of Food and the Society of Public Analysts, was concerned with the possible effects of war gases on foods and on water supplies, and with the methods of examination of contaminated foods. Particular attention was given to arsenical war gases of various types. Fortunately, owing to the unexpected abstention of the enemy from gas warfare, no opportunities arose of applying the methods of prevention and defence discovered in actual practice.

Work was also done on the methods of chemical standardisation of the methylene blue test for milk, on the determination of copper in tomato products and crude fibre in standard flour, and a standard method was devised for the determination of fluorine in foods. A number of other analytical methods were investigated in the laboratory, particularly in connexion with the work of the Inter-Departmental Committee on food standards.

INSTITUTIONAL DIETARIES AND FOOD EDUCATION

Institutional Dietaries. Whereas persons living at home had the chance of augmenting their diet with unrationed food as required, persons living in institutions seldom had. Special attention was therefore paid by Dr. Magee of the Ministry of Health to children's homes, poor law institutions, hospitals and other institutions controlled by local authorities, and to voluntary hospitals coming within the scope of the Emergency Medical Services, for which the Ministry had some responsibility. In 1942 handbooks were issued on *War-time Feeding in Hospitals*, *War-time Institutional Dietaries* and on *The Feeding of Children from One to Five*. The advice contained in these handbooks was, in 1943, powerfully seconded by the issue by King Edward's Hospital Fund for London of a Memorandum on Hospital Diet, containing *inter alia* analyses of the diets of staff and patients in three general hospitals in Greater London. In 1944 three dietitians were appointed to the staff of the Ministry to inspect and advise institutions. The boards of management of many hospitals, both voluntary and municipal, found with some surprise that the diets of their staff, and particularly those of the patients, when analysed, fell dangerously short in several essential nutrients. From 1943 onwards there was a noticeable improvement in the diets of most institutions, in spite of the difficulties of war-time catering, and the amount of food wasted was much reduced. The increasing demand for trained dietitians to supervise all the catering and cooking in institutions far outran the available supply.

Food Education. To improve the general standard of knowledge of the values of food and of proper cooking, the Ministry of Food conducted an educational campaign through the agency of the press, the radio, the cinema and of a staff of teaching advisers who came into personal contact with housewives throughout the country. The Ministry of Education emphasised the importance of instruction in cooking at girls' schools, and the Ministry of Health through local authorities and the Central Council for Health Education stimulated public interest. Before the end of the war the people were not a little surprised to discover how much food consumption had been restricted without any obvious loss of health. A new interest in the value of different foods was aroused as in contrast to the old belief that taste and appetite were all that mattered.

ASSESSMENT OF THE NUTRITIONAL STATE OF THE POPULATION

In order to be able to advise on matters of nutritional policy, it was necessary for the Ministry of Health to keep a continuous watch on the nutritional state of the people. There were dietary surveys and clinical surveys, while the Oxford Nutritional Survey (attached to the biochemical department of the University of Oxford), under the direction of Dr. H. M. Sinclair and with Dr. A. P. Meiklejohn as field investigator, in association with the Ministry of Health and the Medical Research Council, investigated nutritional problems and added to scientific knowledge.

In 1941, a society of those interested in nutrition, particularly in its scientific aspects, was founded under the name of the Nutrition Society. The Ministry of Health in 1943 arranged for a committee of this society to collect information about all the research on nutrition being done in this country, and to assist the persons concerned to co-ordinate their efforts by an interchange of information.

Some reference will now be made to these methods of assessment of nutritional states.

Dietary Surveys. In 1940, arrangements were made to examine the food purchased and consumed over periods of a week in a large number of households. The scheme was later taken over by the Ministry of Food by a special survey department with a staff of trained women, but the Ministry of Health continued to advise on technical details. The survey, eventually, was examining as many as 1,000 families a month and care was taken to obtain representative groups of different trades and activities and of different social classes in different parts of the country.

These surveys gave a reasonably accurate assessment of the consumption of different foods per household and an approximate estimate of the consumption per head. A number of more accurate surveys were also made in which the food consumed was actually weighed and measured, and in addition the diet of many individuals was estimated. The figures were worked out as nutrients, allowing for wastage and losses from cooking and showed the amount of calories, protein, calcium, iron, vitamin A, thiamine, riboflavin, niacin and vitamin C consumed. The ascertained intake of each person was then compared with tables of requirements. By this means the Government was able to know from month to month how the average diet of different sections of the community compared with a presumed normal.

Clinical Surveys. In 1942, Professor Sydenstricker of the U.S.A. was lent to the Ministry by the Rockefeller Foundation, and was employed in making a rapid clinical examination of some five thousand persons in different parts of the country. He had a large experience of deficiency diseases in the southern states of America and was particularly well

qualified for work of this kind, which was outside the experience of most doctors in this country. Afterwards he was succeeded by Drs. Stannus and Hawes, both with long colonial experience of deficiency diseases, and later still by Drs. Adcock and Fitzgerald, also of the Colonial Service.

With the co-operation of medical officers of health they were able to examine many hundreds of persons a week, and to look for those clinical signs which were thought to indicate a deficiency of some particular nutrient. Samples of blood were also occasionally taken for analysis. Their findings were unexpectedly satisfactory, for although they paid most attention to poor areas, they found surprisingly little evidence of under-nourishment or malnutrition which could not be attributed to shortages in the past. In districts which before the war had been subject to long periods of unemployment, many of the adults and adolescents, and particularly the women, showed that they had suffered severely, but only occasionally could evidence of a present deficiency be found. Such evidence as did exist occurred in single families or persons.

Synthetic Vitamin Supplements. In 1939 and 1940, before America entered the war, this country received a steady flow of gifts from the United States. Among them were boxes of vitamins, the consumption of which had grown to an enormous extent in the States. The Ministry decided that what this country needed was an adequate quantity of good nourishing food, which could not be replaced by synthetic vitamins however valuable these might be for specific purposes. While it had been known since the last war that certain illnesses were due to a deficiency of certain vitamins, there was no evidence that the consumption of an excess would improve human health. The Ministry therefore accepted a gift from a group of U.S. physicians of two million capsules of composite vitamins, made to an approved prescription. Capsules similar in appearance but containing no vitamins were used as a control.

Doctors Magee and Bransby undertook feeding tests with some 2,500 school children and adults in receipt of what might be considered a normal diet, with the object of determining whether any benefit resulted from the consumption of these extra vitamins. The tests were continued for over a year and showed clearly that such vitamin supplements produced no improvement in health or growth nor, as far as could be ascertained, in physical or mental ability in the case of persons in receipt of such a diet as was readily available for all. The fact that persons suffering from some particular vitamin deficiency would benefit from appropriate treatment was never questioned.

Anaemia. The Medical Research Council made a special study of the haemoglobin content of the blood from 1942 onwards, and some 16,000 persons of various categories, men, women and children, were examined. It concluded that in 1943 the mean value for all the men examined did not differ appreciably from the well accepted normal

average, and few low recordings were found. Large differences however did appear between different occupational groups, some of which, e.g. agricultural workers and one group of factory workers, had levels low enough to merit further study.

For women and children it was impossible to say with any degree of accuracy what constituted the normal level. Standardised instruments had not been available to previous workers, nor had the many physiological factors which may affect the haemoglobin level, such as menstruation, been taken fully into account. Considering all these factors, it seemed fairly certain that no greater degree of anaemia was found than in the limited numbers examined before the war, and that, in certain groups, there was probably less.

There was probably, too, less anaemia in certain comparable groups in 1943 and 1944 than in the few groups of expectant mothers and school children studied in the first year of the war. It was concluded, however, that there was still an undue amount of preventable anaemia, among infants and young children, expectant mothers, housewives and in some occupational groups.

The Growth of Children. From 1940 onwards Dr. Bransby made a study of the heights and weights of some 12,000 children a year, living at home or evacuated to camp schools. The results showed that the growth rates of children living at home were well maintained throughout the war. In some districts a slight retardation occurred in 1940 to 1942, but this was generally made good by 1943. In 1944 the rates corresponded very much to the steady upward rise shown before the war.

The growth of children evacuated to camp schools showed at first a slight but distinct retardation. This might have been partially accounted for by the complete change of environment and by the increased amount of exercise taken. The diets of these camps were examined by the Ministry of Education and improved where necessary. The growth rates of the children, however, never quite equalled those of children living at home, which suggested that factors other than diet were at work. At the same time, detailed clinical examinations failed to show any signs of undernourishment.

Body-weight Survey. In 1944 the Ministry of Food commenced a survey of the weights of adults and were able to obtain volunteers from many factories and offices for weighing at three-monthly intervals. Arrangements were also made for people to be weighed at chemists' shops free of charge. Food is not the only factor which affects weight, as such things as loss of sleep, worry and anxiety may cause more loss of weight than a small shortage of food. Under the conditions in which most people in England were living and particularly in the south, where air raids, flying-bombs and rockets were a constant menace, it might have been expected that weight would fall. Reports collected

from time to time in 1944 and 1945 tended to show that there was no noticeable change, and that up to middle age persons had put on weight at a perfectly normal rate. Above middle age, the figures tended to show a slight drop.

All the foregoing methods of assessment suggested that the nutritional state of the nation was not worse at the end than at the beginning of the war, and, as regards children, was somewhat better.

CONCLUSION

During the war, through Government organisation and control, the average diet of all classes became physiologically a better diet and was more evenly distributed. Rationing, unfortunately, had to continue after the war years owing to a world shortage of food and deficiencies in transport. Certain members of the community found difficulties in the restriction of proteins and fats. This was felt especially by hard manual workers and was recognised by an increase in the meat ration for coal miners. In the latter years of the war there was an increase in minor ailments, some of which, like anaemia and slight forms of peripheral neuritis, were ascribed to dietetic deficiencies. But on the whole, national rationing worked well in an unprecedented time of great difficulty and was an important contribution to the maintenance of good health, especially in expectant mothers and in children.

REFERENCES

MAGEE, H. E. War and the Nutritional State. *Mon. Bull. Min. Hlth, Lond.*, 1944, 3, 146.

Application of nutrition to public health: some lessons of the War (Milroy Lect. R.C.P., 1946). *Brit. med J.*, 1946, I, 475.

CHAPTER 6

PUBLIC HEALTH IN WALES

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REGIONAL ORGANISATION

BEFORE the outbreak of war in September 1939, it had been decided that in Wales, which became Region 8, the regional work of the Ministry of Health should be undertaken by the Welsh Board of Health. Some of the normal work of the Department was suspended or was reduced in volume, but the novel and frequently strenuous duties in carrying out regional work involved a drastic reorganisation in the medical staffing of the Department. The regional medical officers functioning in peace-time under the National Health Insurance Act were seconded for emergency work.

Apart from entirely new services such as the Emergency Medical Services, the A.R.P. Services, the Emergency Pathological Service, the Blood Transfusion Service, etc., the Welsh Region was faced with the need for extending existing health services in order to cater for evacuees. Broadly, Wales should be described as a reception area. The ports in South Wales were scheduled as especially liable to air attack and, as events proved, they got their share of attention from enemy aircraft; but the thickly populated coal-mining and industrial areas lying behind the ports, as well as the more sparsely populated agricultural areas, were used for the reception of evacuees.

EVACUATION

The evacuation into Wales of civilians from areas likely to be subjected to enemy air attack was first considered in September 1938, and during the following months a survey of available accommodation was made with a great deal of voluntary help. The clerks of the various local authorities were nominated as billeting officers, and excellent work was done by members of the women's groups and school teachers, as well as by those officials of the local authorities more immediately concerned. Upon completion of the survey, estimates were made of the number of evacuees who could be received into Wales, and were sent to the Welsh Board of Health. At first there was some doubt whether Welsh areas could be exclusively used as reception areas. Wales had suffered much during the years of economic depression, and housing was thought to be poor and inadequate even for the needs of the

normal inhabitants. But after the fall of France and the evacuation of the British Army from Dunkirk, it was clear that the use of Wales as a considerable reception area could not be avoided, and as a result parts of London and the south-east coast of England became evacuation areas for Wales. To meet the new situation a house-to-house canvass was made and particular care taken to note special requests: e.g. whether the householder preferred boys or girls, etc. The readiness of householders to take in unaccompanied children was especially noteworthy, though it was less easy to find those who were willing to accommodate mothers and children, or pregnant women. It soon became apparent that special accommodation would have to be provided for children suffering from such physical defects as lameness, asthma, chorea and heart troubles.

THE FIRST EVACUATION TO WALES

Immediately before and at the outbreak of war, there were mass evacuations followed by a fairly rapid return of evacuees to their homes when the expected air attacks did not take place. Naturally, the ebb and flow of evacuation was governed by the character and extent of enemy activity from the beginning of the Battle of Britain in August 1940 to the end of the flying-bomb and long-distance high-explosive rocket attacks in March 1945. On the whole, it is probable that this ebb and flow eased the burden on the early reception households; but it created troublesome administrative problems, since billeting and re-billeting became a more or less constant duty.

The first mass evacuation to Wales took place in July 1940. The Welsh local authorities had acquired valuable knowledge of the practical difficulties involved from the experience of other reception authorities who had received children evacuated on the two days immediately preceding the outbreak of war in 1939. In July 1940 evacuation authorities had, generally speaking, arranged for the examination of all the children before they left and had kept back children physically unfit for billeting at the time of examination, as a result of which it was easier to billet the children as they came into Wales. In the built-up mining areas the local school was suitably equipped and used as a reception centre, and here the children were fed after their long journey. From the school the evacuees were assigned to the householder in the order named in the billeting list. Some emergency hostels were established in readiness for types of children not fit for billeting at the moment of reception. Subsequently, many other facilities were provided for the evacuees. An early welfare report submitted to the Welsh Board of Health emphasised the need of welfare officers in every county.

Facilities for the Care of the Unaccompanied Child. Generally speaking, these children were evacuated in school groups supervised by school

teachers. Large education authorities such as the London County Council and the Birmingham Local Education Authority arranged for the supervision of the children in their billets by the teachers in charge. The L.C.C. seconded care-organisers to some counties in the reception area. The teachers and care-organisers supervised the children who had been billeted and arranged that clothing, which was at first one of the major problems, was provided when necessary. They also referred the child to the school medical authorities when this was deemed necessary; and they were responsible for the provision of recreational facilities.

As time went on, the counties in the reception area appointed their own welfare officers under the Government Evacuation Scheme, and some of these had paid billeting helpers. In areas where the billeting officer acted as a welfare officer he too had his staff of billet visitors. The county welfare officers and the billeting officers and helpers were under the direct supervision of the regional welfare officers appointed by the Ministry of Health, and in this way the standard of child care among the evacuated children was improved.

To meet the needs of the evacuated children, general emergency hostels or buffer hostels, sick bays, and special hostels for difficult children were established, to be followed later by a large convalesent hostel which was equipped to cater for all evacuees in South Wales in need of convalescent treatment. Later still, a psychological service for difficult children was instituted by the Welsh Board of Health. The administration of these special hostels was carried out by the local authorities, but the psychological service team attached to the Welsh Board of Health were responsible for the admissions and discharges. In course of time this service was reorganised and placed under the charge of a psychiatrist lent by the Emergency Medical Services. This service was thus brought under direct medical supervision with the result that the needs of evacuated children suffering from emotional difficulties were more fully met.

Four types of hostels for unaccompanied evacuees were provided, viz. general sick bay, sick bays for contagious skin diseases, hostels for difficult children and general emergency hostels.

As far as possible, the first two classes were administered on a county basis although they could be, and sometimes were, used on a regional basis as the need arose. The hostels for difficult children were administered on a regional basis and the general emergency hostels by a district or joint district.

Communal Billeting and Feeding. Early in 1940 many communal billets were operating, and by 1941 the supervision of the entire needs of the mothers and children in these billets had been provided for. In some of these a supervisor was in charge and meals were provided from a central kitchen in a communal dining room; in others, families lived independently of each other.

The provision of communal meals developed early in the war, but it was a service confined to South Wales where twelve schemes were in operation in the early part of 1941. When the British Restaurants were established in the autumn of 1941, the community feeding centres were absorbed. By October 1941 the Ministry of Food had opened nine British Restaurants in South Wales and 28 other restaurants had been approved.

Social Centres. By October 1941 there were 65 social centres approved for the use of evacuated mothers and their children and for unaccompanied children. They were provided by the local authorities under the Government Evacuation Scheme, but, in addition, provision was made by such voluntary agencies as the South Wales National Council of Social Service, Women's Institutes, Women's Voluntary Services, and the evacuated teachers.

Welfare Committees were set up by every authority in the South Wales area except two, and they held frequent meetings in order to discharge their duties. County welfare conferences were held and it became clear from the discussions at these conferences that the proper care of evacuated children in billets could only be safeguarded by regular visits to their billets. Good work was done by the welfare committees in arranging for visiting evacuated mothers and children in communal billets, and unaccompanied evacuees in their billets. This system worked well in those rural areas of Wales where it was not feasible to appoint welfare officers.

Hostels for the Aged and Infirm. As early as 1941, seven hostels had been established in South Wales for the accommodation of the aged and infirm. They were administered by the Public Assistance Authorities. Three similar hostels were also established by district councils. These hostels were successful and every endeavour was made to conduct them in a humane and friendly atmosphere. They were generously equipped and many comforts and amenities were provided for the aged. Much was learned about care of the aged while the evacuation scheme was in operation, and valuable help was given by voluntary bodies in providing recreational facilities suitable for aged people.

THE HEALTH OF THE CHILDREN DURING EVACUATION

The medical care of evacuated children of school age was made the responsibility of the existing School Medical Service, which was faced with the task of examining evacuated school children on arrival, or soon afterwards in the schools. The general health of the school children evacuated into Wales was thought by the examining physicians to be good. Remarkably few cases of rickets were discovered, although there were many indications of malnutrition and many children were under weight. In these, great increases in weight were soon noted, the rate of increase, until the deficiency was made good, being greater during the

same period than in Welsh children, who had a good average standard of nutrition.

Infectious Diseases. An intensive programme of immunisation against diphtheria was carried out among the evacuees and local children. There were some cases of diphtheria among the evacuated children, but even in the so-called epidemic periods of July 1942 and February 1943 the numbers were inconsiderable.

Scabies and Impetigo. In many parts of Wales, scabies was practically unknown until the advent of the war, which involved the presence of large numbers of evacuees and of troops. In the early months scabies became a major problem and in 1940 the situation had become so serious that emergency legislation (The Scabies Order, 1940) became necessary. Local authorities were obliged to provide cleansing stations for carrying out the necessary treatment and many Welsh families were affected. The Department had to arrange for the opening of a number of sick bays to deal specifically with cases of contagious skin diseases; and these were freely used for all cases which occurred, whether evacuees or native. First-aid posts were also brought into use so that the necessary treatment could be given. Sanitary inspectors in many areas instituted and continued the practice of visiting the homes of those who had been referred for treatment, since it was common for children who had contracted the disease and who had been declared free of contagion to return within a short time suffering from a recurrence. It was clear that the disease had to be attacked on a family basis. The introduction of a new method of treatment by benzyl-benzoate emulsion saw a gradual decline in the disease, and at the end of the war with Germany the incidence had been reduced to almost negligible proportions.

Lousiness. Medical officers of health reported that lousiness showed a marked increase during the war years. This was no doubt due to overcrowding and fresh infestations introduced by persons migrating to Wales.

Hospital Care. The provision of hospital accommodation for evacuated children in Wales was not easy, but the co-operation of hospital doctors and nurses overcame all difficulties. Many evacuated children were found to need surgical treatment for tonsils and adenoids, and most of the cases sent to hospital required such treatment. There were some cases of pneumonia, rheumatism, chronic mastoiditis, and a few cases of chorea, besides common smaller injuries to the body, and fractures.

Convalescent Care. In April 1942 the idea of starting a convalescent hostel for evacuated children in South Wales was discussed. It was felt that such a hostel ideally situated in a seaside town would be of great service to evacuees in the mining valleys and in the rural areas, and the first convalescent hostel in South Wales was opened in April 1943. The children were accepted on a medical certificate from all parts of South Wales, and, as a rule, they remained for a month unless an

extension was recommended by the local medical officer of health. In the first two months of the hostel's existence over seventy children were admitted and the numbers gradually increased. Their medical certificates showed them to be suffering mainly from such diseases as asthma, bronchitis, shock following air raid experiences, enlarged glands, post-operative debility and heart trouble following rheumatism. The matron-in-charge was a state registered nurse who worked in co-operation with the school medical officer of the area in which the convalescent home was situated, and the success of the experiment was entirely due to their enthusiasm. In all cases it was reported that the children had benefited greatly and had returned to their billets improved in health.

PSYCHOLOGICAL PROBLEMS

The Welsh Board of Health set up a psychological service for difficult children in November 1941. The area over which the service was to extend comprised the counties of Glamorgan, Monmouth, Brecon, Radnor, Carmarthen and Pembroke. The service aimed at dealing with billeting difficulties arising out of bad behaviour or personality deviation. Two out-patient clinics were set up in Swansea and Cardiff, and sessions for examination were held in the special hostels also.

The underlying policy of this service was to control the admissions to the special hostels, to make the special hostels true treatment centres, and to select and direct the children to the particular type of special hostel best suited for their proper care and treatment. In this way the hostels were prevented from becoming mere dumps for the mentally defective children, who were always dealt with under the existing facilities provided under the Education Act. The policy was to arrange for intensive treatment in the special hostel with a view to early re-billeting. At the inception of the psychological service there were 101 children undergoing treatment in the special hostels but by December 1941 the number had fallen to 91. In that month alone 146 children were referred to these hostels, and during the first year of its operation the Service dealt with 320 boys and 130 girls, of ages varying between 5 and 15 years in the case of boys and 4 to 18 in that of girls. Of the 450 children dealt with, 344 (76·4 per cent.) were between ages 9 and 14. In the case of boys the age at which the highest number 57, or 17·8 per cent. was referred was 10 years; in girls the maximum number was reached at 12 years, viz. 21 cases (16·1 per cent.). The problems and difficulties in respect of which children were referred were numerous, and often a combination of several difficulties was found in a single child. 'Generally unmanageable' children numbered 208 (46·2 per cent.); in 172 (38·2 per cent.) the trouble, or one of the troubles, was recorded as 'minor and episodic pilfering'; 75 (16·7 per cent.) showed mental retardation, and 35 (7·8 per cent.) scholastic

retardation. Speech defects were present in 15 children, 54 displayed abnormal temper, and 29 destructive tendencies. Among the problems more directly associated with war conditions were 'disturbance following raids, shock or war experience' (7 cases), homesickness (10), and anxiety (7). Twenty-three children were classified as 'running away', while 76 (16·9 per cent.) were entered as 'billeting problems'. Later on, classification appeared to become more exact, and for the period June 25 to December 31, 1944, only 1·6 per cent. of the new cases referred were put in the latter category. In this later period, during which the flying-bomb and rocket attacks occurred, 'generally unmanageable', 27·9 per cent. of the new cases, again headed the list, with pilfering (14·2 per cent.) second, and enuresis (9·8 per cent.) third in frequency of occurrence.

The children were referred to the service from the general emergency hostels and by local authorities, medical officers, schools, probation officers, and private physicians.

The work done in the special hostels for difficult children showed the value of psychological work, and it became clear to county authorities that this type of service might well be incorporated in their general scheme for child care and education.

The psychiatric social workers also did valuable 'educational' work, visiting foster parents and teachers as well as children, both in billets and hostels, and many difficult children were able to live more happily as a result of their advice and help.

WAR REFUGEES AND EVACUEES

Region 8 in the early days of the war was a vast reception area for evacuees and, with its many important ports, regarded as comparatively safe, it was natural to expect after the fall of France that it would play some part in the reception of war refugees from oversea.

Plans were rapidly made and perfected. In general the local authority at the port of disembarkation was made responsible for all the arrangements of landing, which included medical examination of refugees, and the county authority was to co-operate both in rendering assistance when necessary in the actual medical examination and subsequently in providing hospital facilities for sick and other cases; and the Public Assistance department of the county or county borough prepared rest centres for the reception of refugees pending their transfer to more permanent accommodation.

Early in 1940 the organisation was called into action by the arrival of Dutch and Belgian refugees who landed from small trawlers over a period of some weeks. The trawlers were crowded with refugees and as much of their belongings as they could bring from their homes. During this period approximately one thousand women and children were disembarked.

The arrangements worked very smoothly. The medical officer of health at the ports of landing was assisted by the staff of the county medical officer of health; in addition a medical officer of the Department also assisted, and the feeding and accommodation arrangements were supervised by the general inspector.

Some months later the organisation was again called upon to deal with some 3,500 persons evacuated from Gibraltar. This proved a more formidable task because some of them were in a very poor state of health; and over 150 were detained in hospitals in the Region for treatment.

From 1940 to 1944 the numbers of refugees arriving in this Region diminished but throughout the period calls were made from time to time and the arrangements were kept in a state of efficiency. Refugees from the Far East came by a devious route on ships sailing from the United States. Owing to the need for secrecy, no advance information could be made available as to the numbers arriving on any particular ship and a day and night service had therefore to be kept in readiness, so that a ship could be met at short notice at any port in the Region and assistance given to refugees.

A more pleasant side of this work was the repatriation to Gibraltar and elsewhere of those evacuees returning home after a sojourn of some years in this country. Repatriation began in October 1944 and on two occasions the work was done in this Region.

A well-merited tribute should be paid to the staffs of the local authorities who bore the brunt of this work and, in particular, for the whole-hearted co-operation between the small and large authorities.

MATERNITY AND CHILD WELFARE

For some years before the war there had been a gradual decline in the maternal and infant death rates, and in the still-birth and neo-natal death rates, and in Wales, as in England, the decline continued even under war conditions.

The various maternity and child welfare services were maintained during the war with no appreciable alteration in the number of health visitors or infant and ante-natal clinics, although the higher birth rate meant an increased number of home visits by the health visitors and heavier attendances at the clinics. The welfare authorities included evacuees within the scope of their services and certain of the authorities maintained emergency maternity homes especially for the confinement of evacuated expectant mothers. The number of evacuated expectant mothers admitted to these homes was much lower than was expected, but the homes proved to be invaluable in meeting the greatly increased demand for maternity accommodation which arose during the war. There were no reports of unwonted outbreaks of illness among young children, and their general nutrition was not adversely affected by war

conditions. This was probably due to the rationing of essential foods and to the special measures taken by the Ministry of Food in regard to the supply of milk and vitamin preparations to young children.

About forty residential nurseries were set up in Wales for children under five years of age evacuated from London or (to a lesser extent) from the Merseyside. Nearly all of these nurseries were managed by voluntary societies and were accommodated in large country houses. The children enjoyed a high standard of health generally. There was a severe outbreak of ringworm at two of the nurseries, and a few mild outbreaks of Sonne dysentery.

About eighty day nurseries for children under five whose mothers were in employment were established in the more thickly populated areas of Wales during the war. More than half of these nurseries were in huts erected for the purpose. Reports show that the care received in the nurseries had a beneficial effect on the health of the children and that no epidemics of infectious disease arose which could be attributed to aggregation in the nurseries.

TUBERCULOSIS

An increase in the incidence of tuberculosis was expected in the light of the experience of the War of 1914–18 and, in fact, an increase occurred. It was, however, comparatively speaking, a small one, and was rather in the nature of an interruption in the gradual decline in the disease (which had been going on for some years) than a serious set-back. The major problem, which still persisted after the war, was not so much one of providing suitable accommodation for treatment, as of obtaining the necessary nursing and domestic staff. The Welsh National Memorial Association, which undertook the treatment of tuberculosis in Wales on behalf of the major local authorities, was forced to close some wards in its hospitals and some blocks in its sanatoria because it was impossible to obtain nurses and domestic staff. Though all possible means short of compulsion were considered in consultation with the Ministry of Labour and National Service in an attempt to solve the problem, the skeleton staffs in the Association's institutions necessarily carried an abnormally heavy burden and their devotion in the face of almost insuperable difficulties was deserving of the highest praise.

The emergency measures taken at the outbreak of the war for the discharge of 1,000 patients from tuberculosis institutions in order to provide beds for the reception of casualties under the Emergency Hospitals Scheme were found in the event to have been unnecessary. Consequently, within a short while, fifteen of the eighteen institutions belonging to the Welsh National Memorial Association were again filled to normal capacity. The number of persons awaiting admission to tuberculosis institutions fluctuated; the figures at June 30 in each

of the years 1939 to 1945 were: 1939—357; 1940—309; 1941—250; 1942—449; 1943—413; 1944—722; 1945—683. A number of factors account for the increase, foremost among them being the shortage of beds and staff.

The steps taken during the war to provide additional beds for the treatment of tuberculosis included the renting of the following: 150 beds at the Government Pavilions (originally built for the reception of war service casualties) in the grounds of the North Wales Sanatorium, 240 beds at the Government Emergency Hospitals at Swansea and Abergavenny, and 120 beds at the Gellygaer, Caerphilly, Cardiff and Penarth Isolation Hospitals.

In addition, arrangements were made to take over 150 beds at the Ministry of Pensions Hospital, Chepstow. Considerable difficulties were experienced in obtaining staff and comparatively few of the beds were brought into commission. Before the end of hostilities, priority was given for the erection of extensions at the Cefn Mably and Glan Ely Hospitals to provide accommodation for 96 patients.

In all, the Association had, by the end of 1945, 742 more beds (96 of their own and 646 rented) than were available at the beginning of the war.

During 1944 a scheme was adopted for sputum examinations to be made at the E.M.S. and public health laboratories for districts in North and West Wales instead of at the Cardiff Laboratory, with the result that the receipt of the results of testing for those districts was considerably expedited.

An E.M.S. chest unit of 30 beds for the treatment of non-tuberculous chest conditions in both civilian and Service cases was in operation at the Sully Tuberculosis Hospital during the war. This was the only chest unit in Wales and came into being as a war-time measure.

Great difficulties were experienced during the war in providing medical as well as nursing staff. Owing to the depleted medical staff, the extra work occasioned by the war, e.g. examinations of recruits, evacuees, Service cases and the staffs of war-time nurseries, was carried out under conditions of great strain. Work for the Ministry of Pensions increased and large numbers of men were examined as to their fitness for underground work in collieries. Many women also were examined in order to ascertain their suitability for nursing and domestic work in sanatoria. In the later years of the war the shortage of nurses became a problem of considerable gravity. After the introduction of the Rushcliffe Report there was a temporary improvement, but during the latter part of 1944, beds at a number of institutions had to be closed for lack of nurses, and by March 1945, some 250 available beds had to be closed on this account.

After discussions early in 1945 between the Department, the Association and the authorities of hospitals approved as training schools,

schemes of affiliation between tuberculosis institutions and general hospitals, under which a student nurse trained for her first two years at the tuberculosis institution and for the next two at the general hospital, were adopted by the Welsh National Memorial Association, and some easing of the staffing difficulties of tuberculosis institutions was expected as a result of this arrangement.

In Wales the mortality rate for tuberculosis (all forms) declined between 1938 and 1944 from 812 per million, to 715 per million. This is an unusual feature in war-time and it is interesting to contrast this fall with the death rates for tuberculosis (all forms) during the War of 1914–18, which increased from 1,276 per million in 1914 to 1,627 per million in 1918.

VENEREAL DISEASES

In Wales, as in England, war conditions led to an expected increase in the incidence of venereal diseases. The extent of the increase can probably be judged best by the number of new patients suffering from syphilis attending the treatment centres. As regards gonorrhœa, the widespread use of sulphonamide remedies by private practitioners resulted in a reduction in the attendance of cases of gonorrhoea, and it seems likely that the decrease was attributable to the efficacy of the new treatment rather than to a diminution in the number of persons who exposed themselves to the risk of infection. In Wales alone the number of new cases of syphilis attending the centres reached a peak in 1942 and then began to decline. Taking England and Wales, as a whole, however, there was a further slight increase in 1943. In Wales the 1943 figure represents an increase of 30 per cent. over 1939, compared with an increase of 41 per cent. for England and Wales. Roughly one-half of the cases attending centres in Wales were from the South Wales coastal towns and included foreign seamen. It will be appreciated that the above comparisons take no account of infections among men and women in the Fighting Services. It was noticeable that, during the period of intensified propaganda on the dangers of venereal diseases, the number of persons attending the centres who were found on examination not to be suffering from venereal disease almost doubled.

Generally speaking, the local authorities responsible for providing facilities for the treatment of venereal diseases were satisfied that the facilities for treatment which existed before the war were sufficient to deal with the increased number of patients during the war. Additional sessions were instituted at a few treatment centres, adjustments were made in the times or days of the sessions, and the accommodation was improved. Two authorities adopted a scheme which relied on the services of a number of general practitioners and not on the provision of treatment centres, whereby the patients were saved time and inconvenience and did not have to travel long distances for treatment.

The authorities in Wales responded well to the suggestion of the Ministry of Health that almoners should be appointed to follow up patients who had ceased to attend the centres before completion of treatment and to encourage the voluntary attendance of contacts brought to light as the result of the operation of Regulation 33B of the Defence (General) Regulations. In some cases it was not found practicable to appoint a full-time almoner, and health visitors and school nurses then undertook this work after having received a course of special instruction. Reports received showed that good results were obtained.

INFECTIOUS DISEASES

It is not surprising that those concerned in public health viewed the prospects of serious epidemics with some misgivings. In Wales, there were, as elsewhere, fewer doctors in general practice and in the public health services; there was a drastic alteration in the distribution of population due to evacuation and large labour transfers for war work, and overcrowding was the result. Standards of domestic hygiene naturally declined and all the conditions seemed to favour the spread of epidemic diseases. There were few first-class isolation hospitals in Wales, and not many second grade ones, and it was felt that as an insurance against expected outbreaks the Government must undertake to augment the existing accommodation for infectious diseases at the expense of the exchequer. Medical and administrative opinion clearly indicated that the new accommodation had to be provided at existing isolation hospitals, and hutments were erected within the curtilages of four such hospitals. The number of new temporary beds for patients provided in this way was 94. Throughout the war with Germany this emergency accommodation was never fully used. No major attack of infectious disease occurred, though small outbreaks of a local character, such as would not be thought abnormal in peace-time, took place.

Cerebro-spinal Meningitis. In 1940–1 a local outbreak occurred at Neath. In 1940 there were 8 cases, with 4 deaths. In 1941 there were 24 cases, only 1 of which ended fatally. The introduction of the new sulphapyridine treatment in 1941 was undoubtedly the cause of the lower death rate in that year.

In 1942 a notification of a case in Brecon was received, followed by 10 further cases, including 5 military cases, in the following fourteen days. The medical officer of health immediately arranged for a ban on public meetings and dances, and used the cinema screen, police loudspeakers, and leaflets to advise the public of necessary precautions. The military authorities also agreed to bar the cinemas to soldiers. The epidemic quickly ended.

An outbreak of cerebro-spinal fever also occurred in Wrexham in 1942. Cases were treated with sulphonamides and by lumbar puncture and responded well.

Typhus Fever. The presence of troops and of British civilians abroad at places where typhus fever had broken out, or where it was endemic, gave rise to grave concern lest the disease should be introduced into this country when troops returned on leave or British civilians were repatriated. Accordingly, suitable accommodation for the best investigation of persons coming from abroad was made available at the principal South Wales ports. Teams of workers, consisting of doctors, nurses and sanitary inspectors, were held in readiness to deal with the delousing of persons coming from abroad.

Diphtheria Immunisation. Throughout the greater part of the war there was an intensive campaign to encourage immunisation against diphtheria. Half-yearly returns, showing, *inter alia*, the estimated percentage of children in the age groups 1–5 and 5–15 who had been immunised, were regularly collected by the Department, and it was their special concern to ensure an improvement in the work shown in 'laggard' areas. All local authorities were provided with propaganda posters and leaflets and with written advice on how to induce parents to get their children immunised. The press, the cinema, the distribution of leaflets to school children, advice by the school nurses and by the health visitors were all used in the campaign. There is evidence that the direct personal approach was the most effective. Some medical officers of health considered the public were inundated with 'visual' propaganda on so many topics of national importance that they became indifferent, if not impervious. Moreover, in the backward areas, the Department arranged for visits by their senior staff to discuss with the medical officer of health and the health committee the best practicable means of ensuring that at least three-quarters of the child population were immunised.

On June 30, 1945, it was estimated that in Wales and Monmouthshire as a whole the following percentage of children had been immunised:

1–5 years	66·7 per cent.
5–15 ,,	83·0 ,, ,,

INDUSTRIAL DISEASES

No evidence seems to have been obtained of any high increase in the incidence of industrial diseases.

NUTRITION

With the introduction of food rationing and the severe restrictions in the variety of available foods, some concern as to the incidence of 'deficiency' diseases was natural. The reports from the health departments of local authorities were uniformly reassuring.

As regards the milk supply, the position was frequently described as 'difficult'. This, no doubt, may be taken to refer to shortages in supply, undoubted decline in the standard of cleanliness in the various processes

of production and distribution and less frequent sampling. There was a good deal of criticism by local authorities of the conditions under which milk was in general produced during the war. The local war agricultural executive committees, in co-operation with local authorities, were asked to assist as much as possible in an advisory capacity. Improvements in the keeping quality of milk were brought about as a result of testing under the National Milk Testing and Advisory Scheme introduced by the Ministry of Agriculture and Fisheries.

Meat. The arrangements made in January 1940 by the Ministry of Food for the centralisation of slaughtering were widely approved. Under these arrangements a stricter control in the supply of meat could be exercised and less labour and transport were absorbed, but there were other advantages scarcely less important. The multiplicity of small registered and licenced slaughter houses, many of them extremely crude and unhygienic, had been regarded as extremely undesirable for years before the war broke out. The war afforded an opportunity of discarding these places and so immensely facilitated the inspection of meat at the time of slaughter. This, however, led in some cases to an undue amount of work falling upon the meat inspector in the area in which the central slaughterhouse was situated, and the Department's intervention was occasionally necessary to secure the co-operation of adjoining local authorities.

It can fairly be said that the inspection of meat at slaughterhouses during war-time was of a consistently higher standard than in pre-war years.

WATER SUPPLIES

With a view to securing the due functioning of water undertakings in the event of hostile attack, approval was given to the payment of grant at the rate of 50 per cent. on some £25,000 capital expenditure incurred by the larger water undertakings in Wales in carrying out various precautionary measures, which included the bringing of their stocks of pipes, collars, bends, etc., to prescribed levels, the provision of mobile tanks and interconnection of mains. Mobile tank provision on the scale of 500 gallons per 15,000 population was generally available and in addition there was a reserve of mobile tanks available for the use of any undertaking which required them in emergency.

Water undertakings in S.E. Wales, S.W. Wales, N.E. Wales and N.W. Wales were also linked in mutual aid zones and groups. Each undertaking agreed to assist the others in emergency by providing pipes, plant, mobile tanks, labour and materials. Lists were in possession of each undertaking in important areas showing the resources of all undertakings in their groups and these lists were revised from time to time. If necessary, labour could also be supplied by the Assistant Director of Emergency Works from the Region's maintenance garrison.

Grants amounting to £340 were allowed towards meeting some £1,000 incurred by water undertakers in Wales in providing air-raid shelters for their employees.

Chlorination. A direction was issued to all water undertakings, requiring them to arrange for continuous chlorination of water from sources which supplied upwards of 1,000 population.

Invasion Precautions. In planning for the protection and maintenance of water supplies in the event of invasion, arrangements were made for co-operation in each area between the local military and sanitary authorities, the water undertakings, and the A.R.P. wardens. Water undertakings were instructed in the provision of deterrents against enemy landings on reservoirs, and in accordance with the Department's instructions, operational schemes were prepared in detail by all the larger undertakings (roughly those serving 10,000 population in coastal areas and 20,000 elsewhere) for the supply and distribution of water under invasion conditions. The cost of approved schemes was fully reimbursed and £6,800 grant was allowed on the development of new sources of supply (usually wells and water points in streams). The emergency arrangements provided for emergency chlorination and where necessary rapid filtration. Distribution arrangements carried 50 per cent. grant and these normally consisted of mobile and static tanks; expenditure amounting to £9,900 was approved for arrangements for distribution.

Householders were instructed that if and when warning was given they should fill baths and cut down consumption to two gallons per head per day or less, and that in the event of normal supplies being cut off, through contamination by enemy action or otherwise, and recourse being had to inferior sources, water for drinking or washing-up should be boiled. Warning was to be given orally by wardens under arrangements agreed with the Ministry of Home Security. Special arrangements existed for maintaining supplies to vital industrial establishments, hospitals and bakeries.

Anti-sabotage. Arrangements were made in conjunction with the Vulnerable Points Adviser to the War Office for securing the guarding of vulnerable points on reservoirs, mains, etc. belonging to certain of the larger undertakings. At a few of the very large reservoirs a regular military guard was provided, but ordinarily the undertakers provided their own guards by enrolling members of their staff in the Home Guard.

Security officers were appointed by the more important water undertakings and they were responsible for seeing that all practicable security measures were taken against the various methods of sabotage which might be adopted.

Certificates of employment and identity were issued to employees of water undertakings to enable police and military authorities to check the *bona fides* of persons employed on mains, stations, and other

apparatus belonging to water undertakings and steps were taken in conjunction with chief constables to eliminate from positions of trust all aliens except those with unexceptionable credentials.

Anti-gas Precautions. Arrangements were made for the formulation by the twelve largest water undertakings in Wales of schemes of anti-gas precautions: the remaining undertakings relied on the schemes prepared by local authorities. Among the matters covered by water undertakings' schemes were treatment of reservoirs, filter beds and mains after gas-contamination and the provision of gas-proof shelters and protective clothing for employees, also the training of personnel including first-aid parties.

War Damage. Instructions were issued to water undertakings regarding the sterilisation of mains after repair and the special measures to be taken against the consumption of contaminated water during the interruption of supplies following damage to mains.

The Royal Air Force were advised of the position so as to avoid locating decoy flares near reservoirs and other installations.

SEWERAGE

ACTION TAKEN TO MEET CIRCUMSTANCES ARISING FROM WAR CONDITIONS

It was not considered necessary to formulate a specific scheme for mutual assistance to cover air raid damage to sewers in this Region, but sanitary authorities were advised that in the event of their requiring assistance with labour or materials they should be able to call upon a neighbouring authority for mutual assistance between water undertakings. It was pointed out that for that purpose undertakings in S.E. Wales, S.W. Wales and N.W. Wales were linked in mutual aid zones and groups and a list of the authorities covered by the water mutual assistance scheme was forwarded for the information of the sanitary authorities concerned.

Sewerage authorities were asked to satisfy themselves that they had, or could obtain quickly, sufficient pipes of various sizes for repairing air raid damage to sewers, and adequate pumping plant, manual or otherwise, for pumping over a block to avoid flooding while the repair was in progress. Councils who had pumping stations as part of their sewerage systems were asked to notify the Department whether they had any stand-by pumps.

It was found from experience that except when a sewerage system depended upon pumping, the position after air raid damage was not acute. Sewers generally are provided with storm water overflows, and if a sewer is damaged and choked it normally means that the sewer discharges to a stream at the overflow next above the point of damage. A sewer also runs on a gradient under gravity and is not under pressure

like a water main, with the result that as soon as any block is removed the sewage will run through, although a portion of the actual pipe may be missing and the flow may be open to the air at the bottom of a trench. When, however, a system depended on pumping to keep the sewers running, reserve pumps were required as a necessary precaution. Regional commissioners were asked by the Ministry of Home Security to consult regional engineers and satisfy themselves that adequate provision was made. As a result of a survey, the regional engineer was of opinion that no serious flooding would result if any sewage pumping station in Wales were put out of action.

As in the case of employees of water undertakings, certificates of occupation were issued to employees of sewerage undertakings to enable their identity to be readily established (Circular 2325 (Wales), April 15, 1941).

Invasion. A circular (I.A. 91222/6/1) was issued on January 21, 1942, to borough and urban district councils pointing out that under intensive attack, sewers and sewage pumping stations in the district were likely to be put out of action, and that in such a case water must be cut off from W.C. flushing tanks and the use of baths prohibited. Besides conserving the water supply these measures must be taken to reduce the flow of sewage which would have to be disposed of and to minimise the risk of pollution of emergency water supplies. The circular advised that the population should make use of commodes, pail closets or trench latrines and bury all foul matter in gardens or other open land as far away from water supply sources as possible. Where this could not be done arrangements should be made for the collection of foul matter and its disposal at a safe place. The local authorities were also told that it might be possible to arrange emergency conveniences instead of a collection service for the congested areas.

After the transfer to the Department from the Ministry of Home Security (Circular H.S.R. 214/42) of the full responsibility for approving A.R.P. proposals to secure the due functioning of sewerage and sewage disposal arrangements in Wales, a Circular No. 2739 (Wales) dated December 29, 1942, was issued to borough and urban district councils on the subject of emergency sanitation in urban areas and on methods of meeting difficulties from damaged sewers and drains and from inadequate supplies of water for flushing W.C.s. This circular was prepared in the light of experience gained, and with due regard to the possibility of more serious and prolonged interference with normal sanitary services than had so far occurred.

In the larger towns where there were densely populated districts with no garden ground or open spaces within reasonable reach, stocks of latrine buckets were available for purchase by local authorities. A simple form of framing and screening was suggested, subject to prior approval being given by the Department; grant under the Air

Raid Precautions Act 1937 was available towards capital expenditure on buckets and screens.

CONCLUSION

The foregoing brief account of the impact of war upon the public health services in Wales shows that in the administration of these services the experience of the Welsh Board of Health was similar to that of the Ministry of Health in England, the national health in both England and Wales being maintained at an unexpectedly high standard under conditions which imposed no little strain upon the depleted medical staffs of central and local authorities, as well as upon the general practitioners, of increasing age and diminishing numbers, who were left to care for the civilian population after the demands of the fighting Services for medical personnel had been met.

In attacking the special problems inherent in large-scale movements of child population, foresight was shown in planning, and the schemes adopted were carried out, not merely with practical efficiency but also with sympathetic understanding of the difficulties of evacuees and householders alike. These special problems are discussed rather more fully, as are those of public health generally, in the English narrative contained in the earlier chapters of this volume.

This chapter, which brings the war-time history of public health in England and Wales to its conclusion, will be read with particular interest in Wales. It fully justifies the decision to entrust the administration of Region 8 to the Welsh Board of Health, and shows that in the discharge of their responsibilities officials in the Principality, as elsewhere, were able to count on the effectual help of voluntary bodies and the intelligent and public-spirited co-operation of the people as a whole.

CHAPTER 7

THE MENTAL HEALTH SERVICES

Contributed by the Board of Control

THE SURRENDER OF ACCOMMODATION IN MENTAL INSTITUTIONS TO THE EMERGENCY MEDICAL SERVICE

As in the War of 1914–18, the Board of Control were called upon to provide casualty beds in their institutions to accommodate war casualties and sick. At first the Board proposed to follow the course adopted in that war and evacuate and surrender a number of their hospitals sufficient to provide for about 40,000 casualties.

Subsequently, it was felt that this scheme would not provide for the adequate dispersal of the available beds to meet the altered conditions to be expected in a war in which a large number of civilian casualties in many parts of the country might result from widespread attacks from the air.

For these reasons, an alternative plan which entailed the partial evacuation of a much larger number of suitably situated hospitals, which would provide the same number of beds, was adopted. The scheme also provided for the complete or almost complete evacuation of a few selected institutions. Altogether, accommodation for upwards of 26,000 beds were surrendered in the mental institutions, thus providing for about 40,000 casualties. Full details of this plan will be found in E.M.S. Volume I, Chapter 2.

SURRENDER OF ACCOMMODATION TO THE COMBATANT SERVICES

In the above-mentioned scheme the accommodation released was meant to be devoted to the treatment of civilian casualties except for one mental hospital—Barrow Gurney—which was lent to the Navy for the treatment of naval casualties. But as time went on the Fighting Services became more and more insistent in their demands for beds, both for mental patients and for sick and wounded. Military hospitals for the treatment of mental cases arising in the Armed Forces were established at Banstead, Oxford, Talgarth and in the North Riding. In these units the patients remained still under military discipline and it was thus possible to secure treatment of their mental illness for an agreed period (up to nine months) without resort to certification and at the same time to avoid any question of illegal detention. This was done by giving commissions in the R.A.M.C. to the Superintendent and his Deputy—the former being accorded the rank of Lieut. Colonel and the latter that of Major. The former, as officer-in-charge, was responsible for treatment, assisted by other physicians with special experience in psychological medicine, all holding commissions in the

R.A.M.C., and detailed for duty in these units by the War Office. In the case of Banstead, for the first two years of its working, the additional medical officers were found by the London County Council from the medical staffs of their mental hospitals. The necessary staff was supplied by the War Office, as well as fully trained hospital nurses, certificated also in mental nursing, and enrolled in the Q.A.I.M.N.S.R. Either the mental hospital's matron or her deputy, or both, were similarly enrolled. The fact that some hundreds of male patients who would otherwise have been in public mental hospitals were treated in military units without coming under the provisions of the Lunacy and Mental Treatment Acts has an important bearing on the statistics of admissions under those Acts, a matter dealt with in the next paragraph. While it cannot be said that all the patients in the military units would have broken down had they remained in civil life, it is certain that an appreciable number would have done so, and the subtraction of these cases from the civil statistics helped to reduce the total of male admissions to public mental hospitals. But the demands of the Army for mental beds were not the only demands from the Services. Half Bracebridge (Lincoln) was handed on to the Army for general hospital purposes, and the whole of Rauceby (Kesteven) was taken over by the R.A.F. The Royal Naval Hospital, Yarmouth, had to be evacuated to Lancaster Mental Hospital, and later a small unit (200 beds) was established at Knowle (Hampshire) for the treatment of mental cases from the Navy which for legal reasons could not be sent to the Royal Naval Hospital. The whole of Exeter City Mental Hospital was handed over to the War Department who placed it at the disposal of the United States Forces.

During the course of the war, adjustments of the scheme had to be made from time to time among which may be noted the transfer of Hollymoor Mental Hospital from the Emergency Medical Services to the Army for the treatment of Service psychoneurotics. As regards diversion of beds, the peak was reached at the beginning of 1943, the Board's records showing at that date, 26,428 beds diverted.

Altogether, ten mental institutions were wholly or mainly cleared of mental patients. Six of these were used as large base and special hospitals by the E.M.S., two by the Army, one by the R.A.F. and one by the United States Army. Seventy-four institutions were partly cleared of mental patients—63 for the E.M.S., eight for the Army, two for the Navy and one for the Canadian Army.

The Board made the following acknowledgment in their thirty-second Annual Report for the year 1945 (Part I):

> 'The Board take this opportunity of expressing to all visiting committees of mental hospitals and managers of mental deficiency institutions concerned their gratitude for the splendid co-operation they received at every stage of the scheme and their appreciation of the smoothness and efficiency with which it was operated. In doing so they are mindful of the immense

burden which the scheme imposed upon the administrative, medical and nursing staffs of the hospitals concerned, whose devotion to duty played so great a part in making the scheme a success.'

EFFECT OF WAR UPON THE ADMISSION RATE IN MENTAL HOSPITALS

The results of the heavy demand of the Emergency Medical Services for beds would have been more serious had it not been for the fall in admissions and the rise in the death rate. The immediate result of the outbreak of war was a rise in the admission rate, notably in London and to a less extent in other large evacuation areas. There were no doubt many elderly people, senile or approaching senility, who under war conditions could neither be evacuated nor kept at home. The transfer of these cases to institutional care and the necessity of clearing certain wards in public assistance institutions which were required for Emergency Medical Services purposes resulted in a sudden upward jump in the admission rate. But the peak of the curve was soon passed and the admission rate in London was back to normal before the end of 1939. Early in 1940 it began to drop below normal, but this was at first probably mainly due to the refusal of many local authorities to admit voluntary patients to their already overcrowded hospitals. Incidentally, this illustrates the difficulty of measuring the true incidence of mental disorder, since the admission rate is always liable to be affected by variations in the accommodation available. Shortage of beds means that cases which ought to be treated in a mental hospital are left to accumulate in public assistance institutions, while early cases which ought to be admitted on a voluntary basis remain at home. There is also the point alluded to in a preceding paragraph that a number of mental patients in military units would probably have broken down if they had remained in civil life and would thus have increased the number of admissions to public mental hospitals. It follows that a fall in the total of admissions does not necessarily mean a reduced incidence of mental disorders. But if the reduction continues over a long period, as in fact it did from early in 1940, there is some reason for believing that the incidence is falling; and indeed the belief is confirmed by the fact that voluntary admissions slowly rose again until by the summer of 1942, they reached the pre-war level, while admissions under certificate continued to fall though the rate of the fall gradually slowed down.

The fall in the male admission rate, as has been noted in a previous paragraph, appeared to be greater than it actually was because cases admitted to military mental units were not included in the statistics returned to the Board. But where full allowance has been made for this there was a marked fall in admissions among both sexes, and though the apparent fall was greater than the true reduction in incidence, there can be no doubt that there was a considerable reduction in the amount of mental disorder during the first two and a half years of the war.

Direct Admissions to Public Mental Hospitals

	Voluntary		Temporary		Certified		Totals		
	M.	F.	M.	F.	M.	F.	M.	F.	T.
1938	4,387	5,264	434	1,086	7,139	9,127	11,960	15,477	27,437
1939	4,451	5,726	446	968	7,234	9,154	12,131	15,848	27,979
1940	3,537	4,570	344	703	6,932	9,114	10,813	14,387	25,200
1941	3,658	4,757	303	762	6,115	8,407	10,076	13,926	24,002

This phenomenon was not unexpected. The experience of the previous war was similar and reports from Barcelona during the Spanish Civil War indicated that war does not produce any increase in the incidence of the major psychoses. The causes of this cannot be established with certainty, but it is likely that a main factor is the improvement in employment. Mental disorders are for the most part disorders of middle and later life, and there is little doubt that at this stage in life money worries and the fear of unemployment are among the commonest stresses which lead unstable people to break down. Nor is it merely a question of financial anxiety. People who are fully employed, especially if their work is such as to keep their minds occupied and if they feel that they are making a real contribution to the national war effort, have no time to brood over real or imaginary woes. At the same time the fall in the incidence of psychoses was not regarded as indicating any permanent improvement in the mental health of the nation, and this expectation was realised, as the following table shows:

Direct Admissions to Public Mental Hospitals

	Voluntary		Temporary		Certified		Totals		
	M.	F.	M.	F.	M.	F.	M.	F.	T.
1942	3,854	5,505	249	667	5,819	8,248	9,922	14,420	24,342
1943	4,691	6,673	243	729	6,116	8,211	11,050	15,613	26,663
1944	5,166	7,325	371	733	6,022	8,142	11,559	16,200	27,759
1945	5,623	8,287	403	874	6,141	8,248	12,167	17,409	29,576
1946	7,563	10,496	459	1,004	6,500	9,563	14,522	21,063	35,585
1947	9,181	12,176	403	979	6,642	9,842	16,226	22,997	39,223

EFFECT OF THE WAR UPON THE DEATH RATE IN MENTAL HOSPITALS

A rise in the death rate (which, for the five years 1935–9 averaged 6·85 per cent. of the average number resident) was not unexpected. It never, however, showed any sign of reaching the catastrophic level of 1918 (20·3 per cent.). The figures for the first three years were—1939, 7·2 per cent.; 1940, 8·3 per cent. and 1941, 9·2 per cent. Various causes may have contributed to this increase, the most important factors probably being overcrowding, the increase in senile admissions during the early part of the war, the blackout and the reduced ventilation

resulting from it and the loss of facilities for open-air treatment of tuberculosis owing to the difficulty of adequately protecting the glass roofs of verandahs. So far as could be seen rationing was not a major factor. In most mental hospitals the dietary, at least from the point of view of its calorie content, compared not unfavourably with the pre-war dietary. But the lack of fruit, the shortage of fresh vegetables and other protective foods, and in some cases shortage of milk, undoubtedly lessened the vitamin content. Such examination of weights as it was possible to make indicated a greater loss than would normally be expected, and it is possible that some under-nourishment contributed to the increase in the death rate from tuberculosis. The deaths from tuberculosis rose from 500 (3·8 per 1,000 resident) in 1938—a record low year—to 1,138 (8·7 per 1,000 resident) in 1941. At the same time, while the deficiencies of protective food may have been, and no doubt were, a factor, overcrowding and the impossibility of isolating tuberculous patients, or of giving them open-air treatment, may have been responsible more than any food shortage necessitated by the conditions of war.

The evil effects of overcrowding were not, however, limited to cases of tuberculosis. There had been a marked increase in the incidence of dysentery. This is always a danger in mental hospitals, though prior to the outbreak of war the number of dysentery cases had greatly decreased. Fortunately, the cases occurring during the war were mainly of a mild type and, though the source of infection in many instances could not be traced, the outbreaks were probably due in a large degree to the admission of patients who were either carriers or suffering from dysentery, and whose condition, owing to the shortage of medical and laboratory staffs, was not ascertained early enough, and partly also to the exposure of transferred patients to strains of infection to which they were previously unaccustomed. But overcrowding has a direct bearing on the increase of dysentery because, whatever the source of infection, the control of this disorder is primarily a matter of isolation and care in nursing. The degree of overcrowding which existed throughout the war period made effective isolation almost impossible. The difficulty of dealing with dysentery patients was aggravated too, by the shortage of nurses to which allusion is made later, and the poor quality in many cases of the substitutes for experienced nurses who left to take up nursing elsewhere. Though the mortality from dysentery was not sufficiently serious to be regarded as a material factor in the rise in the death rate, it was a source of much anxiety both to the Board and to medical superintendents.

From 1941 onwards, however, the death rate improved, owing to progressive amelioration of the early war-time conditions under which patients had lived. By 1945 it had fallen to 6·84 per cent., i.e. virtually the pre-war figure.

REDUCTION IN MEDICAL STAFFS

Another factor which must be regarded as having in some measure contributed to the rise in the death rate in the early years of the war was the reduction in the strength of the medical staffs. The demands of the Fighting Services, and particularly of the Army, for doctors, compelled the release of practically all the younger men, with very few exceptions, who were medically fit. The medical staffs of public mental hospitals were greatly depleted in the first years of the war, and the acceptance by the Government of the recommendations of the Shakespeare Committee* led to the withdrawal of a further 85 doctors during 1942. In order to secure the numbers demanded by the Shakespeare Committee, it was necessary in many cases to reduce the staffs to such an extent that, including the medical superintendent who had, of course, many administrative duties, the staffs were reduced to something in the neighbourhood of one doctor for every 400 patients. But the depletion of the medical staffs, even on this scale and necessary as it was, in many cases led to the abandonment of special forms of treatment such as insulin, cardiazol or electrical shock treatment which make a special demand upon the medical and nursing staffs. For the same reason, there were few public mental hospitals with sufficient doctors to attempt effective psychotherapy. Indeed, it is safe to say that medical treatment was in a number of hospitals limited to the treatment of purely physical conditions. Even the new admissions who are most in need of psychotherapeutic treatment had, usually, little chance of receiving the attention they required. The lot of the new admissions was still further aggravated by the fact that, in many instances, the admission and treatment units, the newest and best equipped sections of the hospitals, were taken over by the Emergency Medical Services. The incidental result of this was that the accommodation left for voluntary patients was unsuitable and unattractive, and it is remarkable that in spite of this the number of voluntary admissions had by 1943 reached almost a pre-war level.

As a partial remedy for the shortage of doctors efforts were made to employ aliens whose title to practise in this country had been officially recognised. In a few cases the experiment was successful, but only in a few. It is no reflection on the competence of foreign doctors to point out that there is no branch of medicine which presents greater difficulties to them than psychological medicine. Even though their duties may be limited to dealing with the physical condition of their patients, the approach to the mentally disordered must present special difficulties to the foreigner. A command of English quite sufficient for the ordinary purposes of social life may be wholly inadequate when it is a question of dealing with persons suffering from mental disorders.

* Ministry of Health, First and Second Reports of the Medical Personnel (Priority) Committee. London, H.M.S.O., 1942.

SHORTAGE OF NURSES

The effect of the shortage of doctors was still further aggravated by the shortage of nurses. Although at first mental nurses over thirty were in reserved occupation, the process of dereservation led to a dangerous reduction in the total nursing strength on the male side. On the female side, the drift away from mental hospitals of nurses who wanted work which seemed to them more directly connected with the war reduced the numbers to such an extent that the Minister of Health felt compelled to make the Mental Nurses (Employment and Offences) Order 1941, commonly known as the 'Standstill' Order, to prohibit nurses with more than twelve months' service in hospitals which paid the standard rates, from leaving without the permission of the committee, with a right of appeal to the chairman of the Board of Control. This Order was successful in checking any further drift away but, as was recognised at the time to be inevitable, it added to the difficulties of recruitment. Every effort was made to bring back pensioners and married nurses but, in spite of this the shortage, though unevenly distributed, was such as to compel many mental hospitals to accept substitutes who would never have been engaged under normal conditions. A general deterioration in the standard of nursing was inevitable, and undoubtedly contributed to the rise in the death rate from tuberculosis, and in the incidence of dysentery.

OUT-PATIENT CENTRES

The depletion of the medical staffs added greatly to the difficulty of carrying on out-patient centres. Of these there were, before the war, over 170 staffed wholly or mainly by doctors from mental hospitals. The number of sessions was never sufficient, and the demand on the time and energy of the remaining doctors, combined with the difficulties of travelling, prevented any general development of the service. Out-patient work is exacting and takes time, and it is not surprising that doctors with more work than they could well do in their own hospitals were unable to give more of their time to out-patient work. Although air raids, even in those areas which suffered most severely, did not produce the increase in neuroses and psychoneuroses which might have been expected, there were indications that the strain resulting from raids and from the excessive hours worked in war factories, especially by people wholly unaccustomed to prolonged labour under factory conditions, produced neurotic and psychoneurotic cases with which the out-patient centres, as staffed at the time, could not adequately cope.

EFFECTS OF THE WAR ON THE MENTAL DEFICIENCY SERVICE

As stated above, accommodation for nearly 26,000 patients was surrendered to the Emergency Medical Services on the outbreak of war.

Only the larger mental deficiency institutions were affected, but in these the surrender of beds resulted in a degree of overcrowding which, under normal conditions, would have been most undesirable. It did not, however, have any grave reaction on the health of the patients except for a rise in the tuberculosis rate. But it inevitably produced serious discomfort and, combined with the A.R.P. measures, it must have resulted in a lowered power of resistance to epidemic disorder. Fortunately, there were no serious epidemics, and the effects of overcrowding in mental deficiency institutions were much less serious than in mental hospitals, partly because the average age of the patients was lower, but mainly because, apart from cot-and-chair cases and other low grades, the patients were practically all employable and could be kept out-of-doors to a far greater extent than mental hospital patients.

Unfortunately, this is far from being the full extent of the harmful results of war conditions. Although at the outbreak of war there was a shortage of beds in mental hospitals, expressed as a percentage of the total accommodation it was relatively small. But the mental deficiency service, which was still in course of development, suffered far more. New colonies were either commandeered, like School Aycliffe in Durham, or were unable, owing to the shortage of staff, to open new villas completed during the war. This was notably the case at Stallington Hall, near Stoke; Leybourne Grange, near Maidstone, and Brockhall near Clitheroe.

Members of the Civil Nursing Reserve were not required to nurse in mental institutions, nor were women 'directed' by the Minister of Labour and National Service to join the staffs of such institutions. The result was that, owing to difficulties in securing staff, some hundreds of beds remained unoccupied. This was all the more unfortunate as evacuation had brought to light a large number of mental defectives who had not previously been 'ascertained' by local authorities. Many defectives who had been evacuated proved, as might have been expected, a constant source of difficulty in billets with normal children, and in many reception areas it was necessary to provide special hostels for unbilletable children. Indeed, the shortage of beds for low grade cases became so acute, that by the summer of 1942 it was practically impossible to find beds anywhere for low grade defectives. Nor did the difficulty end with the termination of hostilities. The stoppage of all building not directly necessary for the war effort meant that work on projected new colonies was entirely suspended and it will take some years to overtake arrears.

EFFECT OF WAR CONDITIONS ON OCCUPATION THERAPY

An incidental and unforeseen result of the war was to add to the difficulties of organising occupation therapy owing to the shortage of

many essential materials. But, while indoor work was curtailed, in some places to a regrettable extent, the necessity of producing more food led to a considerable increase of outdoor occupations. The acreage under vegetables was expanded almost everywhere, and those patients who were physically fit for field work took to it very kindly. Many who would in normal times have resented the monotony of occupations such as weeding were content to do this work and did it well as a contribution to the national war effort. Similarly, many of the less active women patients were enthusiastic in knitting comforts for the Forces, and in some institutions in mending of soldiers' underclothing. Although the more co-operative patients were in general usefully occupied, much of their work could hardly be regarded as occupation therapy, since these occupations were not selected because of their special suitability to the patients, and in many cases they called for so little thought and attention as to leave the patients free to brood over their real or imaginary troubles. In other words, to occupy patients' hands is not the same thing as occupying their minds.

AIR RAID DAMAGE TO MENTAL INSTITUTIONS

A considerable number of mental institutions suffered damage in air raids. Happily, with the exception of Friern and Severalls, where there were direct hits on crowded buildings, the number of casualties was far smaller than the extent of the material damage might have suggested. Owing to the difficulty of moving large numbers of patients in every alert, it was found impracticable to provide shelter for all of them, but in areas where raids were at all frequent it was the custom to let the patients sleep downstairs, and to use the upper floors as day accommodation. This necessitated protecting many of the ground floor windows, at first by sandbags and later by baffle walls. This tended to impair ventilation and lighting, but the absence of any outlook was less depressing than might have been expected because during the day the patients, except in sick and infirm wards, were upstairs. During the actual raids the patients behaved extraordinarily well. Nowhere was there any panic, and the courage and cheerfulness of the nurses were beyond praise. In general, it is not too much to say that mental patients faced their ordeal with the same fortitude as the rest of the civil population. In large institutions the maintenance of complete blackout presented obvious difficulties, but the cases in which restless patients deliberately damaged blackout materials were comparatively few, and for the most part patients were at least as careful as the nursing staff. The Board encouraged all mental hospitals and mental deficiency institutions to spread their stores over a number of buildings and to avoid the accumulation of reserves in one central store. This dispersal of consumable stores was not practicable everywhere, but it was adopted in the great majority of institutions.

STATISTICS AND RECORDS

The Board did all that seemed possible to relieve medical superintendents of unnecessary returns and other clerical work. But they took the view that statistics must continue to be kept, since a prolonged break in the continuity of statistical returns would greatly impair their value, besides making it difficult, if not impossible, to compare peacetime and war-time experience. The Board also, not without reluctance, sanctioned the scrapping of considerable quantities of records. While they indicated what records might, in their view, properly be utilised as salvage, the actual decision in each case rested with the local authority concerned, and the practice naturally differed in different areas. They recommended however, the preservation of all the more important medical reports and of all admission and other statutory documents relating to persons still living. The total amount of paper thus released as salvage cannot be ascertained, but it is known to have been considerable.

DEMOBILISATION OF EMERGENCY HOSPITAL SCHEME

Preliminary plans for the return to normal use of bedspace in mental hospitals and institutions diverted to war purposes were made well in advance of the end of hostilities. The order of priority as regards mental institutions was largely determined by such considerations as the need to recover treatment and special units and the desirability of relieving overcrowding where it was most serious. On the whole, the return to normal conditions proceeded smoothly, though it was frequently delayed by shortage of staff to man recovered units and the scarcity of labour and materials made it difficult to recondition accommodation.

It was possible to begin to release bedspace in 1943, at which time accommodation for 26,428 patients had been diverted to emergency uses. Between then and 1945 bedspace for approximately 6,280 mental patients was returned to committees, but about a quarter of it could not be occupied because of shortage of staff and incomplete structural restoration.

Naturally, the needs of the war-time medical services continued for some time after the end of hostilities and at the beginning of 1948, bedspace for some 6,000 mental patients remained diverted. On July 5 of that year, with the coming into force of the National Health Service Act, 1946, the Emergency Hospital Scheme came to an end. Any hospital bedspace still in use for emergency purposes then passed to the Regional Hospital Boards.

FUTURE DEVELOPMENTS

Under the National Health Service Act, 1946, the Mental Health Service was integrated in the National Health Service. Local health authorities were called upon to organise their functions under the

Lunacy and Mental Treatment Acts and Mental Deficiency Acts as part of the Public Health Service. At the centre, there was a corresponding integration, and the National Health Service Act transferred to the Minister of Health certain functions previously assigned to the Board of Control. These were primarily medical and administrative. The Board of Control retained independent responsibility for certain functions relating primarily to the liberty of the subject. While this allocation of responsibility was readily definable in the National Health Service Act, it is, in practice, frequently impossible to separate with precision the legal, the administrative, and the medical aspects of mental treatment. In order, therefore, to obviate duplication of machinery, and to preserve the proper co-ordination of all the functions involved, the personnel of the Board of Control operate as the Mental Health Division of the Ministry of Health for the discharge of the medical and administrative functions assigned to the Minister, while they exercise, in their independent capacity as a Board, the quasi-judicial functions relating primarily to the liberty of the subject.

The integration of the Mental Health Service in the National Health Service is designed to achieve the closer approximation of the treatment of mental illness to the treatment of physical illness. The objective is to remove the isolation which has, in the past, sometimes handicapped psychiatry and the Mental Health Service, and to ensure wider facilities for the treatment of mental disabilities. It is expected, for example, that more facilities will be provided at general hospitals and neurosis centres for the treatment of suitable cases, and that there will be close co-operation and exchange of staff between the mental and the general hospitals, so that the special facilities for diagnosis and treatment in the general hospitals on the one hand, and in the mental hospitals on the other, will be available to both.

One further development arising directly out of the war, has been the attention given to rehabilitation. Beginning with the rehabilitation of Service personnel who required treatment for mental breakdown, greater attention is being focused on the rehabilitation of civilians who, from time to time, present difficulties to industrialists and employment agencies. It is clear that one of the lines of development in the Mental Health Service in the future will be to endeavour to give greater assistance in the rehabilitation of the industrial 'misfits'.

CHAPTER 8

THE PROBLEM OF THE AIR RAID SHELTER

Compiled from material supplied by the Ministry of Health

WITH the intensification of the air attacks in 1940 and particularly with the continuous night raids upon London, shelters not originally intended or designed for sleeping began to be used every night as dormitories. There was a rush to the underground tube railway stations, which rapidly led to severe overcrowding. People felt safer when they no longer heard the sound of gunfire or exploding bombs; they therefore avoided the surface shelter and sought protection underground or under such places as railway arches, many of which, though traditional shelters of the last war, had never been scheduled as shelters, and afforded protection much below standard.

A serious public health problem thus appeared, and the Minister of Home Security and the Minister of Health appointed a committee, with Lord Horder as chairman, on which both Ministries were represented, to inquire into health conditions in air raid shelters.[1] Medical officers of health of the metropolitan boroughs were asked to inspect the public air raid shelters in their areas, but by the middle of October little sanitary improvement had been effected. This appeared to be due to the reluctance of the local authorities to enter where they had previously been excluded, and to the fact that it rested with the borough engineers' departments to carry out the recommendations of the health department, and they were overwhelmed with other work, including the rendering of shelters structurally safe, and the restoration of damaged public services. Moreover, there were shortages both of materials and labour and even under favourable conditions time would have been needed to convert into dormitories shelters not designed for the purpose. Dr. P. G. Stock was accordingly placed in charge of a team of medical officers selected from the staffs of the Ministry of Health and the Board of Education, with other doctors specially engaged, to visit shelters and co-operate with the local authorities. Special attention was paid to the epidemiological aspects, and a careful watch kept on the incidence of infectious disease.

Early in 1941 the responsibilities of the Ministries as to shelters were delegated to the Regional Commissioners, and in London the work came under Alderman Charles Key, M.P., one of the three Commissioners for the London Region.

HYGIENIC PROBLEMS

The fundamental problems were overcrowding, defective ventilation, insufficient closet accommodation, dampness and lack of cleanliness. Many of the shelters were below the level of the sewers and pail closets were essential. Dampness, due to faulty roofing, condensation, and flooding by storm or by fire-hose water, led to increased overcrowding in those shelters or parts of shelters which remained dry.

Overcrowding. The seating capacity of public shelters provided for occasional use had been assessed at 6 sq. ft. per person, or $3\frac{1}{2}$ sq. ft. if artificial ventilation provided an adequate turnover of air. This assessment, or 'coded capacity', did not foresee their use as dormitories, and yet so dense was the crowding in some shelters that even this space was not available. For example, in October 1940, 200 persons were found to be sleeping on the floor of the basement of Neckerbocker Buildings, Bermondsey, with less than 4 sq. ft. of floor space and 30 cu. ft. of air each. There was no ventilation, and at 2 a.m. some inspecting medical officers were attacked with hyperpnoea. The shelterers, however, slept on, and came to no apparent harm.

The first attempt to control overcrowding was to fix a minimum of 50 cu. ft. per person in shelters used as dormitories, though it was recognised that since it was humanly impossible to deny admission to anyone during air raids it was equally impossible to enforce any standard. The provision of bunks in which shelterers could sleep went far to reduce overcrowding and later, when more approved shelters were provided, a ticket system restricted the dormitory population of a shelter to the number of its bunks. In another and unexpected way the provision of bunks seems to have saved life. In the early days shelterers spent long hours sitting or sleeping in chairs, particularly deck chairs, and hypostatic oedema of the legs was occasionally noted. Coincidently, a small rise was observed in sudden death from pulmonary embolism among the sheltering population,[2] but bunking speedily ended these troubles. Fortunately, shelterers were never forced to spend the hours of daylight as well as the night in shelters, and as an adequate vitamin content was always maintained in the people's diet, no immediate ill-effects from sunlessness were observed. Irradiation with ultra-violet light was considered impracticable.

Except in the tube stations, lighting was often inadequate, while in very few shelters was there effective lighting during the evening which could be dimmed during the night. Heating arrangements were seldom provided as they interfered with adequate ventilation of the shelters.

The absence of a piped water supply and consequently of washing facilities in many large shelters, and an unexpected mosquito nuisance in several of the underground tube stations were other difficulties to overcome. Circulars were issued to secure the regular medical super-

vision of shelters, and to authorise the appointment of additional assistants to medical officers of health at the cost of the Exchequer. The various instructions in regard to shelters were summarised in memoranda issued in 1941.[3] [4] Ministerial broadcasts, statements in the press and instructions to the Regions sought to secure the utmost dispersal to deal with the crux of the problem—overcrowding. Children were expected to suffer most from the conditions of 'shelter life', and everything possible was done to secure their voluntary evacuation and that of mothers accompanied by their children, expectant mothers, and the aged, crippled and infirm.

Buildings were resurveyed to find more shelter accommodation and a long-term policy of deep tunnels additional to the London tube railway system was undertaken.

Adequate ventilation was difficult mainly because of the necessary precautions against poison gas, and when a committee was appointed under Sir Alexander Rouse in October 1940 to consider ventilation and heating, the Horder Committee urged that full use should be made of whatever means of ventilation existed.

There was nevertheless at first a degree of overcrowding in many shelters which no one could regard with equanimity; the most dismal forebodings as to the epidemics which would occur were voiced in the press, and the Ministry's medical officers, the staffs of local authorities and of the London Passenger Transport Board and voluntary bodies such as the British Red Cross Society, St. John Ambulance Brigade, W.V.S., and the Salvation Army, put in much hard work before the situation seemed really in hand.

Gradually medical aid posts were opened and staffed. Bunks were provided and shelters coded to indicate clearly their capacity both as dormitories and as casual shelters. Sanitation, water supply, ventilation and lighting, canteens and amenities were installed and the management of the shelters was made part of the warden service of local authorities.

The size of the problem will be gathered from the following figures. On the night of January 5, 1941, the number of persons in shelters in the London Region was 1,300,000. Of these, 275,000 were in public shelters, including some 95,000 in the tube shelters. From September 1940 to May 1945 there were over 53,000,000 attendances of dormitory users of the tube shelters. The monthly numbers are shown in the graph on p. 196 kindly supplied by the London Passenger Transport Board.

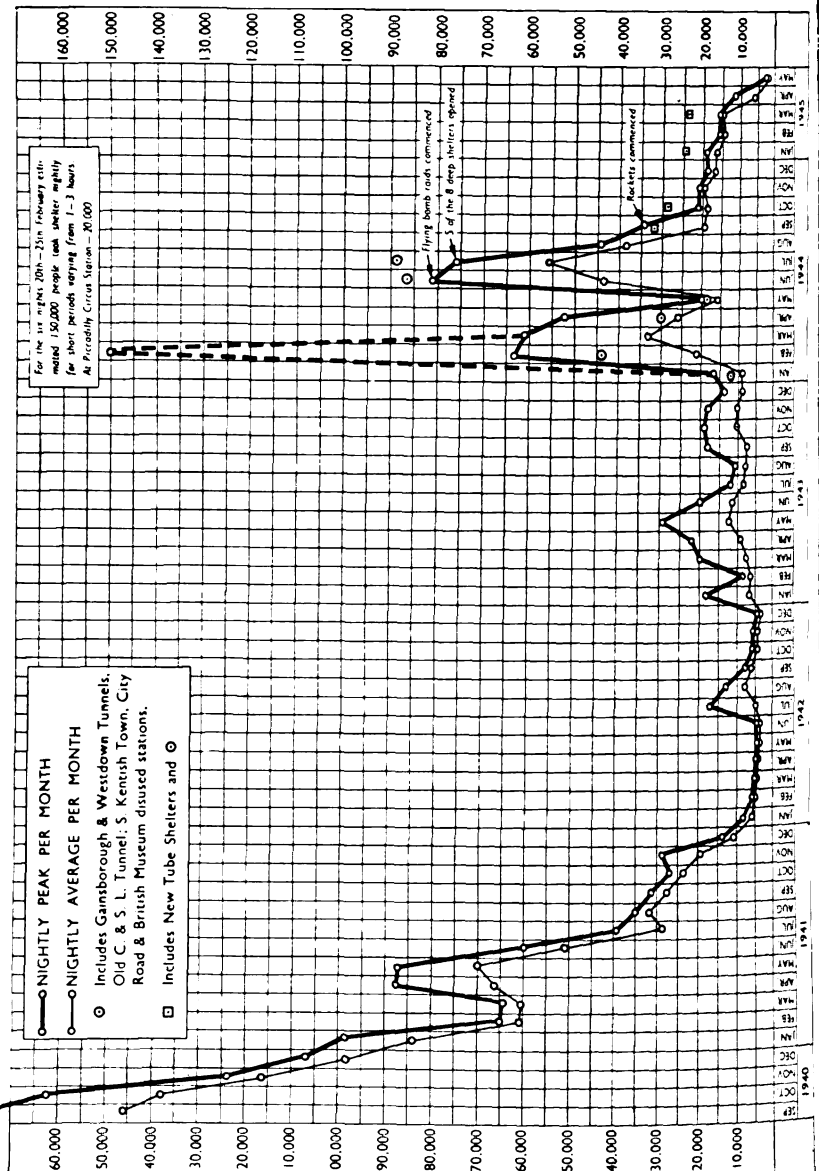
TYPES OF SHELTERS

Air raid shelters were, for official purposes, divided into domestic and public shelters.

The former included 'Anderson' shelters, strutted basements, individual or communal brick surface shelters, and later on, indoor shelters

such as the 'Morrison'. Though at times overcrowded, individual domestic shelters did not lead to large aggregations of persons, water

NUMBER OF TUBE STATION SHELTERERS (including Liverpool Street, Aldwych, and Bethnal Green) from September 7, 1940 to May 6, 1945.
25 per cent. (approx.) should be added to the undernoted figures for those shelterers attending only during short alerts.



and sanitary facilities were readily available, and from them no general health problem arose.

Public shelters were of the following types: (*a*) Basement shelters under public buildings, large blocks of flats and large shops were much

used. Some basement shelters in London, e.g. those of Selfridge Ltd. and of Stepney Fruit Market, were very large and became places of public resort, in which canteens, entertainment and quite elaborate medical and sanitary arrangements were gradually installed. (*b*) Trench shelters, constructed in parks and open spaces, were not popular, though in some London areas, e.g. Wandsworth and Poplar, their dormitory population was large enough to justify medical and nursing arrangements. Many were damp and cold despite considerable efforts to improve the conditions. (*c*) Street surface shelters were constructed in large numbers, generally for about fifty persons, in accordance with the policy of dispersal. This type of shelter was also not popular, and, as in any case large aggregations of population were not possible, the main hygienic problems were of heating (Cura stoves were later installed), lighting and general cleanliness. (*d*) Railway arches were traditional from the last war, but many had never been scheduled as shelters. The Tilbury Arches in Stepney became famous and at one time the nightly population approached 15,000. At first the conditions were unspeakable, but gradually with the installation of water closets, ventilating fans, a piped water supply and the reduction of the population by the provision of alternative accommodation, they became fairly satisfactory. (*e*) London's extensive system of tube railways provided very popular ready-made shelters with safety, easy access, warmth and lighting already provided. It had been decided on the outbreak of war that the underground stations should not be used as public air raid shelters, and notices to this effect were posted in the stations in December 1939. Early in September 1940, however, when heavy night raids started and the public rushed into the underground stations, the original policy was reversed, and on September 27 the peak number of over 177,000 shelterers was recorded.

Eighty-two of the stations, part of the Aldwych tube and parts of the tunnels which had not been opened for use at Liverpool Street, Bethnal Green, West Ham and Leyton, were scheduled as shelters. At first the shelterers slept as best they could on the platforms and staircases, but gradually order emerged out of chaos, the numbers were regulated, sleeping bunks were erected and medical and sanitary arrangements installed.

Latrines were erected at the ends of the platforms or in passage ways, but as most of these were below sewer level (the depth varying from 30 ft. to 130 ft.) water closets were not practicable and the great difficulties of emptying pail closets were overcome at eighty-two stations by the provision of 'hopper and ejector' plants. The plant consisted of a hopper into which the contents of the pails were emptied leading to a 200-gallon steel cylinder. When the entrance valve was closed the contents of the cylinder were blown into the sewers by compressed air already available for station purposes.

A refreshment service, which had been started at Holland Park Station in October 1940, was gradually extended until there was at least one canteen point at each station, including apparatus for warming infant feeds. Thanks to the whole-hearted co-operation of the Ministry of Food, the service operated all the time the stations were used as shelters.

Though the underground tubes afforded fine protection, some stations were damaged by enemy action and casualties therein amounted to 153 killed and 213 injured. Of these, 52 fatal and 52 injured casualties (including persons taking cover temporarily in the top subway) occurred at the Bank Station on January 1, 1941.

A most lamentable disaster, due indirectly to enemy action, also occurred at the unused station at Bethnal Green, which had been taken over as a shelter. As people were taking cover on the night of March 3, 1943, there was an accident on the entrance stairs and 173 persons lost their lives.

New Tube Shelters. During the latter years of the war eight large tunnel shelters were constructed under the existing tube railways. Each comprised two lengths, 16½ ft. in diameter, of tube tunnelling with cross passages and branches. The main tunnels were divided into upper and lower decks by a flooring of pre-cast concrete slabs. Each shelter was scheduled for 8,000 persons, and a special system of forced ventilation installed. They were equipped with steel bunks, medical, sanitary and canteen arrangements of the latest pattern and embodied various improvements. Two large hot-air disinfestors were built for these shelters, one serving those north of the river and the other those south. Three of these new tube shelters were reserved for special purposes, and the other five were opened to the public in June 1944. Fortunately, they had never to be used to capacity, the highest number of shelterers being 12,297 on July 24, 1944.

Caves and Tunnels. The well-known Chislehurst caves in Kent were extremely popular as an air raid shelter and attracted tenants from far afield. Privately owned and at first administered by an unofficial committee, they were eventually taken over by the local authority. At one time over 14,000 persons were taking shelter in these caves, which were finally scheduled for 10,000 after many improvements had been carried out, but though the installation of fans did something to combat dampness, the walls and roofs of the tunnels dripped and bedding left in the caves became damp.

A large medical aid post with nursing staff was installed and a local practitioner slept in the caves every night. In addition to the general supervision exercised by the local medical officer of health, health visitors from the county staff helped to prepare infant feeds and instruct mothers.

The floor of the caves being at ground level, pail closet sanitation was adequate. Electric light was installed and a cleansing station with a

steam disinfestor and baths was built just outside the entrance to the caves.

Tunnels, constructed during the war at Epsom, Merstham, Coulsdon and Riddlesdown and equipped in the usual way, were much used during the flying bomb raids. The roofs and walls, however, dripped badly, and in the Riddlesdown tunnels it was necessary to put brick linings in some places. Ventilating fans produced some improvement, but the conditions were never entirely satisfactory.

Another large tunnel shelter was a disused portion of the old City and South London Underground Railway in Southwark, at one time said to be used by over 15,000 people. This tunnel has a smaller diameter than the more modern tunnels, and as there was no movement of air due to the passage of trains, the atmosphere was sprayed with sodium hypochlorite solution as long as the shelter was occupied.

Tunnels in the chalk were used at Dover, where the morale of the people was particularly high, and during the height of the raids in October 1940 not more than 1,000 people on the average occupied the shelters. At Ramsgate the shelters were unique as they consisted of some 2¼ miles of deep tunnelling in the chalk cliffs and the old London and South Eastern Railway tunnel which extends for about three-quarters of a mile from Broadstairs to the beach at Ramsgate. In the early days each family had a portion of this tunnel screened off to form a fair-sized room, which the occupants furnished for themselves. At Hastings, St. Clement's Caves at West Hill formed a fine shelter, with two inter-communicating series of caves, one above the other. Electric light, gas and water were laid on, and the form of the caves, with bunks for 500 people, allowed the segregation of males and females and accommodation for married couples. Water closets and wash places were also provided and a large space was set aside for recreation. As with all shelters of this kind, ventilation presented special difficulties.

A disused railway tunnel at Bristol, two-thirds of which was not considered structurally safe, was adopted by a few people as a haven of safety for most of the twenty-four hours, despite wretched conditions due to poor ventilation, damp and dirt. Early in 1941 the unsafe portion was closed as a shelter, and bricked off; the remainder was reconditioned with proper bunks and water closets were erected at the entrance.

Newcastle-on-Tyne had two structures—namely, the Victoria Tunnel and the Ouseburn Culvert—which were readily converted into deep shelters. The Victoria Tunnel, one hundred years old, ran with a gentle gradient for a distance of two miles down to the river at a depth varying from 40 ft. to 90 ft. The circular arched roof and walls gave a maximum height of 6 ft. 6 in. and a width of similar measurement at floor level. It easily accommodated 3,000 persons during the day and as a dormitory had bunks for 15,000 persons. Surprisingly, natural ventilation sufficed at all times, and though the temperatures, ranging

between 55° F. and 60° F., did not call for supplementary heating, it was later introduced to try to counteract the high humidity and condensation. Main drinking water was laid on at various points, but sanitation was by chemical closets. The restricted cross-section of the tunnel meant that the barest amenities only could be provided, the lighting by main electricity was deficient except in the immediate vicinity of the lighting points, and it took a long time for the public to filter in and out of the entrance.

The Ouseburn ferro-concrete culvert was constructed between 1904 and 1907 to cover over the stream of that name. It has been covered since to a depth varying from 50 ft. to 90 ft. by controlled tipping of refuse and is some 1,800 ft. long with an egg-shaped cross-section 21 ft. high and 27 ft. wide. In 1939 a concrete platform was laid along the whole length of the culvert at the level of its greatest width which provided a chamber 13 ft. high, 27 ft. wide and 1,800 ft. long, situated just above the maximum recorded storm water level of the stream. By reason of its relative inaccessibility the shelter was not well suited as a daytime shelter, but provided excellent dormitory shelter accommodation for 1,500 persons.

The shelter remained dry at all times. Ventilation by the entrances was inadequate and encouraged by a number of electric fans. Sanitation was provided by water carriage, discharging directly into the stream below. Brilliant illumination was provided by 'daylight' lamps and so much floor space was available that two canteens, a medical aid post, a recreation centre and a library centre were readily fitted into the shelter.

MEDICAL ARRANGEMENTS

The employment of medical practitioners and nurses at shelters was authorised, but it was in the larger shelters that outbreaks of disease were mostly feared; and in those shelters, with a nightly population of some 500 people or more, local authorities were asked to establish medical aid posts with equipment provided by the Ministry of Health, the whole of the cost to be borne by the Exchequer.[5]

The underlying idea of a medical aid post was not merely to provide medical aid to shelterers but also to facilitate the detection and prevention of infectious disease. This necessitated a large staff and in the London Region in March 1941, four doctors were resident in the largest shelters, two in attendance whole-time, 208 visited nightly, and 318 were 'on call'. There were also some 300 nurses and over 300 nursing auxiliaries employed.

To provide the nursing staff Dame Katherine Watt, the Chief Nursing Officer of the Ministry, had to overcome many difficulties. The greatest help was also given by the Joint War Organisation of the British Red Cross Society and Order of St. John. In the London Region shelter

matrons were appointed to supervise the welfare of the nurses and undertook this work in addition to their ordinary duties.

Part of the medical aid post was equipped as a small consulting room, with drugs, dressings and instruments, facilities for washing and sterilising and for recording attendances, and two or more beds or bunks. The other part contained beds or bunks for persons isolated pending removal from the shelter. Sanitary arrangements for the staff were provided.

Cases of notifiable disease were formally notified in the ordinary way and ambulance transport was provided both for infectious and non-infectious (including maternity) cases.

Medical officers attending shelters were given powers:

> (1) to require a person suspected of infectious disease to submit himself to medical examination;
>
> (2) to require a person found by the medical officer to be suffering from infectious disease to be isolated temporarily in the shelter; and
>
> (3) to require the removal of such person to hospital or to his home or some other suitable place as the medical officer may consider necessary.[6]

The problem of infectious disease was complicated by the impossibility of excluding patients from public shelters when air raids were expected or in progress, if such exclusion meant that they would be without adequate protection from enemy action. So long as all cases of infectious disease, whether notifiable or not, could be admitted to infectious disease hospitals they could be excluded from shelters; and in London, Sir Allen Daley, the County Medical Officer, rendered invaluable help. Fortunately, no severe outbreak created a demand for beds which could not be met, but later on some difficulty occurred from bomb damage to the infectious disease hospitals themselves.

When the shelter population of London again increased with the flying bomb attack in the summer of 1944, numerous requests were made for the hospitalisation of mumps, chicken-pox and german measles, but the County Medical Officer was then compelled to restrict admissions as a rule to cases of serious notifiable disease and complicated cases of measles and whooping cough. After consultation between the Ministry of Health, the London County Council and the Metropolitan Boroughs Standing Joint Committee, it was decided that special shelters or special bays in large shelters should be allocated to patients with infectious disease and their immediate contacts. Such an arrangement had already been introduced by Dr. Fenton in Kensington as far back as 1940 and had proved satisfactory. A number of metropolitan boroughs now made similar arrangements but there was no great rise in the number of cases, and as aerial attacks became less frequent this precaution became unnecessary.

One of the chief duties of the staff of medical aid posts was to maintain general supervision over the health of the shelterers, and many

cases of incipient illness, minor ailments, accidents or infestation were dealt with promptly. In many boroughs, immunisation for diphtheria was energetically pressed.

Health Propaganda and Education. The fears expressed by press and public of epidemics in air raid shelters prepared the ground for the health propaganda which the Ministry organised in the autumn of 1940. With the help of the Central Council for Health Education, posters and leaflets were prepared and much publicity was given by the press and by the B.B.C. on the prevention of respiratory disease and droplet infection in the shelters. Such well-known posters as 'Coughs and Sneezes Spread Diseases' now made their first appearance in medical aid posts and on the walls of shelters. The value of masks was stressed. Other posters dealt with ventilation, cleanliness and precautions against vermin, and the importance of diphtheria immunisation.

Courses of instruction on shelter nursing were arranged by the Royal College of Nursing and given by Dr. J. Fenton, Medical Officer of Health of Kensington, and Dr. W. H. Bradley, of the Ministry of Health. Lectures on shelter hygiene were given to sanitary inspectors and shelter wardens at the London School of Hygiene, and on vermin, with films and practical demonstrations, by Mr. McKenny-Hughes (of the Natural History Museum) and medical officers of the Ministry.

ENEMY ATTACKS

By the end of May 1941 enemy attacks had become weak and infrequent, and in June 1942, after a long lull in air attack and a corresponding diminution in the number of shelterers, many of the medical aid posts were closed and their equipment placed in store—a step taken only after careful consideration, especially as it seemed unlikely that the medical and nursing staff, if once they were released, could be got together again.

In January 1943 there was a renewal of enemy attacks on London, now defended by a powerful anti-aircraft barrage which made streets and open spaces very dangerous. The number of shelterers rose once more, and some medical aid posts had to be re-opened with whatever medical and nursing staff could be procured at short notice.

With the summer of 1943 air attacks again decreased, but at the beginning of 1944 there was renewed enemy activity over London, chiefly in the form of concentrated incendiary raids. Shelterers again increased, large numbers taking shelter for short periods from the heavy anti-aircraft fire. This again caused much congestion in some shelters, notably in the tube railway stations in the West End, and on one occasion there were about 20,000 shelterers in Piccadilly Circus station.

In June 1944 the flying bombs began, and alerts became very frequent though short. The number of persons sleeping in shelters again increased and there were also considerable numbers of 'short-term' shelterers.

In July, five of the eight new tube shelters were opened to the public but the flying bomb attacks from the Pas de Calais ceased on August 30, 1944, to be followed on September 9, 1944, by the first rocket in the London area. After that the number of shelterers steadily diminished. The air raid warning system was discontinued on May 2, 1945, and the tube shelters were closed to the public on May 7.

BODY VERMIN AND INSECT PESTS

The risk of disease by the spread of body vermin in crowded shelters was fully appreciated, and the Ministry had the advantage of Professor P. A. Buxton's advice and help.

From time to time a number of persons were found to be lousy but, in spite of the huge population of shelters throughout the months of severe raids and despite the residual population which continued to sleep in shelters in the long quiet periods, there was never any serious increase in lousiness. Several things contributed to this fortunate circumstance. Firstly, the bombing was never so devastating as to disrupt all civilised amenities, and most people were able to get their underclothes washed and attend to personal cleanliness. Secondly, health propaganda made the shelterers aware of the risk and the shelter wardens were ready to deal with obviously verminous individuals.

The few shelterers in the London Region found to be infested were mainly those who had habitually slept on the Embankment, and for them a special shelter—known as the 'Hungerford Club'—was organised in the railway arches near Charing Cross Station. Here bathrooms and cleansing facilities were installed and a small band of voluntary workers under the supervision of Dr. A. J. Shinnie, the M.O.H. of Westminster, succeeded in eradicating the danger, and verminous tramps found comfort and shelter in the 'Club'.

To deal with the danger, short courses of instruction were arranged at the London School of Hygiene for shelter wardens, and a pamphlet was issued dealing with the life histories of the louse, bed bug and flea, and simple measures for their destruction. These included the British anti-louse powder A.L.63, afterwards so successful in the Naples typhus outbreak in the winter of 1943–4, and thiocyanates as insecticidal sprays.

The disinfesting plants of local authorities were used and Millbank portable hot-air disinfestors were borrowed from the Army and distributed wherever the need was greatest. The large hot-air disinfestors later installed for dealing with bedding in the deep tube shelters have already been mentioned.

Compulsory powers for dealing with infectious and verminous persons in public shelters were provided in some areas by the Public Shelter Rules made by Regional Commissioners under Defence Regulation 23AB.[7]

Bed bugs proved more troublesome and some basement shelters and tube stations became infested, though in the latter, thanks to the prompt measures taken, the incidence was generally slight.

The measures taken to control bug infestation fall into two groups.

The Problem of the Bedding Bundles. In dwelling houses bugs occur in crevices in furniture and in the walls; they are not commonly found on clothing or bedding. Infestation usually occurs through the transfer of furniture or the purchase of second-hand articles. It seems clear, however, that the shelters became infested by bugs carried in the bundles of clothing and bedding brought in by the shelterers.

As bedding was not usually allowed to be left in shelters during the daytime, private persons in certain neighbourhoods began to provide storage on payment. Many of the 'stores' were disused shops, outhouses, etc., and some were bug-infested. There were seldom any shelves or racks, and the bedding was merely piled on the floor or on benches or counters. As a result, bugs were probably sometimes transferred to the shelters. Bedding stores were opened by some of the boroughs—notably the City of Westminster—where the bundles were kept separate on suitable racks and insecticides could be easily applied. These satisfactory stores were, however, few in number and the less suitable premises were a constant source of trouble.

Hot-air disinfestors were the most convenient method of destroying vermin in the bundles. Only disinfestors with a large output could treat all bundles within a reasonable time and the 'Millbank' type was used for the ordinary shelters in many districts. To deal with the large number of bundles from the new tube shelters, two special hot-air plants already mentioned were constructed on lines similar to the 'Millbank' portable apparatus. Each consisted of a brick chamber with doors at either end, and the articles to be disinfested were spread out and suspended by hangers on travelling rails near the roof. After loading, hot air (heated by gas burners) was driven by a fan into the chamber, through flues running under the floor, and kept in circulation.

Control of Bugs in the Shelters. Bugs hid in crevices in the bunk frames and cracks in the walls and bred there. Bunks constructed entirely of wood contained many joints and cracks which formed ideal refuges. There were fewer in metal bunk frames but bugs found their way into the hollow rails, into the wooden slats which the metal frames usually included to form a seat, and into the cracks round the wooden blocks fixing them to the walls. No way of sealing the crevices in wooden bunk frames was found, but metal frames with closed-end rails much simplified the problem.

For mortar joints and other crevices in walls the lime-cement paints given in the Report of the Committee on Bed Bug Infestation were recommended.[8] The same report gives formulae for spray insecticides required for regular use when fumigation is impracticable. Some of the

substances advocated (e.g. pyrethrum) became unobtainable as the war progressed, but the following were used throughout:

Thiocyanates. 'Lethane 384' 6 per cent. in kerosene or 10 per cent. of 'Lethane 384 Special' in kerosene.

Heavy naphtha plus carbolic acid 5 per cent. cresylic acid in heavy coal-tar naphtha. It could not be used near electric fittings because of its solvent action on rubber.

In 1944 limited supplies of the new insecticide D.D.T. became available. Trials were made in several large shelters in which there had been persistent trouble with bugs, and it was found that after a thorough application of 5 per cent. D.D.T. in kerosene they remained free for at least six months.

Fleas. Reports of infestation by fleas were rare. Presumably they were unable to breed in the shelters because of the regular cleansings. One disused tunnel which had been used as a shelter was subsequently found to be heavily infested with fleas. The temporary flooring had made adequate cleansing impossible, and the next generation of fleas attacked the workmen clearing the shelter three months after it had been abandoned. Regular spraying quickly got rid of the infestation.

Mosquitoes. Towards the end of October 1940 complaints were made by shelterers in the tube shelters that they were being badly bitten by mosquitoes, and an investigation was at once made by Mr. P. G. Shute, the Assistant Malaria Officer of the Ministry of Health. Large collections of stagnant water were found in some of the old tubes, extending even under the platforms, in which mosquitoes were actively breeding. In one unbroken stretch of water about 80 yd. long there were enormous numbers of larvae and pupae, and the walls and ceilings of this particular stretch of tube were swarming with both male and female adults, a number containing undigested blood.

The only species found was *Culex molestus* which, although not a disease carrier, bites man viciously. Under natural conditions this mosquito hibernates from October to April, but in the tubes, where almost summer temperatures prevailed and they could obtain plentiful blood meals from the shelterers, the adults did not hibernate. A squad of men was employed on anti-mosquito work. Collections of water were either oiled or treated with cresol which turns the water a milky white and shows up the larvae whether alive or dead; it has the added advantage of making it easy to detect untreated pools. The sides of the inverts of the platforms where bunks were situated were also sprayed and by the end of 1942 the nuisance was ended. These observations helped to clear up a problem dating as far back as 1932. Residents in the Charing Cross district and other parts of London had often complained of being bitten by mosquitoes. At that time little was known about *Culex molestus*, and it was thought that the mosquitoes responsible must be a human-biting variety of *Culex pipiens*, a species which seldom,

if ever, attacks man, but depends for its blood meal on birds and other small animals. A search for the breeding grounds had failed, as it was not then known that they were almost exclusively confined to underground collections of water. Later on, when large static water tanks were erected all over London, none was ever found to contain larvae of *Culex molestus*, which is an indication that this species selects water in darkness in which to breed.

SANITATION

Cleansing. General cleansing of public shelters was the responsibility of the ordinary cleansing staffs of local authorities, the cost of additional staff being reimbursed by the Exchequer.

Sanitary Appliances. So many shelters were below the sewer level that in most cases water carriage was not possible. Pail closets were installed in the ratio of 1 per 25 bunks, with urine buckets in addition. W.C. and urinal accommodation was on the same scale where water carriage was possible. Separate accommodation was provided for men and women. Where possible the former was outside the shelter, but as near the entrance as could be. In the women's accommodation footrests were installed for children (to give the effect of a low seat) in 25 per cent. of the conveniences, and also bins for sanitary towels. Impervious floors, suitable partitions, preferably of non-absorbent material, doors or curtains to each convenience and adequate lighting were considered essential. Male and female lavatory attendants were provided, where necessary, and labour was also required for emptying the pails and keeping the conveniences and other parts of the shelter clean. These services were the responsibility of the local authority; the cost was borne by the Exchequer.

The special difficulties in the sanitation of underground railway shelters have already been described.

Washing Facilities. Where a water-borne system of drainage was installed, washing facilities were provided in the form of deep sinks with cold water on the following scale: 2 sinks for 100 bunks, 3 sinks for 200, and 4 for 500. The use of public baths, lavatories and conveniences, opening at times convenient to shelterers, was arranged when these were nearby.

If possible a piped supply of water was laid on; if not, drinking water was supplied in stone jars or other suitable vessels, which were cleansed daily.

Provision of Bunks and General Arrangements. As far as possible metal bunks were issued, the standard type (supplied centrally) being in three tiers, the two upper beds being of strong steel wire-netting and the lowest of longitudinal wooden slats. In some the middle bed could be swung and hooked up to allow the lowest bed to be used as a seat. Bunks were fixed so as to allow 50 cu. ft. per person, and only 75 per

cent. of shelter space was used for bunks, the remaining 25 per cent. being kept for emergency shelter, medical aid posts, sanitation, and canteens. Bunks were placed side by side only in exceptional circumstances, and only one double row was permitted in each shelter. In these double rows, panels 2 ft. in width and extending from the lowest bunk to at least 18 in. over the top bunk were placed between the heads of the occupants. Wherever possible, a gangway of 4 ft. was left between rows of bunks, and in any case a minimum space of 2 ft. was insisted upon.

Tickets. A ticket system was introduced in many public shelters, including the tube shelters, and did much to reduce overcrowding and facilitate control. Not more than 75 per cent. of available shelter space, however, was ticketed, and local authorities gave preference to persons living in their area who had not satisfactory domestic shelter at their homes.

VENTILATION, AIR DISINFECTION AND FACE MASKS

Reference has already been made to the difficult question of ventilation. As examples of the difficulties, the conditions in caves, tunnels and portions of the tube railway system which were not open to traffic, may be quoted. Here poor air circulation brought condensation and drippings, but in the tube stations open to traffic the enormous volume of air propelled along the tunnels in advance of the trains caused complaints of draught. The watertight gates at some stations, a precaution against flooding, also added to the difficulties, and the fine metallic dust from the wheels and brake blocks of the trains made the cleanliness of the medical aid posts and canteens on the platforms difficult to maintain.

In May 1941 an expert committee reviewed the instructions regarding ventilation, and advised that the previous minimum standard of 150 cu. ft. of fresh air per person per hour should be raised to 450 cu. ft.[9]

To guard against the spread of winter diseases the Medical Research Council advised some system of air disinfection in overcrowded and ill-ventilated air raid shelters. The Horder Committee also advised that there was evidence that the risk of airborne infection might be reduced by spraying the atmosphere of shelters and recommended an aqueous solution of sodium hypochlorite. For this purpose two types of spraying apparatus were employed: a small type which could be operated by means of a hand or foot pump, and a large type for use with an electric compressor.

The arrangements chosen were on the lines advocated by Dr. C. H. Andrewes, and his fellow workers in a paper on the control of airborne infections.[10]

Letters were sent to the medical officers of health of the metropolitan boroughs describing the methods advised, with copies of notes prepared

by the National Institute for Medical Research. It was pointed out that air disinfection alone could only deal with half the problem, and that some method for treating dust must also be employed.

In April 1941 a further committee was appointed to examine the practical application of sprays and how to surmount the technical difficulties which had been encountered. The committee found that spraying was a poor second best to adequate ventilation and the reduction of overcrowding, and that in shelters where the ventilation was adequate and there was no overcrowding, spraying was not indicated as a routine measure. As, however, the air space per person in shelters must inevitably be much below that normally advised, they made recommendations for the practical use of spraying and to surmount the technical difficulties encountered the previous winter. In doing so they recognised that many shelterers regarded spraying as a valuable health measure and, in the absence of official spraying would continue to employ primitive and useless methods.

Face Masks. The use of anti-droplet masks, if upper respiratory epidemics occurred in shelters, was considered by a special committee and a cellulose acetate mask was designed at the National Institute for Medical Research. Large supplies of masks were obtained and held in reserve against an emergency, which providentially never arose.

HEATING, LIGHTING AND CANTEEN SERVICE

As the winter came on in 1940–1, the heating of shelters raised many difficult questions. It was decided that heating could be provided in all shelters with sitting accommodation for 50 or more persons which were in use for temporary purposes or were likely to be brought into such use.

As far as possible, trench and surface shelters were warmed by means of the enclosed 'Cura' stove, burning bituminous coal. This was lighted before the arrival of shelterers and allowed to go out before they settled down for the night. One person, a shelter warden or volunteer from among the shelterers, was made responsible for the stove and its working. Occasionally, electric heaters were installed in trench shelters and added much to the comfort.

In other types of shelter, electrical heating was used if feasible; but the system appropriate to any particular shelter had to be determined on its merits. Electrical apparatus, which was very scarce, had to comply with British Standard Specification A.R.P. 54 and was regularly inspected and tested. Fuses, switch boards, etc., were placed, so far as possible, in lockable boxes under the control of the warden staff.

The approved cost to local authorities was reimbursed by the Exchequer.

Lighting. Electric light, bright enough for reading, was considered essential for all shelters. Arrangements for dimming during sleeping

hours and for emergency lighting were provided, the latter by a second circuit, by battery or by hurricane lamps.

Adequate lighting in lavatories was provided throughout the night. The costs of installation of lighting and maintenance were reimbursed.

Canteens. Arrangements were gradually made to provide tea and light refreshments if the dormitory population exceeded 50. The Ministry of Food supplied local authorities with the necessary equipment on free loan and some grants were made by the Lord Mayor's Fund. The London Passenger Transport Board provided food for shelterers in the tube stations and at one time six special trains were in daily use for transporting the food. To avoid congestion the refreshments were carried along the platforms by women workers, of whom about a thousand were employed.

Welfare activities proved to be very important in maintaining the morale of shelterers, and were encouraged and co-ordinated by Regional Welfare Advisers with the co-operation of local authorities and the valuable help of many voluntary organisations.

When shelter life first became a feature of the war, there was no organisation specifically to observe the health of shelterers and, until medical aid posts were established and provided means of accurate observation, direct information on the subject was scanty. Investigations had, however, been made by certain medical officers of health under Defence Regulation 31C, which provided for the compulsory evacuation of children suffering ill-effects from air raids or shelter life. A comprehensive inspection of children in London County Council schools and in the shelters resulted in the certification of only 381 children (282 under 5 and 99 of 5 to 14 years) as requiring evacuation on health grounds from the whole of London up to September 1941. Among 280 children examined in shelters in St. Marylebone during March and April 1941, it was considered that definite disease could not in any case be attributed to shelter life and in no instance was compulsory evacuation advised. In Kensington, of 725 children examined, only 16 were recommended for compulsory evacuation.

A very significant proportion of Londoners slept in shelters and any abnormal sickness incidence among them must have influenced the health statistics for London as a whole. Notifications of deaths and infectious disease returns, therefore, may be accepted as indirect evidence on the subject.

MORTALITY IN LONDON

There were 11 per cent. fewer deaths from non-violent causes registered during the seven months September to March 1940–1, than in the same period of 1939–40, and the average population at risk during the period is estimated to have fallen by about the same percentage. Changes in age selection of the population remaining in London, and

in hospital arrangements prevent any firm conclusion being reached from the crude figures, but they do not suggest any increase in mortality from disease as a result of the air raids.

INFECTIOUS DISEASE RETURNS FOR METROPOLITAN LONDON

In the aggregate infectious disease notifications during the Battle of London were less than the average of the corresponding pre-war period, but there was a slight rise of total notifications over 1939–40, when evacuation was at its peak and London's population lowest. Cerebro-spinal fever and pneumonia, two conditions expected to spread in over-crowded shelters failed to increase and diphtheria did not become epidemic. The rise in measles notifications was expected. During the past sixty-four years London had experienced a bi-annual wave of measles and the outbreak due in 1939–40 failed to mature. Apparently the epidemic cycle had been disturbed by evacuation and a slowly mounting increase over the whole of the country throughout 1940 resulted. Notifications in London were much below expectation and neither measles nor whooping cough gave rise to outbreaks clearly associated with shelters.

EPIDEMIOLOGICAL STUDIES IN THE LONDON REGION

In February 1941 an 'Epidemiological Committee' was set up at the Ministry of Health to study the spread of infection in shelters and to investigate the application of counter measures.

Observations by the Committee. Records of attendances at the medical aid posts in selected shelters were scrutinised weekly at the Ministry of Health so that the earliest signs of an outbreak of any disease might be investigated at once, and the Ministry's medical officers also informed the committee of any prevalence in any shelter in the London Region. On five occasions only was the committee called upon to investigate suspected outbreaks, and in three of these (one each of dysentery, scarlet fever and diphtheria) the outbreak ended spontaneously with the start of the investigations. The remaining two outbreaks, one of virus A influenza and the other of mild upper respiratory infection of unknown origin, were confined to the shelters in which they originated, and in neither was there sufficient material to permit of adequate epidemiological investigation.

Influenza appeared in the Southwark tube amongst 3,000 shelterers. It was found that virus A was present and that limited spread in a shelter could occur; but not more than 100 cases resulted among the shelterers, though all three of the investigators from the Ministry of Health contracted influenza immediately after their first visit. The infection apparently did not spread to other shelters in Southwark. The Southwark tube, like other shelters in the district, was regularly sprayed with hypochlorite.

A minor respiratory epidemic was detected at St. Paul's tube station by the committee's routine scrutiny of shelter records, and seemed to be confined to a circumscribed section of the station platform, suggesting case-to-case spread.

Records. Six shelters of different structural types and representing contrasting economic levels in the population were chosen for keeping especially planned records of all attendances at the medical aid posts from February 24, 1941. This brought 3,000 shelterers under constant observation. At the end of March the field of study was increased to thirteen shelters in five different boroughs and a total of 4,000 persons. Two bacteriologists, Dr. S. D. Elliott and Dr. Lowenthal, co-operated with the Ministry's team in a laboratory under the direction of Professor S. P. Bedson provided for them at University College Hospital, studying the flora of 420 shelterers suffering from respiratory infections, and taking samples of air and dust in the shelters. Later on, Sir Alexander Fleming generously undertook the bacteriological examinations.

Space allows only a summary of the bacteriological results. From 475 acute upper respiratory illnesses streptococcus pyogenes was recovered 55 times, virulent *C. diphtheriae* 5 times, meningococcus twice and *H. pertussis* once. Pneumococci and coagulase positive staphylococci were occasionally recovered in significant numbers, but there was no evidence of spread. At one time in two shelters the carrier rate of haemolytic streptococcus reached 25 per cent. In the shelters the carrier rate of haemolytic streptococcus was no greater than that in a healthy peace-time population.

The following 19 cases of infectious disease were clinically detected among about 4,000 persons in 13 shelters in a 27-week period from March 2, 1941: measles 8; diphtheria 2; chicken-pox 3; scarlet fever 3; whooping cough 2; and rubella 1.

Apart from five cases of measles, multiple cases of infectious disease did not occur in any one of the thirteen shelters.

Age Incidence of Sickness and Injury among about 4,000 *Shelterers during 27-week period from March* 2, 1941

	0–9	10–19	20–29	30–39	40–49	50–59	60 and over
Total new cases . . .	337	577	384	505	494	359	240
Upper respiratory infections and complications (including notifiable infections and exanthemata) . . .	100	106	80	104	117	75	76
Percentage upper-respiratory infections of total cases in each group . . .	29·7	18·2	20·8	20·6	23·7	20·9	31·7

Upper Respiratory Infections. It is interesting to note that upper respiratory infections showed the usual seasonal incidence, although in the deep shelters the physical and atmospheric conditions remained much the same winter and summer. During the 27-week period acute respiratory disease attacked 825, fever was present in 91, but in 10 only was a diagnosis of influenza made and it is clear that epidemic influenza did not invade these shelters; but 237 persons had uncomplicated common colds; 313 throat infections; 368 coughs without involvement of the lungs; and 97 follicular tonsillitis. These infections were complicated by bronchitis 66; otitis media without discharge 49; otorrhoea 13; glands in neck 25; rashes not diagnosed as exanthemata 4; broncho-pneumonia 2; lobar pneumonia 1.

Digestive disorders were few; vomiting occurred in 26 patients and diarrhoea in 16.

Other diseases encountered were rheumatism (indefinite diagnosis 40; arthritis 3; neuritis 7; total 50 cases). 'Rheumatism' covers a multitude of different diseases from rheumatic fever to trivial aches and pains, but apart from upper respiratory infections it was the largest single cause of discomfort in shelters, and 1·25 per cent. of shelterers complained of rheumatism in some form or another during the 27-week period.

Conjunctivitis was the next most common condition and 43 cases occurred scattered through 11 of the 13 shelters, the greatest numbers being 6, 5, 5 and 4 per shelter. Conjunctivitis is usually very infectious, with high attack rates in community outbreaks, so it seems reasonable to conclude that if conjunctivitis spread at all in shelters it did so with less than the usual violence.

Meningitis. One doubtful case only was reported amongst 4,000 people.

There were two cases only of food poisoning; one of catarrhal jaundice; and one of malaria. No history as to origin was obtained in either case.

Nothing, therefore, which could be described as an 'epidemic' occurred in any of these thirteen shelters, and apart from minor respiratory troubles no outbreak seemed related to shelters.

One good feature revealed by these studies was that single cases of infections often gave rise to no secondary cases; measles in 3 shelters; diphtheria in 2; chicken pox in 3; scarlet fever in 3; whooping cough in 2; erysipelas in 2; rubella in 1; meningitis in 1; lobar pneumonia in 1; and catarrhal jaundice in 1.

The bacteriologists detected many different types of pathogenic organisms and watched for the appearance of multiple cases due to any one type, for they were anxious to test sprays, masks and other methods designed to control the spread of infection, but no opportunities occurred.

Reasons for Absence of Serious Outbreaks. At the beginning of the air raids on London conditions in shelters were appalling; some weeks elapsed before they were improved, and at no time were they better than the worst pre-war living conditions in London. Organisms capable of producing epidemic disease were present in this environment, and although detected sources of notifiable infection were promptly removed it is improbable that more than a small proportion of sources were dealt with in this way.

The radical improvements effected in the environmental conditions undoubtedly helped much to prevent any serious outbreak, but certain 'herd' factors were probably important in producing this relative immunity from epidemics. Of the sample, less than 10 per cent. were under fifteen years and most were of middle-age, with a heavy predominance of females. The shelter populations were first assembled at the end of a fine summer, they tended to come from the same locality and the same social group, and so to be concentrations of pre-existing groups. There was no large-scale massing of strangers, the population was relatively immobilised, and haphazard massing in places of amusement was lessened. The mortality figures for the country as a whole were low. The weather, though cold, was dry and unusually free from fog. The shelter population, in short, was tough and resistant, and the nation's diet carefully planned with adequate rations of protective foods. Morale was high, and unexpected patience, good temper and even heroism prevailed. The psychological ill-effects of bombing were compensated by the benefits of a new social experience; there seemed to be no increase in neurosis. Of over 3,500 new cases treated in the medical aid posts, only 30 were obviously of psychological origin, though some 150 other complaints may have had a psychological element.

CONCLUSION

Finally, while it is most satisfactory to record that there were no serious outbreaks of disease and that health in air raid shelters was good, it is not easy to say with certainty why this was so.

The results might well have been far otherwise but for the improvements in environmental conditions, which followed the energetic action to deal with a problem that had not been wholly foreseen. At the same time, there are grounds for believing that some degree of natural immunity existed which was due partly to age and 'herd' composition and partly, perhaps, to the psychological attitude of the shelterer and the well-balanced rationing which was introduced early in the war. The mortality figures for the country as a whole were low and the climatic conditions, for the time of year, were favourable during the earlier stages of the air attacks, when the shelters were overcrowded, but opinions will probably differ as to the correct assessment of the various factors which influenced the result.

REFERENCES

[1] Min. of Health and Min. of Home Security. Recommendations and Further Recommendations of Lord Horder's Committee regarding the Conditions in Air Raid Shelters with special reference to health; and a brief statement of action taken by the Government thereon. Cmds. 6234 and 6245. London: H.M.S.O., 1940.

[2] SIMPSON, KEITH (1940). *Lancet*, **2**, 744.

[3] Memorandum on Air Raid Shelters, London Civil Defence Region, April 30, 1941.

[4] Min. of Health. Air Raid Shelters: Notes on Principal Provisions, June 1941.

[5] Min. of Health Circular 2203, November 12, 1940.

[6] Min. of Health Circular 2231, December 7, 1940.

[7] S.R.V.O., 1940, No. 2064. London: H.M.S.O., 1941.

[8] Medical Research Council. Report of Committee on Bed-bug Infestation. London: H.M.S.O., 1942.

[9] Min. of Health Circular P.R.O. 26/1941, June 14, 1941.

[10] ANDREWES, C. H. (1940). *Lancet*, **2**, 770.

CHAPTER 9

PROVISION FOR THE HOMELESS IN GREAT BRITAIN AND FOR EVACUEES AND REFUGEES FROM ABROAD

Compiled from material supplied by the Ministry of Health

THE HOMELESS IN GREAT BRITAIN

An essential part of the service established for homeless air-raid victims in this country was the immediate provision of food and shelter until they could return to their homes or be billeted or rehoused. The original conception was that it would be necessary to accommodate the homeless in rest centres for a few hours only or two days at the outside, and at the end of this time it would be possible to billet such of them as were unable to make their own arrangements with relatives or friends. The rest centres, which were set up in buildings such as church halls and schools, to many of which hutted annexes were later added, were therefore provided with only a minimum of blankets and other equipment and the intention was that the food provided should be confined to hot drinks and meals of the simplest type. The provision of rest centres was at first regarded as part of the ordinary duty of public assistance authorities to provide relief in kind to the destitute under Section 17 of the Poor Law Act, 1930. The Government therefore undertook to reimburse the cost of the service only to the extent that it exceeded the normal level of public assistance expenditure and was in fact provided for persons other than the inhabitants of the area of the public assistance authority concerned.[1]

During the autumn and winter of 1939 and up to the late summer, 1940, plans proceeded on these lines. Large numbers of buildings were earmarked for use as rest centres; power to requisition them was delegated to clerks of county and county borough councils;[2] equipment was issued from Government stocks and reserves of food were accumulated. Billeting authorities were instructed to billet homeless people who were unable to make their own arrangements and clerks of local authorities were empowered to requisition houses for rehousing the homeless whose own houses had been damaged beyond repair.[3]

The schemes came sporadically into operation during the summer of 1940. The first heavy raids on London occurred in September of that year and in the light of experience certain fundamental changes were made. In September 1940, Mr. H. U. Willink, M.C., K.C., M.P. was appointed Special Commissioner in the London Region to deal specifically with the homeless. The appointment of the special Commissioner was followed by improvements in the service. It was arranged

for the Senior Regional Officer to devote his whole time to work for the homeless and a large inspectorate was appointed to deal with welfare and rehousing. Provision for the homeless was no longer regarded as part of the ordinary duties of public assistance authorities, and the Government undertook to reimburse the whole approved cost of their schemes as from their inception.[4] Since there was often no alternative to the occupants of rest-centres of remaining for some days or, exceptionally, even weeks, hostels were set up and the standard of comfort in the centres was improved; staffs were increased; nurses attended and there was adequate medical and sanitary supervision.

These arrangements varied. In some cases trained nurses or members of the Civil Nursing Reserve were permanently on duty, and doctors—usually general practitioners—visited daily or were on call. In other areas nurses of the Joint War Organisation of the British Red Cross and St. John Ambulance Association did duty. Generally, the arrangement was that there should be someone with a knowledge of nursing who would send for a doctor if necessary, and that there should be a doctor available at all times. On the whole, the arrangements worked well.

The raids on London had shown the need for improvement in the quality of the rest-centre service. The raids on provincial towns, particularly the heavy raid on Coventry in November 1940, revealed the need for quantitative improvement. In December 1940, and January 1941, an intensive review of the rest-centre provision was undertaken by the regional staff of the Ministry of Health and substantial increases were made. A second great expansion of the service was effected in the spring of 1941, after the raids on Plymouth, Merseyside, Hull and other target towns, bringing the total number of rest-centres in England and Wales up to some 11,250, with accommodation for nearly 1½ million people. In the Metropolitan Area, 613 first-line and 384 second-line rest-centres, which could accommodate 132,000 persons, were available.

Special provision was made for aged and infirm persons and others who were difficult to billet. Some were admitted to existing institutions, while for others the problem was met by taking over large houses for what were at first called 'half-way houses', but later 'medical rest centres'. These mainly catered for elderly persons not requiring constant medical and nursing attention, but of a type not easily billeted, and were staffed by one or two trained nurses and a rota of voluntary helpers. Arrangements were made for a doctor to visit at some stated interval, generally once or twice a week, and to be on call as required. Most of the inmates of these medical rest-centres remained only until some more suitable accommodation had been arranged by their relatives or friends. Staffing was sometimes a difficulty, but the aim was to ensure that immediate medical attention and, if necessary, hospital treatment should be available to anybody who required it.

Hostels for Able-bodied Aged Persons in Evacuation Areas. These hostels were first set up in 1940 to meet the needs of aged persons evacuated from London and other target areas. The persons admitted were of the priority classes, that is, evacuees, persons who were homeless by reason of enemy action and E.M.S. patients discharged from hospitals. It was required that these aged persons should be able to attend to themselves and to assist in light domestic duties. No trained nursing staff was engaged because the inmates were not expected to be in need of constant nursing care. The hostels were, as a general rule, administered by the local authorities, but some were run by voluntary bodies, including the Society of Friends War Relief Committee. The usual staff was a resident matron or warden, with resident and non-resident domestic staff. Arrangements were made whereby a local medical practitioner visited the hostels once a week and when needed. Only exceptionally were persons below the age of 65 admitted. As a general rule, both sexes were received into the hostels unless the type of accommodation made it necessary to restrict admission to one sex only.

Hostels for the Aged and Infirm. As noted above, the hostels for able-bodied persons were set up early in the evacuation scheme. It was later found that separate provision would be required for aged and infirm persons, particularly those evacuated into the reception areas, or made homeless by enemy action, and those who, having a degree of infirmity requiring constant nursing care and some medical supervision, were blocking acute beds in E.M.S. hospitals. It was, therefore, decided to set up special hostels for this type of patient, and the premises chosen for this purpose were mainly large country houses with a bed capacity varying from 14 to 48 beds. It was found that the optimum bed capacity was about 40 beds. Special attention had to be paid to adequate accommodation for resident staff and the provision of small ward units of 4 to 6 beds for the patients. Adaptations within the houses were few and simple. Additional baths were occasionally necessary and sluices were required. Simple mortuary provision was necessary in the more remote homes. Particular attention was paid to the choice of nursing staff and the matron was always a trained nurse, selected because of her previous experience with this type of patient. Wherever possible a trained deputy was also appointed. Medical care was in the hands of a local general medical practitioner, who was paid a retaining fee for regular visits and also undertook special visits as required. It was generally found that, unless there was some selection of the type of patient admitted, administration was difficult and it was, therefore, arranged that before admission a medical certificate should be supplied certifying the condition of the patient and his fitness for admission. Neither dying patients nor mental cases were accepted, and, usually, patients requiring heavy nursing or extensive surgical dressings were

excluded. They were originally planned for both sexes, but it was found desirable in several hostels to restrict admission to one sex on account of the limited ward and day room accommodation. The responsibility for administering these hostels rested in general with the county council in whose area they were situated. But voluntary bodies also played their part and, when the flying-bomb attacks came in 1944, the Joint War Organisation of the British Red Cross and Order of St. John of Jerusalem provided additional temporary hostels for these patients.

The experience gained during the war in these hostels for the aged and infirm demonstrated clearly two facts. First, that success or failure in dealing with this type of patient turns almost entirely on the care and devotion of the nursing staff and, secondly, that similar provision must be given a permanent place in the care of this type of patient after the war.

There is no record of the total number of people made homeless during the war, nor of the total number who passed through the rest centres. Of the former, a high proportion went, not to the rest-centres but directly to the houses of their friends. But that many thousands used the rest centres is indicated by the number, some 117,000, who were cared for in them during the last nine months of the war.

The worst never happened. The numbers of the 'bombed out' who failed to find refuge in the houses of their friends never reached unmanageable proportions, and the threatened invasion of our island by the enemy, which in 1941 appeared to be imminent, never came. Plans for dealing with home refugees under invasion were largely left to the Regional authorities. The Government's direction was that the population should in general remain where they were, unless evacuated under pre-arranged plans, but senior regional officers were warned that 'some people may disregard the instruction and take to the roads'. If this had happened, it would have added considerably to the extent and difficulties of the problem.

REFUGEES AND EVACUEES FROM ABROAD

Among the problems and consequences of warfare the movement of populations is one of the most important and far-reaching. When war breaks down protecting and isolating boundaries and disturbs the peaceful lives and habits of men, this movement is seen on a large scale, both in the formations of organised, disciplined armies and in the formless, unorganised and undisciplined flight of civilians from homes that lie in the path of their advance. For many such victims of earlier continental wars Great Britain had provided asylum and livelihood, and at the outbreak of the Second World War, which was to render homeless large numbers of her own citizens, preparations were again made for the reception and care of refugees. Medical attention, ambulance transport and accommodation and food for pregnant women,

wounded, and sick refugees were to be provided; all refugees were to be regarded as potential 'contacts'; careful watch was to be kept for signs of notifiable infectious disease and special care taken against the spread of infectious diseases.

The problem as a whole proved to be less formidable in the event than it had appeared to those responsible for preparing against it in advance. It had been assumed that in the event of Holland and Belgium being attacked up to 100,000 persons would escape directly by sea, and that substantial additional numbers would escape by land to France and thence be transferred to this country; but the total number of war refugees admitted, mainly from Poland, Holland, France and Belgium, up to June 30, 1941, was only 37,450, of whom 14,322 were British subjects and 23,128 aliens. Of this total number some 26,000 were dealt with under the Government Scheme. The remainder made their own arrangements. The number within the scheme was gradually reduced (to 15,000 by September 1940, and to 6,000 by March 1941) as the refugees found employment and set up homes of their own. In addition to these refugees, some 11,000 evacuees were received from Gibraltar and about 30,000 from the Channel Islands. The following brief account of the provision made for their medical care is taken from the Report of the Chief Medical Officer of the Ministry of Health for the years 1939–45.[5]

Foreign Refugees. When the Germans invaded the Low Countries the number of foreign refugees arriving in this country fell far short of expectations and ports on the South and South-east coasts were used instead of the West coast landings originally contemplated. Accommodation which had been reserved in Scotland and the North of England was available later on for evacuees from the Channel Islands. After rapid medical examination at the port all were brought to London where large examination centres were set up by public assistance committees of the London County Council and of the County Councils of Middlesex and Surrey. Here they were medically examined. Pregnant women and persons requiring in-patient treatment were sent to hospital. Verminous persons were cleansed at the local cleansing stations, and the refugees were kept in the centres for a night or two, until they could be billeted in various parts of the country. Additional clothing was distributed by the Women's Voluntary Services. All the public health services of the local authorities were available for war refugees. Medical officers of the Ministry visited all the centres, trained nurses attended at each centre, and by agreement with the British Medical Association, medical practitioners carried out examinations under the general administration of the County Medical Officer of Health. Little infectious disease was found and the arrangements as a whole worked well.

Evacuees from Gibraltar. In August 1940, more than 11,000 inhabitants of Gibraltar were evacuated to this country for military reasons.

Medical inspection was carried out at the ports of arrival, where any evacuees found to be seriously ill were detained in hospital until they were able to travel to London to rejoin their families. The Government decided that they should be kept together in hostels instituted for the purpose, and that their accommodation and welfare should be the direct responsibility of the Government. The Ministry of Health therefore arranged for their care and maintainance while in this country.

The Ministry of Works requisitioned hotels and blocks of flats where the evacuees could be accommodated with their families in or near London, and, as there was no question of finally billeting them, arrangements were made for their medical care. The London County Council and the County Councils of Essex, Middlesex, and Surrey, kindly agreed to provide the clinical care required. Nurses were supplied by the county councils, and were present at the centres night and day, and the medical arrangements were placed under the authority of the medical superintendents of public health hospitals in the vicinity. Where the medical and nursing staff of the hospitals concerned were insufficient, arrangements were made to supply members of the Civil Nursing Reserve and general medical practitioners, the latter making daily visits and being on call as required. Pregnant women and sick persons were treated in the county council hospitals, and arrangements were made for the supply of extra nourishment, such as milk and cod liver oil, when ordered. Some difficulties were found in the diet because the evacuees were not accustomed to English food, and had not been rationed in Gibraltar. Gradually, however, it was found possible to obtain suitable food and no signs of under-nourishment were noted among the children.

Medical officers and women inspectors of the Ministry of Health made regular visits to all the centres in order to encourage the evacuees in the best methods of accustoming themselves to the peculiar conditions in which, through no fault of their own, they had to live. Every effort was also made by the officers of the Ministry to find concealed cases of illness and to urge parents to allow their children to take advantage of available public services. An intensive propaganda campaign was carried out with excellent results to induce parents to allow their children to be immunised against diphtheria. In some centres 100 per cent. of the children under 15 were immunised.

After the evacuees had been some time in this country, arrangements were made with the county councils for the education of the children. As a result the children came under the care and observation of the school medical services.

Gibraltar Nurseries. For the children between the ages of 18 months and five years rooms were set aside in the centres as nurseries.

Paid staff was recruited from among the members of the Child Care Reserve, and in addition to these some of the Gibraltar women and

young girls over school age acted as nursery helpers, the staff of a nursery with an average daily attendance of some 15 children being one Child Care Reserve worker and two nursery helpers. Nine of the Gibraltar girls themselves took the Child Care Reserve course.

Close co-operation was maintained between the nursery leader and the sick bay staff, and the sister-in-charge of the latter paid a daily visit to the nursery in order to keep a watch on the general health of the children.

The nurseries began in a very simple way, but the Gibraltar mothers became more and more inclined to use them when they found that their children remained in better health, took their meals well and had daily rests, as well as being off their hands during certain times of the day. The women inspectors of the London Region visited the nurseries regularly and also visited the mothers of the children attending the nursery. Thus they were often able to continue the education begun in the nurseries, and the mothers, who recognised the interest of the women inspectors in the welfare of the children, were always glad to admit them to their rooms.

Children who attended regularly at the nurseries showed a marked improvement in physique, were better clothed and groomed and their personal and social habits improved compared with those of other children. The value of the nurseries was especially shown during the enemy attack by V1 bombs during the summer of 1944 when the mental and physical condition of the nursery children, who often were happily occupied in a portion of the air raid shelter set aside for their use, compared favourably with that of the children who remained with their relatives.

Taking all the children, both those of school age and those under 5, there were about 4,000 children among the evacuees from Gibraltar. During the four years they were in this country they never suffered from serious epidemic disease and their general health was so good that it was the subject of favourable comment when they returned to Gibraltar.

Considering the difficulties in war-time of arranging for the housing and general care of a whole community like this, the results from the medical point of view were most satisfactory.

Refugees from the Channel Islands. In 1940 about 30,000 people arrived in this country from the Channel Islands to escape the German occupation. Of these, about half were destitute and were absorbed into the Government Scheme though, as in the case of refugees generally, the numbers steadily decreased as they found useful work to do and became self-supporting. They were billeted up and down the country through the agency of the Ministry of Health, most of them in neutral areas of Lancashire, Cheshire and the West Riding of Yorkshire, which had previously been earmarked for the accommodation of war refugees

from the Low Counties, and the medical staff of the Ministry was only concerned in enquiring into individual complaints of need for medical attention or medical appliances received at the Ministry through the Channel Islands Refugees Committee. When arrangements were later made for sending relief to the Islands through the agency of the International Red Cross, medical officers of the Ministry advised the Home Office on such matters as diet, medical comforts and drugs.

The question of the medical services of the Islands after the war was borne in mind and the Home Office was informed that medical officers of the Ministry would be available to go to the Islands as soon as they were liberated, in order to advise on the requirements. Within a week of the Islands' liberation Dr. A. Leslie Banks and Dr. H. E. Magee landed on Guernsey and in the following September the results of their investigations were published in the Ministry's *Monthly Bulletin* (1945).[6] A further report, by Dr. Eleanor Knowles, was published in the following year on the dental condition of children in the Islands.[7] (See Part II, Chapter 5.)

Norwegian Refugees. Early in 1945 the population in the Finmark area of Norway was evacuated by destroyers of the Royal Navy and brought to the Clyde. The women and children, of whom there were some 330, were taken to a camp in Scotland, but 156 men were brought by the Security Branch of the Home Office to Canons Park Camp. They were the responsibility of the Home Office but medical officers of the Ministry advised on their medical requirements and, assisted by medical officers of the Medical Research Council, undertook a nutrition survey. The refugees had received cruel treatment from the Germans, and were expected to be suffering from an extreme degree of undernourishment. Fortunately, however, their general condition was fairly satisfactory due, to some extent, to their having been some time on the journey to this country during which period they had been well fed.

Children from Holland. During 1945 Dutch children between the ages of 8 and 14 were brought into this country in order that they might recover from the effects of the German occupation. The children were accommodated in various camps and hostels and they came over in parties of about 500 boys and girls accompanied by school teachers. The Netherlands Government was responsible for the children after they arrived, but medical officers of the Ministry advised on the public health requirements of the camps, and medical officers and women inspectors of the Regions in which the camps were situated visited from time to time in order to help the Dutch authorities in any way they could. Nutritional surveys were made by members of the Medical Research Council's Nutritional Sub-committee. The children were given a careful medical examination in Holland, and those suffering from diseases such as pulmonary tuberculosis, epilepsy and skin diseases, were excluded from the parties. The children were also

immunised against diphtheria. The only other selection that was made was that preference was given to some extent to children whose state of nutrition appeared to be poor. The nutritional state of the parties varied according to the part of Holland from which they came, the original 500 from the southern parts of the country which were first liberated being better nourished than those of the northern areas which were longer in the possession of the enemy. Medical officers of the Ministry maintained a regular liaison with the Netherlands Government 'Children' Committee.

Within this outline of the provision made for the housing and medical care of the homeless there is little of light or shade to depict the behaviour and suffering of the refugees themselves. Whether driven out under fire or evacuated as a precautionary measure beforehand, their story was mainly one of courage and adaptability in the face of upheaval, separation, hardship, distress and bewilderment. Most of the refugees successfully adapted themselves to their changed conditions and those able to take up employment did so; many also set up homes of their own as opportunity offered. The medical arrangements made for them by the Ministry of Health proved to be adequate. There was no major outbreak of disease and no dramatic story to tell of conquest over it. But the essence of preventive medicine is prevention, and in the unspectacular is seen its greatest success.

REFERENCES

[1] Min. of Health Circular 1860, September 2, 1939.
[2] Min. of Health Circular 2074, June 29, 1940.
[3] Min. of Health Circular 2081/2, July 3, 1940.
[4] Min. of Health Circular 2290, February 6, 1941.
[5] Min. of Health Report, 'On the State of the Public Health during Six Years of War'. London: H.M.S.O., 1946.
[6] BANKS, A. L., and MAGEE, H. E. (1945). 'Effects of Enemy Occupation on the State of Health and Nutrition in the Channel Islands'. Min. of Health *Monthly Bulletin*, **4**, 184.
[7] KNOWLES, ELEANOR M. (1946). *The Effects of Enemy Occupation on the Dental Condition of Children in the Channel Islands*. Ibid., **5**, 162.

CHAPTER 10

THE VOLUNTARY SERVICES

A. WOMEN'S VOLUNTARY SERVICES

Based on material supplied by the Dowager Marchioness of Reading, G.B.E., Chairman of the Women's Voluntary Services

ONE of the outstanding features of the war was the notable part that women played in civil defence.

The organisation known as the Women's Voluntary Services, familiar in its abbreviated form as the W.V.S., not only supplied workers for national defence but also helped to facilitate the smooth working of the national and local authority services. Among these services are included those concerned with the maintenance of public health and the medical services.

INCEPTION OF THE SCHEME

In April 1938, Sir Samuel Hoare, then Home Secretary, consulted the Dowager Marchioness of Reading as to the possibility of setting up a Women's Voluntary Service with the support of the great voluntary organisations characteristic of the British social structure.

At a conference of representatives of the chief voluntary organisations held at the Home Office on May 16, 1938, an outline scheme of the new service was discussed, its aims being thus defined by the Home Secretary:

(1) The enrolment of women for the Air Raid Precautions Services of the local authorities.

(2) To help to bring home to every household in the country what air attack might mean.

(3) To make known to every household what it can do to protect itself and to help the community.

Lady Reading was appointed Chairman of Women's Voluntary Services for A.R.P. (afterwards for Civil Defence) and under her direction the new Service was rapidly built up. The chief voluntary organisations nominated members to serve on the Advisory Council of W.V.S. and instructed all their local representatives to co-operate with regional organisers. The latter formed a system of W.V.S. Centres to correspond with each administrative unit of the civil defence and local government structure of the country. This co-operation was particularly valuable during the Munich crisis, when it was estimated that within thirty-six hours of the Government asking W.V.S. to help local authorities with their evacuation problems, they had at their disposal the services of about a quarter of a million women.

Throughout the remaining months of peace, W.V.S. grew steadily. More local authorities invited the opening of centres (and without such

invitation no centre was opened), as they appreciated the practical value of the new Service in keeping together and training the multitudes of part-time volunteers who would be needed after an air raid or during evacuation, and learned that expenditure on W.V.S. offices and equipment ranked fully for Government grant.

The enrolled membership for Great Britain of the Women's Voluntary Services, at the end of March 1944 was 986,134 and at its peak was over a million.

Out of an army of women, the staffs of W.V.S. Regional offices and centres fashioned an implement of civil defence which proved infinitely flexible to meet any local emergency and at the same time was sufficiently consistent in policy and organisation to merit the confidence of the central Government and the local authorities. There were no precedents for a voluntary organisation working under the orders of local authorities and yet controlled by a national headquarters in close touch with the Government, but the lack of precedents meant that the work of the W.V.S. was practically unrestricted. In the first winter of the war the Ministry of Home Security ruled that W.V.S. could properly undertake any work arising out of the war which might be asked of it by a Government department, and almost every department enlisted its aid.

THE WAR PERIOD

HELP IN THE EVACUATION SCHEME

The contribution which W.V.S. made to the health and medical services was a wide and far-reaching one.

The German delay in opening an attack in the west, whether by land or air, made evacuation and not A.R.P. dominate the work of the W.V.S. in the first year of war. Evacuation called into play every faculty most strongly marked in women, quick intuition of difficulties, a gift for improvisation in domestic planning and the safeguarding of the health and hygiene of children placed under their care. A million and a quarter mothers and children moved into the country districts in September 1939, and without the devoted help of volunteers—most of them were members of or worked in close accord with W.V.S.—the scheme would not have been successful. Much was said about the difficulty of absorbing some types of evacuee into private households. There were, on the other hand, thousands of cases in which volunteers working as assistant billeting officers, found homes in which evacuated children settled happily, if not on their first arrival, then after tireless efforts had found the right combination of temperaments.

THE SUPPLY OF CLOTHING

One of the most important services rendered by the W.V.S. to health was the supply of clothing. It began with the clothing of evacuated children whose parents could not send them adequate garments,

especially winter garments. It was this urgent need which first led the American Red Cross to send goods for the relief of civilian distress to W.V.S., for the American visiting representatives found it was everywhere acquainted with the needs of the evacuees and possessed a central organisation which would collate the results of experience and estimate future needs. In August 1940, the American Red Cross appointed W.V.S. to be their sole distributing agents for all supplies that they were sending to Britain for the relief of civilian distress) and during the war W.V.S. distributed on their behalf goods valued at many million pounds. This steady flow of supplies from the United States was liberally supported by gifts from organisations and private donors in the Dominions and Colonies of the British Empire, from sympathisers in all free countries, and the Lord Mayor of London's National Air Raid Distress Fund. The W.V.S. were also responsible for the storage and distribution of clothing supplied officially for unaccompanied evacuated children.

When air raids began in 1940, clothing was needed for bombed-out people. The W.V.S. depots had become the chief national reserves of gift clothing for emergency issue and by 1944 there were 2,000 W.V.S. issuing depots, in addition to an elaborate system of reserve stores enabling clothing supplies to be quickly concentrated in any place which had been heavily bombed without storing undue quantities of stock in vulnerable areas. Not only did the W.V.S. clothe the naked, but it fed the hungry.

AID IN MAINTAINING NATIONAL NUTRITION

Members assisted at the Food Centres in the distribution of ration cards and of extra milk, cod-liver oil etc. for expectant and nursing mothers, infants and invalids. The smooth working of the rationing scheme and the maintenance of adequate national nutrition owes much to the devoted help of these volunteers.

During the first winter of the war, urgent necessity arose for increasing the provisions for the welfare of serving men, and the W.V.S. opened canteens in places where the appropriate organisations lacked staffs and equipment to do so. Its mobile canteens, whose sides bore the names of donors from all parts of the Empire, gave hot drinks and food to the victims of air raids in the bombed towns. The members of the W.V.S. Housewives Section brought a feeling of self-reliance and mutual help everywhere. The mobile canteens, many of them bought through the Civil Defence Canteen Trust, which was inaugurated, at the suggestion of W.V.S., in November 1939, were the first line of defence in emergency feeding. When the provincial cities became targets for concentrated attacks, these canteens were called in support from all over the country; and their teams made long journeys, over unfamiliar roads, which were sometimes frozen or blocked by craters or unexploded bombs, to a

rendezvous at dawn in a stricken city. Here they worked day and night, feeding firemen and rescue squads who could not leave their work, and people who had either lost their homes or all means of cooking in them. Later, W.V.S. provided most of the staffs of the Queen's Messenger Convoys under the Ministry of Food, which rendered great service in the devastated areas left by the savage raids of May 1941. In order that the bombing of a central kitchen in a raid should not interrupt all emergency feeding, the Ministry of Food asked W.V.S. to promote the building of emergency cooking stoves, after the fashion of military field kitchens, with materials available on any bombed site such as bricks, scrap-iron and mud. The target set was a cooker to every street or small group of houses.

At an early stage, communal feeding had to be improvised for evacuees. Before the war W.V.S. Headquarters had sent to all centres memoranda dealing with the quantities of food, equipment, etc. necessary for feeding given numbers of children, and with suggested menus of physiologically balanced meals. These communal kitchens not only helped to maintain nutritional health but made for contentment, since to expect two women of different standards of living to share the same kitchen stove indefinitely generally led to the return home of the evacuees. As the need for economising food and fuel increased, some of these centres developed into British Restaurants for the general public. At first many local authorities asked W.V.S. to staff these restaurants with volunteers until their established success made the employment of paid helpers economically possible. Sometimes the direction and staffing of restaurants remained in the hands of the W.V.S. For those living in rural areas, the W.V.S. took meat pies to village depots or direct to workers in the fields. This scheme was most popular among the agricultural communities. Many W.V.S. workers helped in the schools with the distribution of milk and the serving of school meals.

COLLECTION OF HERBS AND ROSE-HIPS

'Wonderful herbs had our fathers of old', but in more modern times medical supplies of drugs have usually been imported into Britain, even when the herbs from which they were made grew wild in this country. With the urgent war necessity for reducing all available imports, County Herb Committees, generally convened by the Women's Institutes, were set up to organise the collection of medicinal herbs. The W.V.S. was asked to co-operate and organised the collection in areas where the Women's Institute was unable to do so. Schoolchildren and older volunteers were instructed in the proper collection of foxgloves, nettles, deadly nightshade and other wild plants from fields and hedgerows, to make good raw material for the manufacturing chemist.

A further requirement was the provision of properly equipped drying centres in which the plants could be dried at a steady gentle heat in

daylight. A variety of premises, including a disused chapel, were turned into drying rooms. As a result of this effort British imports of medicinal herbs were reduced by fifty per cent. in 1943.

Rose-hips, rich in vitamins, were another form of hedgerow harvest which was widely organised. Manufacturers paid for these at the rate of threepence a pound. The W.V.S. frequently undertook the duty of paying the local children who brought in the rose-hips, and despatched the hips to the factories, where it was made into syrup for issue to mothers and babies.

RESIDENTIAL AND DAY NURSERIES

One of the biggest tasks of the W.V.S. was the provision of residential nurseries in the early days of the war. Grants of money given by the American Red Cross, who closely scrutinised all the expenditure, made it possible for nearly one hundred residential nurseries for children under five years of age, evacuated without their mothers, to be opened in 'safe' areas. W.V.S. delegated the running of these nurseries to the Waifs and Strays Society, but remained responsible for the administration. All the clerical work connected with the investigation of applications to such nurseries of London children, as well as the arrangements for their transport, clothing, escorting, etc., were organised in the first two years of the war from W.V.S. Headquarters. In addition three reception nurseries were set up in London through which all the London children passed before going to the residential nurseries. To deal with the children who were not well enough to go straight into residential nurseries, W.V.S. were also responsible for the establishment of a convalescent residential nursery which was administered for them by the Invalid Children's Aid Association. In this and in numerous other ways W.V.S. promoted child health and welfare. The financial responsibility was undertaken by the Ministry of Health when the United States entered the war.

W.V.S. received a grant from the American Red Cross for the setting up of War (Day) Nurseries, but, simultaneously, the Ministry of Health authorised the organisation of these nurseries by local authorities in England and Wales. The funds which had been given to W.V.S. were therefore expended on necessary equipment for the day nurseries and part of the money was set aside to help with a toy making scheme for supplying toys to children in which members of the Civil Defence and Fire Services participated.

THE VOLUNTEER CAR POOL

In 1942, when the basic petrol ration was withdrawn, motorists who had no supplementary petrol had to lay up their cars. In order to keep a certain amount of transport available for use in an emergency, a plan was drawn up whereby car-owners could enrol in a pool and place their

cars and themselves at the disposal of the Government for certain specified work. The W.V.S. took over the organisation of this Volunteer Car Pool, as it was named, at the request of the Ministry of Home Security, and formed 560 pools throughout the country.

Apart from its work for Government Departments and local authorities, this scheme greatly facilitated the work of the medical services. Whenever an emergency arose the W.V.S. provided transport. It took Government medical officers on visits of inspection, specialists to outlying hospitals, transported patients to hospital, enabled them to attend for out-patient treatment, and conveyed bombed-out persons to rest centres and billets. Men and women drove for hours on these errands of mercy. Help was always forthcoming from the W.V.S. and was rendered cheerfully and ungrudgingly.

HOUSING HOMELESS PERSONS AND AIDING INDUSTRIAL HYGIENE

The experience gained by the W.V.S. in the organisation of hostels and communal billets for difficult evacuees was invaluable when similar problems attended the accommodation of the homeless after raids. This experience led to an arrangement with the Ministries of Health and of Labour, whereby W.V.S., through its street organisation, agreed to help in a comprehensive scheme for all types of billeting made necessary by the war. The W.V.S. also contributed to industrial hygiene. The transference of thousands of men and women to work in war industry led W.V.S. to share in arrangements for their welfare outside the factories. They staffed centres for their reception at railway stations, provided clubs for their leisure, made friendly visits to their billets, informed them about local clinics and hospitals and were always at hand to help the transferred workers, especially girls who were perhaps separated from their home background for the first time in their lives.

WORK DURING ATTACKS BY FLYING BOMBS AND ROCKETS

W.V.S. work found its apogee in the heavy raids. Outside London the majority of rest centres were staffed, wholly or in part, by W.V.S., while members worked tirelessly in clothing depots, emergency feeding centres, administrative centres and information bureaux which brought help to the bombed-out. With the advent of flying bombs and rockets in 1944, the W.V.S. was again to the fore. A new development was the Incident Inquiry Point which relieved the Incident Officer on the site of a bomb-burst from answering the questions of anxious relatives, gathered important information from them, and advised on the procedure for obtaining official help. With this knowledge W.V.S. workers often saved rescue squads from digging unnecessarily for absent tenants or abandoning an unsuspected visitor to living burial. To cope with all the work caused by continual bombing, hundreds of volunteers came from the unexposed areas to London for a turn of duty.

In a single day at the height of the flying bomb attacks, fifty-one trains conveying mothers and children left London, and on each train there were W.V.S. escorts and a canteen. On arrival most of the evacuees spent the night in a rest centre staffed by W.V.S. Here they were rested, medically examined and, if necessary, reclothed before being taken to their billets. Consequently they settled in happily, while for the unbilletable, difficult, and very large families, requisitioned houses were prepared by W.V.S. at the request of local authorities with much less delay than in previous evacuations.

DUNKIRK AND D DAY

The W.V.S. cared for the health and welfare of the B.E.F. when it was evacuated from Dunkirk in 1940. Similarly, and with equal enthusiasm, it provided every form of help asked for by the Service departments during the preparations for D day. Working parties made over 150,000 camouflage nets. This work was a dusty occupation, and W.V.S. Headquarters issued instructions on medical advice, e.g. that a simple mask be worn over the nostrils and mouth, to protect the workers. Innumerable spare parts for small arms were packed. Mobile canteens, which had often fed workmen building aerodromes and factories where no other catering facilities were available, now fed the men engaged on the prefabricated parts or in loading invasion barges. The secrecy observed refuted the saying that no women can keep a secret. When the landings had been made, and wounded, exhausted men were brought back, mobile canteens found their way through darkened docks and down to the little harbours to meet them as they were brought ashore.

WORK FOR GOVERNMENT DEPARTMENTS

A summary of the work done by the W.V.S. for Government departments during the war will be found in Appendix I.

THE POST-WAR PERIOD

CHANGES IN ORGANISATION

When the 'cease fire' sounded there was still much work for the Women's Voluntary Services. In 1943 N.A.A.F.I. had asked for W.V.S. volunteers to serve as welfare workers in their clubs in France, Italy, North Africa and the Middle East. The Army Council asked W.V.S. for 200 members for this same work in the S.E.A.C. theatre of war, and further demands followed. In spite of six years of strenuous war work, women were still prepared to volunteer for further work.

In September 1945 the Government decided that there would be many tasks for the Women's Voluntary Services to perform in the transitional period following the end of the war, and that the organisation should therefore continue to operate.

The organisation, which was officially known originally as the Women's Voluntary Services for A.R.P., and later as the Women's

Voluntary Services for Civil Defence, now dropped the reference to civil defence in its official title and thus became simply the Women's Voluntary Services, by which shortened name it had been popularly known all along. Local authorities were relieved of any expense in connexion with the organisation's local offices, and expenditure authorised by Government departments was borne by the Exchequer.

The Home Secretary, Mr. Chuter Ede, in a circular to local authorities expressed his gratitude for the assistance they had given to the Women's Voluntary Services since its inception, and in particular to those authorities which had continuously or at various times provided accommodation without charge in their own offices.[1]

From April 1, 1946, financial responsibility for W.V.S. administrative offices was transferred from local authorities to the Central Government, provided such premises were not used solely for work which was the direct responsibility of the local authority. In the case of premises used solely as clothing exchanges and clothing depots, responsibility continued to be borne by the Board of Trade and the Ministry of Health respectively. Office premises, including those used partly as W.V.S. local offices and partly as clothing exchanges or clothing depots, were the responsibility of the Home Office. Difficulty continued to be experienced in finding suitable premises but all possible assistance was given by the Ministry of Works. The machinery of the W.V.S. after the war was maintained, therefore, on a national basis with central planning departments at Headquarters, Regional, County Borough and Centre Offices throughout the country in close association with the housewife in towns and villages through local representatives.

In April 1947, the Home Secretary announced in the House of Commons that much valuable work was still being done by the W.V.S. and that it was desirable to keep alive 'the spirit and efficiency of a Service which has proved so successful in mobilising voluntary help for numerous forms of public work'. Consideration was being given to the question of how the W.V.S. could best be fitted into the general pattern of social service by various voluntary bodies whose work was of special assistance to Government departments and local authorities. 'Whatever the future holds', said the Home Secretary, 'the need will continue for voluntary helpers to supplement public services, both on occasions of emergency and at other times'. Meanwhile, the approved administrative expenses of the Women's Voluntary Services would continue to be met from the national Exchequer.[2]

STIMULUS TO RECRUITMENT

This announcement had a great effect on the morale of the Women's Voluntary Services throughout the country. Recruitment of new members became easier as many younger women had previously hesitated to join a Service whose future had seemed so uncertain, and a

number of old members were able to take up work again. The gradual recognition by the general public of the economic crisis with which the country was faced also affected recruitment. As at the time of the Munich crisis, and at critical moments during the war, women came forward in increasing numbers to offer their services. W.V.S. Centres, which had in many places closed down because of lack of encouragement from local authorities or an entire loss of interest among the community generally, were re-opened to start up Meals-on-Wheels and Darby and Joan Clubs for old people, and once reorganised were there to carry out every other type of work.

AIMS OF THE SERVICE

The Service aims to teach a nucleus of people the opportunities there are for serving their community, in order that they, in their turn, may pass this information on and so prove that through serving the community it is possible for individuals to serve the nation. The close liaison maintained between different Government Departments and W.V.S. Headquarters (*vide* Appendix II) makes it possible to keep W.V.S. offices throughout the country informed of the many ways in which they can serve the community. A good instance of this was the advance information on bread rationing which enabled W.V.S. to draw up a concise leaflet for its own members to enable them to explain the system clearly to housewives. The leaflet was so successful that the Ministry of Food ordered several hundred thousand extra copies for distribution to bakers and food leaders throughout the country.

During the floods in 1947 the value of W.V.S. local organisations was quickly shown. Police, Army and Local Authorities called on W.V.S. for help. Stocks of bedding and clothing sent to W.V.S. from oversea were on the spot to meet local shortages. Women experienced in handling evacuees, working in rest centres, and undertaking communal feeding were there ready to help and there was never any need for outside assistance. While the dams in the Fen district were being strengthened, W.V.S. stood by day and night to feed the men who dared not leave their work for more than a few minutes, but in no place did the local members need assistance from the reinforcements who were standing by in adjoining areas.

MAIN ACTIVITIES

Appendix II gives a list of the main activities of the Women's Voluntary Services and their relation to a number of Government Departments in the post-war period. It indicates the many-sided aspects of W.V.S. work, but it will be noted that a number of these activities, especially those in relation to the work of the Ministry of Health, aid public health, hospital and medical work. By the end of the year 1947 the amount of work done, though differing in scope from that of the

war years, was as great as at any time during the war, and was closely linked up with the work being done by local authorities in fulfilling their statutory obligations. From April 1947 the W.V.S. held a number of discussions with the National Council of Social Service and the two bodies established a regular interchange of information. In September 1947 the Women's Voluntary Services had centres in 1,276 places in Great Britain and representatives in almost every village. The network through which information could be circulated or work done in the smallest local units was maintained through the W.V.S. Street and Village Organisation.

CONCLUSIONS

No medical history of the war would be complete without reference to the Women's Voluntary Service. It proved itself capable and competent to deal with any task demanded of it by the Government or local authorities. It had a badge and uniform and it trained its workers in the light of experience. Advanced courses in all branches of Civil Defence and specialised training in all forms of W.V.S. work were made available to members. When one need passed, it was able to transfer its resources of trained women on to the next task, whether temporary or permanent, without being handicapped by a rigid constitution.

Without distinction of religion, class or politics, W.V.S. gave a sense of civic responsibility to women who had never previously thought of influencing the life of the community. They helped their neighbours during emergencies of peace and war and the stranger within their gates, as many a serving man and woman from the Dominions, the Colonies or the United States can testify. They greatly helped to facilitate the smooth working of the Health and Medical Services. They learned much about the intricacies of local government, and through their readiness to help in an orderly and sympathetic way, W.V.S. became the human link between officialdom and the public, with mutual benefit to both parties.

The Women's Voluntary Services was a Service devised for the needs of war and proved so valuable and filled so great a national need that under the aegis of H.M. Government it has become a permanent institution in times of peace.

REFERENCES

[1] Home Office, Civil Defence Circular 87/1945, September 13, 1945.
[2] Parliamentary Debates, Official Report, House of Commons, Fifth Series, Vol. 436, Col. 133. (436 H.C. Deb. 5s, 133). Home Office, Civil Defence Circular 8/47, May 15, 1947.

WOMEN'S VOLUNTARY SERVICES

APPENDIX I

WAR-TIME WORK, 1939-1945

1. MINISTRY OF HOME SECURITY AND HOME OFFICE

Recruitment of women for staffing all forms of A.R.P. and Local Authority Services.
Co-operation with Wardens and Street Organisation.
Organisation of lectures and courses for women in First Aid, Anti-gas and Fire fighting.
Basic Training for all W.V.S. members and organisation of Housewives Service.
Manning of Incident Inquiry Points and training of personnel.
Inspection and repair of gas masks and fitting of baby helmets.
General co-operation in Invasion Defence Scheme.
Staffing of A.R.P. Canteens.
Feeding of Civil Defence workers after raids.
Operation of Volunteer Car Pool for the Regional Commissioners.
Provision of Regional reinforcements during the flying-bomb and rocket period.
Supplementing Wardens Service with part-time volunteers.
Assistance in staffing N.F.S. and Police Canteens.
Assisting Police in escort and welfare arrangements when rounding up women aliens.
Making and filling sandbags.

2. MINISTRY OF HEALTH

Evacuation (billeting, escorting, sick bays, communal feeding centres, hostels, social centres).
Assisting in plans for mass evacuation and coastal evacuation.
War nurseries for under-fives.
Distribution of clothing from Regional, County and Local Depots to air raid victims, evacuees and foreign refugees.
Staffing of Rest Centres and provision of emergency equipment, training and maintenance of mobile rest-centre teams.
Staffing of Administrative Centres and Information Services.
Searcher Service other than that undertaken by B.R.C.S.
Reception and welfare of foreign refugees, evacuees from Gibraltar, Channel Islands, Malta and Far East.
Keeping of Central Register of information regarding refugees from Holland, Belgium and France.
Assistance in Blood Transfusion Service.
Domestic Help in Hospitals.
Regional toy making Schemes.
Welfare work in public air raid shelters, including provision of canteen facilities.
Recruitment of women for water decontamination.

Provision of gas cleansing facilities.
Staffing and planning of Aid-Houses to supplement Casualty Services.
Emergency billeting Services.
Recruiting of Nursing Auxiliaries.
Care of aged and infirm, and evacuation after flying-bomb period.
Re-homing Scheme which assisted 100,000 families with furniture, blankets and other gifts after bombing.

3. ADMIRALTY

Vegetable service for minesweepers, etc.
Comforts for official depots.
Canteens.
Hospitality for W.R.N.S.
Hostels and Clubs.

4. AIR MINISTRY

Hospitality for R.A.F. and W.A.A.F. personnel.
Hostels for W.A.A.F.
Canteens.
Arranging classes on releasing men from crashed aircraft.
Knitted comforts.

5. ASSISTANCE BOARD

Co-operation in the provision of immediate clothing assistance to air-raid victims.
Provision of welfare arrangements for staffs of Mobile Office units and training volunteers for emergency work.

6. BOARD OF TRADE

Collection and distribution of gift clothing and distribution of over eleven million pounds' worth of imported clothing.
Children's Clothing and Shoe Exchanges.
Collections of coupons for gift clothing in all depots.
Help in explaining clothes rationing scheme.
Information on Utility Furniture.
Information on Withdrawing Traders' Register in rural areas.
Domestic Front and Make-do and Mend Campaigns and Exhibitions.

7. DOMINIONS OFFICE AND COLONIAL OFFICE

Gifts from oversea.
Hospitality scheme, e.g. Newfoundlanders.
Clothing and relief for civilian repatriates.
Welfare for Allied troops and their P.O.Ws.
Hospitality to visitors.

8. MINISTRY OF AGRICULTURE AND FISHERIES

Interviewing recruits, billeting and general welfare for Land Army.
Co-operation with County War Agriculture Committees, for the recruitment of part-time land workers.

Feeding of agriculture workers.
Assistance in Dig for Victory campaign.
Welfare of girls in timber corps.

9. MINISTRY OF AIRCRAFT PRODUCTION

Feeding of workers on constructional sites.
Sorting rivets for aircraft factories.
Collection of aluminium.

10. MINISTRY OF EDUCATION

Helping to staff school canteens and transport hot meals.
Helping with clothing schemes for evacuated children.
Co-operation with Girls Training Corps.
Helping with Domestic Front Campaign.
Staffing Social and Play Centres.
Under-fives and war-time nurseries.
School Volunteer Scheme.
Providing Escorts.

11. MINISTRY OF FOOD

Community Feeding Centres and British Restaurants—help in staffing and running.
Pie Schemes in rural areas.
Emergency Feeding Centres.
Queen's Messenger Convoys.
Help with campaign for building field kitchens.
Distribution of food gifts from oversea.
Issuing of fruit juices and cod liver oil.
Food Advice and Food Leader Scheme.
Assistance in issuing of ration books.
Simple instruction in cooking and nutrition.
School meals.
Industrial feeding for outlying workers, etc.
Mobile Canteens for all types of feeding schemes.
Herb collection.
Staffing Ministry of Food Emergency Feeding Units.

12. MINISTRY OF INFORMATION

Hospitality for American Forces in Great Britain, Information Bureaux and Hospitality Centres.
Tours for oversea visitors.
Distribution of leaflets, posters, etc.
Organisation of meetings for M.O.I. speakers and film shows.
Co-operation over the production of films and publications.
Providing drivers and announcers for M.O.I. cars in emergency.
British Welcome Clubs.

13. MINISTRY OF LABOUR AND NATIONAL SERVICE

Industrial billeting surveys.
Reception and hospitality schemes for transferred workers.

Help with "Holidays at Home" campaign.
Forming out-work centres.
Help with publicity with regard to recruitment of part-time workers.
Help with war-time nurseries for children of war workers.
Mobile canteen services for dockers or workers on factory building sites.
Emergency Home Helps.
Recruiting agricultural workers, fruit pickers, etc.
Co-operation with A.T.C., J.T.C. and other Youth Organisations.

14. MINISTRY OF SUPPLY

Salvage, publicity, provision of stewards, canvassing and collection.
The " Cog" Scheme.
Collection of medicinal herbs.
Garnishing of camouflage nets.
Book drives and mending, sorting and disposal of books to Services, Hospitals and Salvage.
Collection of cotton reels.
Feeding workers on operation Mulberry. Knitting many pounds of wool into under-garments for children in liberated Europe.

15. MINISTRY OF WAR TRANSPORT

Feeding of dockers from mobile canteens (temporary schemes).
Assistance in clothing shipwrecked merchant seamen.

16. MINISTRY OF WORKS

Emergency feeding of constructional workers.
Housing Surveys and education.

17. WAR OFFICE

Canteens (W.V.S. is associate member of the Council of Voluntary War work) over 500 canteens were in operation.
Clubs and hostels.
Comforts (in connexion with the Directorate of Voluntary Organisations).
Mending Schemes.
Libraries for outlying units.
Short leave hospitality for personnel.
General welfare work for Service men and women.
Home Guard co-operation in various ways, chiefly with feeding, transport, and communications.
Co-operation with Red Cross, meeting convoys, occupational therapy.
Hospital Libraries.
Care of relatives of wounded and dangerously sick.
Welfare of returned P.O.Ws.; reception, transit, sewing on ribbons, and visiting for Civil Resettlement Units.
Information Bureaux (with N.A.A.F.I.) and at Stations.
Welfare work in N.A.A.F.I. overseas leave clubs.
Publicity for War Dogs scheme.
"Say it with flowers".

Leave petrol vouchers.
Co-operation with S.S.A.F.A.
Provision of wedding dresses for A.T.S.
Assisting civilian population in removal and resettlement in 'Battle' areas.
Map making.

WOMEN'S VOLUNTARY SERVICES

APPENDIX II

W.V.S. POST-WAR WORK

1. HOME OFFICE

(i) *Children's Welfare.*
Assisting Probation Officers.
Welfare Work in Remand Homes, Approved Schools, etc.
General Welfare.
Godmothers. (See also Ministry of Health).
(ii) *Prison Welfare.*
(iii) *Transport.*
Welfare of Poles and E.V.Ws.

2. MINISTRY OF FOOD

Pie Scheme.
Canning.
Ration Books.
Jam Jars.
Welfare for Ground Nut Scheme Employees.
Distribution of Gift Food for Local Authorities.

3. MINISTRY OF HEALTH

(i) *Work in Connexion with Health Services.*
Hospital Work.
Work in Mental Hospitals.
Rehabilitation.
Hospital Car Service.
Home Helps.
Blood Transfusion.
(ii) *Work for Children.*
Welfare Clinics.
Distribution of Welfare Foods.
Nurseries and Afternoon Crèches.
Temporary Foster Homes.
Children's Escorts.
Sitters-in.
Diphtheria Immunisation and Vaccination.
Prevention of Illness.
Mothercraft Hostels.

Rose Hips.
Distribution of Gift Food for Children. (See also Home Office.)
Propaganda for diphtheria immunisation and vaccination.

(iii) *Work for Old People.*
Residential Clubs.
Darby and Joan Clubs.
Meals on Wheels.
Visiting in Institutions.
Visiting Old People in their Homes.

(iv) *Work on Clothing.*
Clothing Depots.
Clothing Exchanges.
Work Parties.

(v) *Miscellaneous.*
Housing.
Garden Gift Scheme.
Citizens Advice Bureau.
Welfare for Repatriates, Poles and E.V.Ws.

4. WAR OFFICE—SERVICES WELFARE

(i) *Services Welfare—Oversea.*
Welfare Work in N.A.A.F.I. Clubs.
Magazine Adoption Scheme.
Ghurka Families Welfare.
Families Hostels.
Escorting School Children.

(ii) *Services Welfare—Home.*
Welfare Work in N.A.A.F.I. Clubs.
W.V.S. Canteens.
Services Families Camps.
Mending for the Forces.
Escort and Reception.
Canteens for Territorials.
Canteens for Cadets.

5. WELFARE FOR POLES AND E.V.WS.

Escorting Poles and E.V.Ws.	Ministry of Labour
Welfare for E.V.Ws. in Hostels.	Ministry of Agriculture
Welfare in Camps and Hostels for Poles.	National Assistance Board
Welfare for Poles and E.V.Ws. in Employment.	War Office

6. NATIONAL SAVINGS MOVEMENT

National Savings.

7. BOARD OF TRADE

Salvage.

8. MINISTRY OF FUEL AND POWER

Fuel Economy.

9. MISCELLANEOUS SERVICES

(i) Distribution of Gifts from Oversea.
(ii) Distribution of Personal Food Parcels.
(iii) W.V.S. Conference Service.
(iv) Newsletter.
(v) Publicity for Government Departments.
(vi) W.V.S. Information Desk Service for International Conferences in Great Britain.

10. EMERGENCY WORK

(i) Repatriates.
(ii) Flood Relief.
(iii) Disaster Relief.

B. THE JOINT WAR ORGANISATION OF THE BRITISH RED CROSS SOCIETY AND THE ORDER OF ST. JOHN

This organisation, which had functioned so successfully in the War of 1914–18, was revived with a view to carrying out similar humanitarian and relief services in the war which by August 1939 was considered inevitable, and on September 2, 1939, a formal agreement providing for its reconstitution was signed. The services it rendered during the War of 1914–18 were necessarily organised under the provisions of the Geneva Convention, as only the Fighting Services had then to be provided for. In the Second World War, however, the appeal for funds laid down that the objects of the Joint War Organisation would be extended to the relief of civilians injured by enemy action in addition to their use for the sick and wounded of the Forces and for prisoners-of-war.

The activities of the J.W.O. for the benefit of casualties among members of the Forces treated in Service hospitals abroad and at home are adequately described in the military volumes of the Medical History, while the duties carried out for the Emergency Medical Service of the Ministry of Health, which was responsible for the treatment of civilians injured by enemy action as well as the bulk of the military casualties admitted to hospitals at home, are dealt with in the E.M.S. volumes.

SERVICES RENDERED DURING THE AIR RAIDS

The J.W.O. was also, however, required by the various authorities dealing with war casualties to supplement the services normally rendered by the official agencies, by affording relief for immediate distress among civilians who, although not injured, had lost their homes and relatives and most of their possessions as the result of aerial attacks. To meet these requirements, arising directly from heavy raids on London, and on other large centres of the population in the provinces, the J.W.O. gradually built up an extensive system for the distribution

of medical supplies, blankets and towels to town halls and rest centres. It also supplied invalid and infant foods, fresh fruit, soups, biscuits, medical equipment, hot water bottles, mattresses, soap and other comforts, and public shelters were equipped with medical stores and first-aid boxes. The latter were also sent to branches of the Women's Voluntary Services, the Charity Organisation Society, and the Salvation Army. Tube shelters were in many cases staffed by members of the British Red Cross Society and St. John Ambulance Association, who were provided with medical and first-aid stores.

Hostels and rest houses for men, women and children who had been bombed out of their homes were provided and equipped, while in shelters, emergency sick bays were similarly dealt with. The ambulance services of the local authorities and the Ministry of Health were also supplemented on many occasions when requested.

The chairman of the J.W.O. (Field Marshal Sir Philip Chetwode) epitomised the policy as follows: 'Do not fear to take action if the local authorities have not got what is wanted and we have, or can get it; see that it is provided'.

CONVALESCENT AND WELFARE SERVICES

The particulars given above relate to the services rendered by the J.W.O. to civilians during or immediately after air raids. In addition to the convalescent hospitals and homes for war casualties, administered and staffed by the J.W.O. on behalf of the Ministry of Health as auxiliary hospitals in the E.M.S., they were also asked to provide homes for industrial workers showing signs of war strain and needing a spell of recuperative treatment, and gradually about twenty of these homes were established for such purposes. They also, at the request of the Ministry, converted a number of homes into residential nurseries for children under 5 years of age. The first three of these were opened in August 1941 and three more in December of the same year, while in January 1942, twenty more were provided. These measures enabled many women with young children to place their services at the disposal of the Ministry of Labour, which they could not have done otherwise.

SERVICES DURING EVACUATION

From June to the end of August 1944, the period of greatest intensity in flying bomb attacks, and from September 1944 when the first rockets came over until they ceased in March 1945, the J.W.O. was again called upon to help civilian victims. The area of its operations was for the most part in London and the home counties. These included the provision of personnel, transport, medical supplies and comforts, also rest centres and the handling of enquiries. Members of the two bodies were always on duty at hospitals and rest centres, at day nurseries and at tubes and other centres, while many others volunteered for shelter

duty in London and Southern England from other parts of the country. Among them were volunteers from every county in England, from Wales, from Northern Ireland and from the Isle of Man. They helped to evacuate patients from hospitals and to carry stretcher cases from shattered buildings. For the injured, messages were taken to their homes.

A cave shelter at Chislehurst, Kent, normally sleeping about 1,400 people was accommodating nearly 10,000 daily during flying-bomb attacks. As difficulty was experienced in feeding the shelterers, the J.W.O. were asked that a mobile canteen might be sent out immediately, and although it was Sunday the canteen arrived within 2½ hours, and fed over a thousand people. Mothers nursing their babies were served at times convenient to them so that they did not have to queue, and a mobile bath unit was also sent to the caves in which about fifty babies were bathed every night. In addition to these services, ambulances and stretcher bearers dealt with the sick and helpless, many of whom required frequent attention during their journeys to reception areas; they also helped the authorities by meeting hospital trains on arrival at their destination. They also opened hostels in many reception areas to accommodate old people and children.

This very short and quite inadequate account of the many activities of the J.W.O. for the benefit of the civilian population is recorded here as an appreciation of this great service.

Full accounts of these and of many other activities of the J.W.O. are contained in the British Red Cross Society and Order of St. John of Jerusalem War Organisation Official History, 1939–47, by P. G. Cambray and G. G. B. Briggs, published in 1949 (14 Grosvenor Crescent, London, S.W.1.).

C. THE AMERICAN RED CROSS AND HARVARD FIELD HOSPITAL UNIT

The war's demand on man-power did not spare the public health service, and in this, as in many other ways, the United States of America provided timely help. In July 1940, Harvard University planned to send a group of field and laboratory workers to reinforce the staff of the Ministry in any emergency which might arise, and a month later Dr. John E. Gordon, Professor of Preventive Medicine and Epidemiology in the University, and his assistant, Dr. J. R. Mote, arrived in England as the first comers of a team which eventually numbered more than 100 persons. The team included Dr. McNair Scott, the Research Professor of Paediatrics at Philadelphia. These were not ordinary people. They had the courage to face an Atlantic crossing and whatever might come to an England awaiting invasion. Six of them lost their

lives. They brought with them a new outlook and a new knowledge which found permanent expression in the institution, with 120 patient beds, at Salisbury which, with great generosity, their country handed over to the Ministry of Health at the end of the war. This—the gift of the American Red Cross Association and other institutions in association with Harvard University—consisted of twenty-two buildings prefabricated in America and erected on a site at Salisbury which had been requisitioned by the Minister. It was formally opened in September 1942, after long delays due to the loss of part of the material by enemy action. It became part both of the Emergency Medical Services and of the Emergency Public Health Laboratory Service. (See E.M.S. Volume I, Chapter 14, Appendix II.)

Professor Gordon and some of his staff, many months before the unit at Salisbury was ready to receive them and throughout the winter of 1940, were attached to the medical staff of the Ministry and played an active part in the planning of preventive measures generally, particularly in air raid shelters. Some of the unit's nurses became shelter nurses, others reinforced the staffs of various hospitals for communicable diseases and of E.M.S. hospitals. The technicians helped emergency public health laboratories, and the medical officers were constantly employed in co-operation with those of the Ministry of Health. Their activities are perhaps best described under the heading of some of the diseases which they studied:

Paratyphoid Fever. In August 1941, owing to an outbreak of paratyphoid fever at Bristol, there arose a need for additional nursing and technical help. A dozen nurses were sent, and shortly afterwards Dr. Dean Fleming and two bacteriologists joined the party, to be followed by a number of public health nurses for field work. The published results (Davis, Cooper and Fleming, 1942) of this investigation do not suggest to the reader that the work was done in a much bombed city at an anxious period of the war. The vehicle of infection was synthetic cream which had also been suspect at Birmingham, Leicester and Liverpool. Little was known about these 'creams' at the time, and Dr. Fleming made an exhaustive inquiry into the processes of manufacture, which led to a great improvement in the quality of these products. He also investigated an outbreak of paratyphoid fever at Brixworth. During these outbreaks Dr. Fleming co-operated with Dr. Felix of the Emergency Public Health Laboratory Service in the investigation that led to the development of Vi-phage typing of paratyphoid B (Felix and Callow, 1943).

In June 1941, when a small outbreak of paratyphoid fever occurred in a boys' public school, the Harvard Unit again helped. Sulphaguanidine, which had recently been produced in America, was then an untried product in the control of paratyphoid infections, and Dr. McNair Scott and others investigated the problem. (Scott, *et al.*, 1943.)

In 1942, the unit enquired into an outbreak of paratyphoid fever at Weston-super-Mare which threw some light upon the feeding in canteens of several isolated communities.

Typhoid Fever. Although paratyphoid fever accounted for the main incidence of enteric fever during the first three years of the war, sporadic cases and small outbreaks of typhoid fever occurred, and for many months the unit co-operated actively with the medical officers of the Ministry and of the Emergency Public Health Laboratory Service in studies of the application of Vi-phage typing to elucidate endemic typhoid fever.

Upper Respiratory Infections. In the winter of 1941 a survey of upper respiratory infections in military establishments at Camberley and Devizes was made for the Army Council. In addition a number of outbreaks of streptococcal infection were studied by Prof. McNair Scott and Miss Caswell, and Drs. Kilham and Steigman (1942) made observations on infectious mononucleosis.

Scabies. Much help was given to local authorities in case-and-contact-follow-up and control. Dr. Steigman (1942) developed the use of sulphathiazole ointment in the treatment of secondarily infected scabies and impetigo.

Trichinosis. In the unusual incidence of trichinosis during 1941 Dr. Paul Beeson (1941, a b) gave great help and did much to advance the use of skin testing with trichina antigen.

Cerebro-spinal Fever. Dr. Beeson scrutinised and reported to the Ministry on the records of 3,500 cases of cerebro-spinal fever which had been accumulated for the purposes of clarifying many uncertainties concerning chemotherapy. Subsequently, a number of public health nurses carried out domiciliary visits and provided useful information regarding the sequelae of cerebro-spinal fever (Maddock, 1943). A similar investigation in Wales was later directed by Dr. J. Degen (1945).

Fibrositis. Muscular rheumatism, a common affection in England, comparatively rare in America, was investigated when some of the field nurses of the unit developed stiff necks while working in a south coast town. The staff were bled to see if the condition was transferable and it was found that the disease could be experimentally transferred by blood injections. Eventually 10 of 18 persons in three successive passages developed it. The incubation period in 7 of the 10 cases was 2 to 4 days and in the others 7, 10 and 16 days respectively. In one passage series all 5 volunteers developed the symptoms within 10 days, 4 after intravenous and one after intramuscular injections of blood. Animal transmission experiments were unsuccessful. Surveys among army and factory personnel brought 125 cases of fibrositis under investigation. Five of these developed the clinical syndrome of general fibrositis. Though not conclusive, these studies strongly suggest that the muscular rheumatism so common in England is in some cases at least communicable.

Jaundice. An outbreak of mumps suggested to the unit that this disease might be controllable by the use of mumps convalescent serum after the manner of measles prophylaxis. Some of the serum, all of which was prepared under exemplary conditions in the unit laboratory, was unhappily icterogenic and it was necessary to admit the resulting cases of hepatitis to the hospital. Good clinical and laboratory observations thus became available and were in fact the basis of the description of homologous serum jaundice contained in a memorandum on the subject prepared by medical officers of the Ministry of Health and published in the *Lancet* (1943).* Subsequently, the incident was reported by Drs. Beeson, Chesney and McFarlan (1944) and was to prove of immediate value when in May 1942, Professor Gordon investigated a serious outbreak of hepatitis among American troops in transit to and recently arrived in Northern Ireland. Dr. Gordon's surveys led him to conclude that human serum used in the preparation of a yellow fever vaccine was the vehicle of an icterogenic agent.

Field surveys of epidemic hepatitis were made at Axminster and Colyton where 122 cases were studied; the results were not published but Dr. McFarlan of the Emergency Public Health Laboratory Service, who subsequently became secretary to the M.R.C. Jaundice Committee, collaborated and this experience was of great value in his later work.

Gastro-enteritis in Infants. Professor McNair Scott contributed studies on the part played by Group G streptococci in epidemic diarrhoea of the newborn, the control of Sonne dysentery with sulphaguanadine and the aetiology and epidemiology of parenteral enteritis. He investigated the virus and the clinical picture of *herpes simplex* (Scott and Steigman, 1942). Assisted by Dr. Degen and Dr. Spring, he made a number of studies of the incidence of giardiasis in children's nurseries.

Typhus Fever. The unit provided the first mobile team held in readiness to proceed at once to any district in which this disease might occur, and its laboratory maintained records and spot maps with regard to typhus fever throughout the world. Forty members of the unit's medical and nursing staff were among the first to volunteer as subjects for comparative trials of different typhus vaccines that were done under a scheme organised by the Ministry in consultation with the Medical Research Council. Professor McNair Scott co-operated with Dr. Felix of the Emergency Public Health Laboratory Service in this investigation and the result obtained by the Weil-Felix test indicated by the spring of 1943 that the vaccine prepared at the Connaught Laboratories, Toronto, according to Craigie's method of purifying and concentrating rickettsia suspensions, was the most potent

* Attention was first drawn to the occurrence of acute infective jaundice in connexion with the administration of convalescent measles serum and other serums of both human and non-human origin in the Chief Medical Officer's Annual Report for 1937, pp. 38, 39. Certain of the patients died with all the classical symptoms of acute necrosis of the liver.

of the different vaccines tested (Felix, 1942). This vaccine was extensively used in the Fighting Services.

Foods. Dr. Fleming investigated the protection of food supplies for ships' use, and Dr. Meiklejohn obtained a useful miniature war-time nutrition survey from the details of the dietaries of 100 patients who had developed paratyphoid fever at Bristol.

Valete. On July 15, 1942, the buildings at Salisbury were transferred to the United States Army and became the first General Medical Laboratory in the European Theatre of Operations. The staff now appeared in khaki, but continued to help the civil authorities until military necessity called for its services elsewhere. The staff dispersed, but the buildings remained a centre for American microbiology and epidemiology in the European theatre and a scientific institution of great importance. By accepting these buildings the Ministry of Health became possessed for the first time of a centre in which were provided all the facilities for the simultaneous study of the clinical, biological and epidemiological aspects of disease.

REFERENCES

BEESON, P. B. (1941a). *Lancet*, **2**, 67.
—— (1941b). *Proc. roy. Soc. Med.*, **34**, 585.
—— CHESNEY, G., and MCFARLAN, A. M. (1944). Lancet, **1**, 814.
DAVIS, I. G., COOPER, K. E., FLEMING, D. S., *et al.* (1942). Ibid., **1**, 129.
DEGEN, J. A., CAMERON, H., ROBINSON, V. L. M., and WIEDEN, M. S. R. (1945). *Brit. med. J.*, **2**, 243.
FELIX, A. (1942). Ibid., **2**, 597.
—— and CALLOW, B. R. (1943). Ibid., **2**, 127.
KILHAM, L., and STEIGMAN, A. J. (1942). *Lancet*, **2**, 452.
MADDOCK, E. C. G. (1943). *Min. of Hlth. Monthly Bull.*, **2**, 111.
Min. of Health: 'On the State of the Public Health' Ann. Report of the Chief Med. Officer for the year 1937. London: H.M.S.O., 1938.
Min. of Health (1943). Homologous Serum Jaundice: Memo. by Med. Officers of the Min. of Health. *Lancet*, **1**, 83.
Min. of Health: 'On the State of the Public Health during Six Years of War', Report of the Chief Medical Officer for the years 1939–45. London: H.M.S.O., 1946.
SCOTT, T. F. MCN., BEESON, P. B., and HAWLEY, W. L. (1943). *Lancet*, **1**, 487.
—— and STEIGMAN, A. J. (1942). Ibid., **1**, 761.
STEIGMAN, A. J. (1942). Ibid., **1**, 632.

PART II

Other Civilian Health and Medical Services

CHAPTER 1

MINISTRY OF EDUCATION

THE SCHOOL MEDICAL SERVICE

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INTRODUCTION

THE birth of the School Medical Service was hastened, and its subsequent development was very greatly influenced by the impact of war. The South African War revealed the extent to which the English people suffered from impaired physique. The Report of the Royal Commission on Physical Training (Scotland), 1903—a direct consequence of this revelation—showed the deplorable condition of large numbers of schoolchildren, a finding confirmed, and indeed intensified, by two further inquiries.[1] [2] The powerful stimuli thus applied to Parliament and people resulted in the passing of the Education (Provision of Meals) Act, 1906, and the Education (Administrative Provisions) Act, 1907, which placed medical inspection, as a duty, upon local education authorities.

The First World War further stimulated the service, which was six years old when that war began, and gave it its first experiences of school feeding on a great scale. The large proportion of the population that was placed in the C3 category, especially during those two years of the war after voluntary recruitment for Kitchener's Army had skimmed off the cream of British manhood, impressed upon the Government the need to improve the standard of national physique. On August 1 1919, the provision of treatment (previously a power only) became a compulsory duty for local education authorities.

During the inter-war years the service developed somewhat slowly, but facilities for treatment, cleanliness, health education and the standard of physical education were much improved. Perhaps the best feature of these years was the growing appreciation of the importance of nutrition, and the most important practical step was the inception in 1934 of the school milk scheme, whereby children could have at school one or two-thirds of a pint of milk at the much reduced price of one-halfpenny a third of a pint. Solid meals were given free to necessitous children, that is to some 4 per cent. of all elementary school children, but in many areas the meals were inferior in quantity and quality and given in overcrowded and unattractive feeding centres.

THE PRE-WAR ELEMENTARY SCHOOL CHILD

The school child of 1939 was in every way more fitted to withstand the strain of 'total' war than his parents had been to bear the lesser civilian ordeals of the War of 1914–18.

For since the School Medical Service began, the elementary school child had gradually undergone a wonderful metamorphosis. The school child of 1939 looked altogether a different person from the child of 1908 —'fairer, fatter in flesh', cleaner and better dressed. On average at 13½ years (almost the end of his elementary school career) he was 2½ in. taller and 10 lb. heavier than his predecessor of thirty years before. Girls had improved even more than boys and, at the same age, averaged nearly a stone in weight and 2½ to 3 in. in height more than those of the previous generation. The improvement in average measurements had been relatively greater in city than in rural children. Nutrition, as judged by clinical assessment, had improved similarly, though the increasing stringency of clinical standards made comparison with the earlier years difficult. Health had improved no less than physique. Death rates per thousand living from all causes for the two school age-groups had, by 1939, been reduced to less than half, i.e. from 3·39 (1911–15) to 1·5 in the 5 to 10 year group, and from 2·08 to 1·0 in the 10 to 15 year group. The incidence of many diseases of childhood which are associated with poverty and neglect, such as chronic otitis, acute rheumatism, corneal ulcer and ringworm, had greatly decreased. Infestation with head lice had also much decreased, but, in view of the disquieting findings after the first evacuation, it is to be remembered that in 1938 some 445,000 children, or 10 per cent. of those in average attendance, were found to have infested heads at nurses' examinations.

Many factors had combined thus to transform the elementary school child. The devoted labours of successive generations of teachers, higher wages, smaller families, greater sobriety, maternity and child welfare work and improved housing (for there is a close correlation between the physique of children and the size of houses they inhabit) had all contributed, but much of the credit can unhesitatingly be given to the School Medical Service.

THE PRE-WAR SCHOOL MEDICAL SERVICE

The central administration was by the Board of Education, whose medical staff consisted of a Chief Medical Officer (also Chief Medical Officer of the Ministry of Health), a senior medical officer, and seven medical officers, two of whom were women. Local administration rested with 315 local education authorities for elementary education: 63 county councils, 83 county borough councils and 169 councils of municipal boroughs and urban districts. The counties and county boroughs were responsible for elementary, secondary and higher education, while the boroughs and urban districts were only responsible for elementary education in their areas, secondary education being provided by the counties. Responsibility for education included that for the School Medical Service and school meals. The numbers of schoolchildren were approximately 4,600,000 in elementary and 450,000 in secondary schools.

In most areas co-ordination with the public health service was secured by the medical officer of health being also school medical officer, and his assistants being officers of both services. Some large authorities, however, preferred to have separate services.

Medical Inspection. Local education authorities had to provide in elementary schools full medical examinations for entrants, 8-year-old and 12-year-old children, while some made a fourth age group inspection within a year of the child leaving school. These routine medical examinations totalled 1,677,000 in 1938, and there were in addition 3,746,000 special and re-examinations, special examinations being those of children referred to the doctor by parents, teachers, nurses or care committees. Secondary schoolchildren usually had three full routine examinations during their secondary school life, and in 1938 260,000 were thus examined.

Treatment. In 1938, 1,072,000 children were treated for minor ailments, 276,000 for defective vision, usually by specialists, 72,600 were operated on for chronic tonsillitis or adenoids, while 3,531,000 children were inspected and 1,635,000 treated by school dental officers. In addition to these statutory duties many authorities had special clinics, usually staffed wholly or partly by specialists, for orthopaedic defects, diseases of the ear and defective hearing, heart disease and rheumatism, nutrition, child guidance, squint, X-ray treatment of ringworm, ultra-violet light, remedial exercise, speech defects and stammering.

Cleanliness. Some 14,546,000 examinations for conditions of uncleanliness in elementary schools were made by school nurses and 26,886 children were cleansed by them. Each child should have been examined at least once every term.

Exceptional Children. The ascertainment of crippled and delicate, blind and deaf, partially blind and partially deaf and mentally defective children took up much of the time of those assistant school medical officers who had been approved for this purpose by the Board. For the education of these exceptional children 20 residential and 80 day open-air schools for delicate children and 27 residential and 123 day schools for the mentally defective were conducted by local education authorities. Most of the schools for blind and deaf children had been established by voluntary bodies, but were largely supported by the payments of local authorities whose children they received. The total number of special schools was about 600. As every physically and mentally defective child must be examined by an approved certifying officer at least once a year, and as children in open-air schools were usually examined at least once a term, the supervision of special schools occupied much of the time of the school medical officers.

Nursery Schools. In addition to special schools there were some 100 schools for children between 2 and 5 years.

Nutrition. In many areas, in addition to routine and special examinations, nutrition surveys of all children in schools, or sometimes of selected groups or of poor district schools, or sometimes of children not receiving supplementary nourishment were conducted six-monthly or yearly.

The Staff of the Service. To perform these manifold duties and many others for some five million children the service had, in 1938, 1,518 medical officers of whom 266 gave whole-time service and the others part-time, making in all the equivalent of the whole-time service of 728 medical officers or about one to every 6,220 elementary schoolchildren. There were also 1,065 specialist medical officers (only 12 whole-time) employed on ophthalmic, oral, anaesthetic, orthopaedic, X-ray and artificial-light work in the various clinics. Similarly, there were in all 1,009 school dentists who gave the equivalent of the whole-time service of 783 dentists or nearly one to every 5,780 elementary schoolchildren.

School nurses to the number of 5,431 were employed in 1938, but their whole-time equivalent is uncertain, as 2,118 of them were district nurses not employed directly by the authorities. In addition there were 41 whole-time and 114 part-time orthopaedic nurses, and 366 whole-time and 197 part-time dental assistants who were not qualified nurses.

The pre-war School Medical Service was thus a great and complex organisation whose foundations had been well and truly laid in 1907 by its chief architect, Sir George Newman. But when we consider how it bore the impact of war we must remember it was a partial service—the child only came under its care at 5 years of age, and, moreover, it was still, as it began, an educational service paid for by educational funds primarily to prevent waste of those funds in trying to teach children too defective or ill-nourished to derive benefit from education. It was not a complete child health service, and was hedged about by artificial boundaries of status and regulation designed to prevent the diversion of educational funds to health purposes. It was not responsible for home medical treatment, for the treatment of acute conditions, or infectious diseases or for most forms of hospital treatment. It could only deal with home conditions by advice. Moreover, like all other local government service, it had been subject to 'the handicap of locality' and so there were great inequalities of staff and organisation among the school medical services of the 315 local education authorities. To deal with this 'handicap of locality' the Board of Education had done what it could to stimulate the backward authorities and to praise the progressive, but at the outbreak of war great inequalities still remained, even between the services of authorities of the same type, and one of the effects of war was to place the greatest burden where the service was in many cases least adapted to meet the strain. Many of the reception areas had been in peace-time understaffed, especially in the dental service, and lacked treatment facilities, even for the needs of their own children, while the

more highly developed services of the evacuation areas were for the time being suspended.

PREPARATION FOR WAR

Such was the general character of the service when, in July 1938, the shadow of 'things to come' fell upon it with the Report of the Anderson Committee.[3] This Report set forth the policy of evacuation with three objectives: dispersal in view of the threatened aerial bombardment of great cities; maintenance of civil morale enabling the country at once to develop its maximum war potential; and the preservation, continued social care and education of children, and their protection as far as possible against the psychological shocks of bombardment from the air. Endorsement of the policy was, however, delayed by the Munich crisis during which plans had been hurriedly prepared to remove some 400,000 schoolchildren from London and large numbers from other areas such as Birmingham, while some 1,200 nursery schoolchildren and 3,500 physically defective children had actually been sent out of London.

Immediately after the Munich agreement the responsibility for evacuation was placed on the Ministry of Health, and a strong advisory committee representative of the local authorities, the local education authorities, and the teachers was appointed. Following the suggestions of this committee, the Government decided that the official scheme should be confined to the evacuation of certain 'priority' classes; schoolchildren in school units with their teachers, children under 5 accompanied by their mothers or some other responsible adult, expectant mothers, the adult blind and certain adult cripples where removal was feasible. The scheme was to be based on voluntary evacuation, and billeting in privately occupied houses, on account of the great numbers involved, had to be the main method of housing those sent out; compulsory powers of billeting would be taken, but voluntary arrangements were to be relied upon as much as possible, especially in the case of schoolchildren.

England and Wales were divided into three types of area; evacuation areas, 81 in number and including most of the larger industrial cities, selected after taking into account their size, density, and vulnerability, from which schoolchildren and other priority classes were to be sent; reception areas, of which there were 1,100—chiefly small towns or rural parts of the country where they were to be received; and neutral areas, which would neither send out to nor receive persons from other areas. Similar arrangements were made in Scotland. Some great centres, like London, were 'wholly' evacuable; others, like Manchester, were 'zoned' into evacuation and neutral areas.

The Ministries of Health and Transport, and the Board of Education, with the local authorities of the 81 evacuation and the 1,100 reception areas, the main-line railways, and the London Passenger Transport Board, prepared a detailed scheme to meet the enormous difficulties of

the task, which were increased by a substantial number of unofficial evacuees. Two days' rations for all official evacuees were stored in the reception areas.

The estimated number of evacuable persons of the 'priority' classes in the evacuation areas was some 3,644,000, half being schoolchildren; and of this total 80 per cent. or say, 2,900,000 persons were expected to avail themselves of official evacuation.

As a guide to billeting, an accommodation standard of one person to every bedroom and living-room of a house was adopted. Some special schools were to go to camps, and 150 nursery schools, as parties, to large private houses.

The response from householders was such that offers to accommodate over 2,000,000 schoolchildren were received as against an 'expected' number of 1,400,000 to be evacuated. The cost of feeding and billeting the children, and of their medical attendance, was met by the Government, though contributions towards the cost of these allowances were to be called for where the family circumstances justified it. The combined 'London and outer-Metropolitan areas' formed the most difficult problem, as it occupied some 250 square miles and contained some 813,000 schoolchildren.

The vastness of the problem was increased by the decision also to evacuate the hospitals in the evacuation areas and to provide 'Obstetric Areas', defined according to the accessibility of maternity hospitals, for the reception of expectant mothers.

The Ministry of Health, which was at the same time preparing, on a gigantic scale, the Emergency Medical Services for air raid casualties, arranged with the local authorities for increased hospital provision for infectious diseases in the reception areas, and by agreement with the British Medical Association for the domiciliary treatment of evacuated children.

The Medical Research Council organised two central and twenty-three subsidiary emergency laboratories in the evacuation areas. Water supplies, sewerage, and drainage were increased in many areas.

The Board of Education, in May 1939 (Circular 1469) emphasised the risk of contagious and infectious diseases and the preventive measures (although these were primarily the duty of the Health Authority) in which the co-operation of the School Medical Service was essential. The contagious diseases—pediculosis, impetigo, and scabies—were regarded as likely to be the main problems at first, and in-patient as well as out-patient treatment of children, baths, and the disinfection and disinfestation of clothes and bedding would be required. An increase of the medical and nursing staffs, particularly for inspection for cleanliness and cleansing, was advised.

With regard to infectious diseases, the most imminent risk naturally seemed to be that of the epidemic spread of those whose seasonal

maxima occur in autumn, such as poliomyelitis, diphtheria, scarlet fever, enteric fever and dysentery.

The Board urged school medical officers, who in many reception areas were also medical officers of health, to plan the provision of emergency standpipes, ablution arrangements, latrines, and facilities for the disposal of sullage water in villages; to undertake the examination of contacts; and to assist in any scheme of immunisation which the local health authority already had or might organise.

But this advice fell upon the ears of authorities and medical officers already overwhelmed by duties relating to air raid precautions and the treatment of casualties, to which precedence had been given both officially and by the general expectation of a period of intensive air bombardment at the outset of war. Fortunately, this expectation was not fulfilled; but in view of subsequent criticisms it should be remembered that all preparations were based on it and that it was almost universally held.

THE EVACUATION SCHEME AND ADMINISTRATIVE PROBLEMS DURING THE WAR

The declaration of war coincided with the end of the normal school holidays; the schools had not been re-assembled to enable the children to be examined for preparation for cleansing, and the School Medical Service had therefore been inactive for five weeks. In most of the evacuation areas its staff had already been largely transferred to the Emergency Hospital Service in expectation of immediate and severe bombing; this expectation had also influenced the decision not to re-assemble the schools for preparation.

Exodus. On Thursday, August 31 evacuation was announced for the next day. On Friday, September 1 the main bulk of the schoolchildren, with their teachers and helpers, and on Saturday mothers and accompanied children, and the few remaining schoolchildren were moved. When war was declared on September 3 nearly all the children who availed themselves of the move were already in reception areas. Some 80,000 persons from the Metropolitan and outer-Metropolitan areas, including schoolchildren, expectant mothers in their later months, blind and deaf persons, and some special schools, travelled by motor bus. Some 23,000 persons, mostly schoolchildren, were taken by steamboat from the Thames to Norfolk and Suffolk, and conveyed inland by motor bus after disembarkation at Lowestoft and Yarmouth. The rest travelled by train from many emergency railheads, to avoid congestion at termini. The whole movement, which was finished on Monday, September 4, was a miracle of organisation. Trains arrived on time, and there was scarcely a casualty. Transport officials, guards, porters, bus drivers and conductors, teachers, escorts, receiving and billeting officers, showed the utmost resource and kindness. The behaviour of the children during

the long and tiring day was exemplary. Ordinary traffic was somewhat interfered with, but a substantial skeleton service was run for ordinary travellers, who suffered little inconvenience. The English climate, kind for once, materially assisted, both in the exodus and in the settling-in process, with a spell of perfect weather. The achievement was one which no other nation could have surpassed, or carried through in a more kindly and cheerful way.

Billeting, on the whole, was successful, particularly as regards unaccompanied children who were sorted out, despatched to the receiving towns and villages, and thence distributed to their billets, generally with a minimum of delay.

The evacuation of two small but important groups of children must be mentioned. Thirty camps (22 of them privately owned holiday camps) were occupied on evacuation by handicapped children (deaf, cripples, heart cases and mental defectives) who could not be billeted either in the interests of the children themselves or in those of householders. The total number of such children who left London, Birmingham, Newcastle, and Gateshead for these camps was 5,087. Further, some 55 day and 36 residential nurseries, normally containing about 2,400 and 1,500 children respectively, and 59 nursery schools, with a normal accommodation of about 3,500, were evacuated as units, mostly to large country houses.

Numbers. The total evacuable population in the areas zoned for evacuation had been estimated as some 3,644,000, of whom half were schoolchildren. The decision had been, however, left to parents, and less than half had been willing to send their children. In the event, only some 1,270,000 persons, not much more than one-third of the total evacuable population, went to the reception areas under the official scheme. Of these, 734,883 were schoolchildren, who not only formed by far the most numerous section, but were also the more permanent settlers and owing to their school attendance were brought more intimately into contact with the 'native' children. Large numbers in addition went in the voluntary evacuation.

Far larger numbers of schoolchildren were, however, materially affected by evacuation than those actually moved, either under the official scheme or otherwise. The daily environment of those who stayed behind in, or drifted back to, the evacuation areas was profoundly changed by the complete closure of schools in these areas. In the neutral areas many schools were closed for many weeks, some were overcrowded, others worked on double shift. In the reception areas the 'native' children were working half-time in consequence of the double shift.

In round numbers, official evacuation increased the school population of the reception areas by 735,000 from 1,958,000 to 2,693,000, and thus diminished that of the evacuation areas from 1,914,000 to 1,179,000. Unofficial evacuation increased the change, but by how much it is hard

to say. The neutral areas containing 1,070,000 schoolchildren, though officially unchanged, were affected by a considerable amount of unofficial evacuation.

The impact of the great Metropolitan and outer-Metropolitan evacuation of 366,800 schoolchildren naturally was most felt in the Home Counties. Surrey was zoned into evacuation, neutral and reception areas. Dr. Ferguson, the County Medical Officer of Health of Surrey, reported that the school population in the county's reception areas received evacuated schoolchildren equal in number to 93 per cent. of its 'native' schoolchildren, as well as a number of younger children under 5 ('accompanied') equal to 43 per cent. of the estimated under 5 'native' children. Surrey in mid-January 1940 still retained 76 per cent. of its evacuated scholars, a good proportion when its proximity to their homes is considered; Sussex (East) with the accommodation afforded by its great holiday towns naturally received a number (43,444) greater than any other receiving area, Kent being next with 38,054. Some counties far from London received comparatively small numbers of schoolchildren (Cornwall, for example, had 1,250) and military requirements diminished the numbers of billets which some reception areas could afford for civil evacuees.

The evacuation areas also varied much in the proportion of children sent. London, which was 'wholly' evacuable sent 48 per cent. of its estimated school population, Manchester rather more than 66 per cent., Sheffield only about 10 per cent.; both Manchester and Sheffield were 'zoned' areas, but this does not account for the striking difference.

The Drift Back and Subsequent Evacuations. The air attack, so surely expected, did not come, and months passed without an alert. The drift back set in almost at once, that of the schoolchildren, though large, being much less than that of any of the other priority classes. Hastened by the beginning of billeting payments by parents at the end of October and later by Christmas, 344,000 children had returned to their homes by January 1940. As the absence of air attack continued for some months the drift back had compensations, for many 'difficult' children returned home; moreover, it relieved overcrowding, facilitated appropriate billeting, and left in the reception areas those children easiest to billet and most likely to benefit.

The rate of return varied enormously, children from the poorer areas went home more rapidly than the others; while nearness to home, the relative safety of the reception and evacuation areas, and the social customs of the respective areas, all seemed to be factors. Thus, while one-third of the children evacuated from London had returned by January 1940, two-thirds of those from Gateshead, West Hartlepool, Wallasey, Sheffield and Walsall were already home. The reception areas varied greatly in their retaining power. Devon, Somerset, Kesteven (Lincs.), Surrey, Oxford, Wiltshire and Suffolk West, still retained

three-quarters of the schoolchildren evacuated to them in January 1940, whereas Rutland had kept 27 per cent. and Blackpool 12·6.

Before dealing with the difficult problems which faced the School Medical Service immediately after the first evacuation, it will be convenient to describe the course of subsequent waves of evacuation.

In February 1940, the Government announced a second scheme, restricted to schoolchildren. Parents were asked to register their children for it before the end of March on the understanding that the children would not be sent away until bombing had begun, and that the parents by registering undertook to send them with their school parties and leave them in the reception areas until their school party returned. Some 1,100,000 children were still in the evacuation areas, and the scheme arranged for the registration, medical inspection, labelling to show for what type of billet the child was suitable, necessary treatment and cleansing of 550,000 children; but by June only 239,000 had been registered. The reception authorities were asked to arrange for a further rapid inspection on arrival, rapid dispatch to appropriate billets and the preparation of hostels, with beds for 2 per cent. of the total number of children expected, and for children not immediately fit to be privately billeted. For this intensive medical examination and treatment, the local education authorities were empowered to augment their service by the temporary engagement of practitioners and nurses. The occupation of the Low Countries and the fall of France made all these measures the more urgent. In May 1940, 134,000 London children, who had been evacuated in the first evacuation to the East and South-east Coasts, were transferred to South Wales, and a week later the local children of the towns on these coasts were offered evacuation. Some slight bombing began in May and 138,000 registered children had been sent out by July. When the real storm broke in September 1940, a year later than had been expected, evacuation was again open to mothers with young children; and children were evacuated daily in parties, and later, three times a week. These movements entailed an immense number of inspections and treatment, which in June 1940, was accentuated by the examination and any necessary consequential treatment of 17,000 children of parents who wished to take advantage of the scheme for the evacuation of children oversea. Although only a very small percentage of these children had been sent oversea before this scheme had to be abandoned, these special examinations and treatments were by no means wasted. In February 1941 479,000 unaccompanied schoolchildren were in billets as well as 325,000 children (some probably schoolchildren) accompanied by their mothers. Later, however, the numbers fell because of the lessening of air raids on London, but evacuation was begun from cities such as Birmingham, Coventry, Manchester, Liverpool and Bristol, when they were heavily attacked, and some 123,000 children and 10,000 mothers with children were evacuated from these cities. The tendency to drift

back continued in ceaseless ebb and flow according to the persistency, fury or intermission of attack. In the evacuations of 1940 and 1941 the children had been carefully prepared and inspected before evacuation and complaints of verminous or contagious conditions were almost entirely absent, showing how well the School Medical Service had recovered and had learned from the experience of the first evacuation. The resumption of bombing in London in February 1944 increased the number of mothers and children and of unaccompanied children leaving London for the reception areas; finally, the coming of the flying bombs in June 1944 rendered obsolete the previous classification of areas and caused what may be called the fourth wave of evacuation.

The distribution of schoolchildren between the evacuating and receiving authorities had, indeed, been constantly changing with the various phases of the war. In the absence of the expected bombing, the mass evacuation at the beginning of the war was followed by a drift back of many children to their native cities. Just as, with the fall of France, and the fear of imminent invasion, there followed a second exodus from London and from the towns and neighbouring countrysides of the East and South-east Coasts which had been receiving children from evacuating authorities, so when the attacks by flying bombs caused another wave of evacuation, cities in the north, such as Birmingham and Sheffield, which had been evacuating areas but now were more or less immune, became receiving areas.

In this fourth wave of evacuation from the Metropolitan evacuation area, extended because of the new danger, 101,000 unaccompanied children were evacuated under organised arrangements, as many as 37,000 going in organised parties on a single day, and by the end of September 1944 officially billeted evacuees numbered 1,012,700, including 284,000 unaccompanied children.

These later evacuations, like those of 1940 and 1941, although there were new and increasing difficulties due to rationing, shortage of household equipment and the wider employment of women, were all from the medical point of view, much more satisfactory than the first evacuation of 1939, the children being thoroughly inspected and cleansed before departure, so that there were hardly any of the complaints of verminous or contagious conditions which had caused such distress in the first evacuation. As Dr. J. R. Mitchell, School Medical Officer of Birmingham, wrote in his annual report for the year 1944: 'Great credit is due to the medical services of the despatching areas for the good condition of the majority of the children and the adequate medical notes accompanying them'. And Dr. H. M. Cohen, of Sheffield, reported that in 3,412 accompanied and 834 unaccompanied children only 26 heads were found to be infested with lice and 182 with nits. A different story from that of the evacuation in 1939 to which some reference must now be made.

IMMEDIATE PROBLEMS FOLLOWING FIRST EVACUATION

Evacuation took place at the end of the summer holidays and cleanliness inspections had not been made for at least four weeks. There seems to have been two reasons why medical inspection, treatment and cleansing were not then done as they were for subsequent evacuations. The fear of immediate and severe bombing gave rise to the decision not to assemble schools for longer than was absolutely necessary, that is the actual assembly for evacuation, and there was also the feeling that no child could be refused evacuation on account of what seemed to be minor conditions, which could be dealt with on arrival in the reception areas. It was easy to be wise after the event and to see how much better it would have been to assemble the schools a week earlier; and so, at least, to have tried to carry out the intensive examination and treatment which were done for later evacuations.

Reception Areas. But the addition of three-quarters of a million uninspected schoolchildren, who had been four or five weeks out of school, to the nearly two million local schoolchildren in the reception areas put a great strain on the School Medical Services in these areas. The strain was unequally distributed, and even in some reception areas where the service was strong and well organised the addition of a number of schoolchildren nearly equal to the native school population (as well as children under five nearly equal to half the resident under-fives) gave rise to difficulty, though in these areas it was tackled effectively and quickly. In some of the more remote and rural reception areas, where the service had in peace-time been barely sufficient, where little had been done, and few or no hostels prepared, complaints soon became clamant, lack of social training in the ordinary decencies, enuresis, pediculosis and impetigo being the main causes. Such revelations shocked the public conscience, the unbilletable minority gaining much more notoriety than the great majority of well-behaved children who settled down happily with their foster parents. A few of the evacuating authorities sent medical officers and school nurses with the children or a little later. Most, however, retained their medical and nursing staffs for the casualty services. To cope with these difficulties the school medical officers visited schools and passed all children under rapid review, nurses carried out frequent cleanliness surveys and where clinical facilities were insufficient, temporary ones were provided, often at first-aid posts. In some areas gas-cleansing posts and showers were used. Hostels for impetigo, severe pediculosis and specially for enuretic children were hastily improvised. The Red Cross Society, St. John Ambulance Association and the Women's Voluntary Services gave assistance, and these acute problems, of which the solution was, as has been seen, somewhat helped by the drift back of many of the more troublesome children to their own homes, were resolved. In a relatively short time the School

Medical Service in the reception areas was able to function more normally.

Evacuation Areas. In these the School Medical Service was entirely suspended; the medical officers were in hospitals or aid posts; the nurses had gone in charge of special parties, or as maternity nurses, or to casualty hospitals; two-thirds of the school buildings had been taken over for civil defence and the other third were closed; nearly all the teachers and every available social worker had gone with the evacuated children. But only half, or less, of the children had gone, the other half were still in the evacuation areas, having no school, no school meals or milk, and no medical service. There was also a fear that to resume services in the evacuation areas would encourage the children to return to them.

By January 1940 conditions in the reception areas, eased by the drift back, had been greatly improved by the exertions of the receiving authorities, aided by staff sent by the evacuation authorities. As the immediate peril of bombing was seen to have receded, attention became focused on the many children left in or returned to the evacuation areas, whose condition without schooling, school meals or milk or school medical service was deteriorating. The Board of Education urged that an intensive effort should be made to provide again the school medical services, especially as regards cleanliness. There were some 180,000 children in London, and with the return of the school medical and nursing staffs who had been lent to the hospital service, school medical service was resumed, 38 out of the 80 pre-war treatment centres being re-opened. Cleansing, medical and dental treatment and the provision of meals and milk were reinstituted. Though there was some deterioration in cleanliness and nutrition, it was much less than might have been expected. From April to July 1940 attention had to be concentrated on the registered children.

Neutral Areas. In these, many schools were closed pending the provision of shelters, and some of the school clinics had been appropriated as aid posts.

Staffing of the School Medical Service. The records of the staffing of the School Medical Service do not give a true picture of the difficulties the authorities had to face in keeping the service at a reasonable level of efficiency. Although for the first eighteen months the service in many areas was comparatively little affected by the call-up of medical officers for the Armed Forces, many school medical officers and their assistants were seconded for part-time or full-time Civil Defence or other urgent duties, and these changes in their work were not recorded by the Board of Education, which did not at that time require authorities to report such changes in their staff. Again, many authorities were able to replace medical officers who had been called up, by elderly and retired medical men. While these kept up the numerical strength of their medical staff, the functional strength inevitably decreased.

By 1941 the medical man-power situation in the Services became critical and the Board gave an undertaking to the Medical Personnel (Priority) Committee not to oppose the recruitment of any medical officer engaged full-time on school duties who was liable for service with the Armed Forces. There was only one exception—the full-time school medical officer of a large industrial city. Authorities generally accepted this decision with good grace, though some lost a half to two-thirds of their effective medical personnel.* Other authorities, whose medical staff were mostly over military age, were but little affected.

Modifications in Routine Medical Examination. The Board in December 1939 (Circular 1490) urged upon local authorities the importance of resuming a school health service comparable with that of peace-time. But later (Circulars 1559, July 1941, and 1604, August 28, 1942) the need for the utmost economy in medical man-power was emphasised and suggestions were made how best to utilise a diminishing medical staff. Among them were:

(*a*) the routine inspection of 'intermediates' should be discontinued; the routine examination of entrants and, so far as practicable, that of children in their last year of school life should continue;

(*b*) rapid surveys of children by doctors or nurses should be undertaken as often as practicable, to compensate for the reduced number of full inspections by medical officers;

(*c*) unqualified women should be appointed for cleanliness work to relieve the professional nursing staff;

(*d*) the medical and nursing staffs of adjacent areas should be pooled where possible.

Suggestions (*a*), (*b*) and (*c*) were adopted by many authorities, and while others devised further modifications some soon returned to pre-war methods.

Whether the 'rapid survey' system had an adverse effect on the efficiency of the service is hard to say. Whether it resulted in an economy of the medical officer's time, depended on the number of special cases referred, which varied much with different head teachers. In rural areas, if such a system were carried out really thoroughly, the total medical and nursing staff required would probably equal that needed for the examination of the ordinary three age groups. But in urban areas, the more elastic system made it possible to carry on a supervisory service with diminished staff more efficiently than by trying to retain the routine inspection of three age groups.

* From 1938 to 1945 the numerical strength of the service in medical officers and assistant medical officers decreased thus : whole-time 315 to 147; part-time 1,203 to 997. In dental officers the numbers fell thus : whole-time from 425 to 317; part-time from 584 to 408. The fall in the whole-time equivalent of school nurses (including district nurses) was about 12 per cent.

PROBLEMS ARISING FROM INFESTATION

Pediculosis. In recent years hardly any body lice have been found in this country either in schoolchildren or among the general population, except in vagrants, but the prevalence of head lice among city children came as a great shock to the foster parents in the reception areas after the first evacuation, and gave rise to much merited criticism. Before the war official figures showed that school nurses found each year nearly half a million children, or nearly 10 per cent. of those in attendance at public elementary schools, to be verminous, though in many cities less than 5 per cent. were recorded as showing any signs of infestation. The incidence varied much from area to area, depending not only on the prosperity, density and type of population and housing conditions, but also on the thoroughness with which the children's heads were examined by the nursing staff. It was far higher in the poorer, older and overcrowded parts of our cities than elsewhere and, as in the 'zoned' cities these parts were invariably included in the evacuation areas, it was only to be expected that the evacuees would show a higher incidence than that of the school population of the country as a whole, or, indeed, than that of the city from which they came. In West Suffolk the incidence was 32·49 per cent. in children evacuated from London, in Shrewsbury it was 31 per cent. in children from Liverpool and in children evacuated from the Metropolitan Boroughs it ranged between 4 per cent. and 45 per cent. There were practically no cases of body lice in school children; but it was obvious that head lice were much more prevalent than had been recorded in the school medical service reports.

At the request of the Minister of Health and the President of the Board of Education an inquiry was, therefore, made by Dr. Kenneth Mellanby in regard to the incidence of head lice. But before Mellanby's report[4] was completed, the Ministry of Health, in January 1940, by a memorandum 'The louse and how to deal with it', stimulated authorities to take further action by more frequent surveys in the schools and by augmenting the staffs of trained nurses by suitable, though unqualified, helpers in this work. Dr. Mellanby's investigation was based on the records of patients admitted to hospital (normally an infectious diseases hospital) as to whether the patient was infested with nits or with living lice, or was free from both. An examination in such circumstances was more thorough than any school medical examination could be, inasmuch as each patient remained in hospital for some time, and was inspected on several occasions, and so was subject to a strict control.

The sample thus taken contained more than an average proportion of young children coming from poor and overcrowded houses, and most of them had been ill for some days before admission. The analysis of some 60,000 cases showed that a high degree of infestation with head lice existed in the industrial cities, but that infestation with body lice

was rare; that girls were more frequently infested than boys; that the highest rate was in pre-school age children (a new finding of great importance); that the rate in the rural counties was very low; and that in the industrial cities, infestation in girls reached 51·6 per cent. at three years old, remained with but little decrease until the age of 14 years, and even persisted in a considerable percentage of girls over that age. In boys also in these cities the peak occurred in the fourth year, when over 40 per cent. were infested, but the incidence then steadily declined with age to a very low level with young male adults. High rates were also found in children evacuated from great cities, and subsequently admitted to fever hospitals in the reception areas, while at the same time the infestation rate in native children remained low.

The report thus showed that the peace-time incidence of pediculosis had been much under-estimated and that in the high infestation rates of children under 5 and of girls over 14 there was a great reservoir of infestation beyond the reach of the School Medical Service, so that even when a child had been cleansed by the school authority, she was often immediately re-infested in her home.

War accentuated the conditions which kept this reservoir full. Employment of women, the time taken in shopping queues and the innumerable difficulties which confronted housewives during war inevitably reduced the attention which mothers could give to their children, while shelter life and the destruction of many houses contributed to the problem in the cities.

The increased attention paid by all classes of girls and women to hairdressing had not, unfortunately, had the good effect in reducing the infestation of older girls that might have been expected. The cost of permanent waving often meant that visits to the hairdresser were infrequent and, at the same time, the regular weekly washing and daily brushing and combing were omitted for fear of spoiling the wave.

J. R. Busvine and P. A. Buxton pointed out that an essential point in control was that if a person lived among others who were infested it was of little use simply to cleanse the head for it quickly became reinfested; what was needed was an insecticide which would remain effective in the hair so as to 'proof' the individual for as long as possible. To this end they recommended three preparations for the control of head lice, namely: 25 per cent. technical lauryl thiocyanate in a white oil; 50 per cent. Lethane 384 'special' in a similar oil; and a derris (7 per cent.) cream. The advantages claimed for these remedies were the low cost, the small volumes required for individual treatments, and, provided the head was not washed, the protection afforded against reinfestation, for even if the drug were not efficiently applied and a few eggs escaped, the larvae hatching from them would almost certainly be killed as they moved about the scalp.[5]

After extensive clinical trials of these preparations among recruits for the women's services and schoolchildren, much laboratory work and stringent investigation of their toxicity by Professor G. R. Cameron, it was decided that while all three were efficient insecticides, the preparation of choice was the 50 per cent. Lethane hair oil.

In an emergency calling for speedy mass disinfestation (e.g. to combat typhus) immediate application of the hair oil without preliminary shampoo and combing would be justifiable and effective. But this method is not suitable for routine use in the school medical services or for 'compulsory cleansing' within twenty-four hours. Removal of nits seems necessary before evacuation, or before an excluded child returns to school, for nits, even if dead, are always suspect; the ordinary processes of cleansing should always precede the application of the hair oil, which application will inhibit reinfestation and allow time, where necessary, for family contacts to be disinfested.

Owing to dollar exchange difficulties, however, Lethane seemed likely to be unobtainable, and in a search for a suitable substitute an emulsion of $2\frac{1}{2}$ per cent. of D.D.T. gave better results than a 2 per cent. of D.D.T. plus 0·2 per cent. of pyrethrins, and a dilute emulsion (0·2 per cent.) gammexane gave promising results. All seemed free from toxicity.

Scabies. Scabies, notoriously a war disease, was very prevalent in 1914–18, but died down rapidly until by 1924 it had become a comparatively rare disease. The incidence, judging by London elementary schoolchildren, began to rise about 1927, so that it was nearly as prevalent in 1938 as in 1920. The rate of increase had accelerated before the war, but there was a still more abrupt rise in 1940, evacuation, shifting of industrial population and shelter life all helping to bring the incidence to a peak in 1942–3. In Leicester, for instance, in 1942 nearly 10 per cent. of elementary schoolchildren were infected—an exceptionally high proportion. In the same year, the rate in Birmingham schoolchildren was about 5 per cent.

In November 1941, under the Defence Regulations, the Minister of Health made the Scabies Order,[6] which gave the local education authorities additional powers to deal with scabies and verminous conditions generally. Having regard to the fact that scabies in civil life is really a family disease, and that when a child suffers from scabies, it is probable that other members of the family will also be infested, medical officers of health were advised that when a case of scabies occurred in a house the whole family should, if possible, be treated at the same time. Later, sanction was given to local authorities to make scabies a notifiable disease if they possessed the necessary facilities for diagnosis and treatment, and scabies became a notifiable disease in the County of London and in the areas of thirty-four local authorities.

A number of memoranda on the prevalence and control of scabies were issued in 1942 and 1943 by the Advisory Committee on Scabies

convened by the Ministry of Health, with Dr. A. M. H. Gray (afterwards Sir Archibald Gray) as chairman. A sound film dealing with the differential diagnosis and treatment of scabies for doctors, nurses, health visitors, sanitary inspectors and medical orderlies was made by the Ministry of Information in 1943 for the Ministry of Health, and, with the help of the British Medical Association, was widely shown to selected audiences throughout the country.

Treatment. The method of treatment advocated by the Advisory Committee, and which was adopted by most authorities with conspicuous success, was the application of benzyl-benzoate emulsion (25 per cent.), after a hot bath for ten minutes (or a shower-bath for five minutes) washing with soap and a rough flannel (but not a scrubbing-brush) and then rinsing the soap off. Afterwards the patient is dried in a warm room and the emulsion is applied over the whole body with a flat paintbrush, 1½ to 2 in. wide, and allowed to dry. The patient then puts on clean underclothing. The treatment is repeated either on the next day or within eight days. After the first treatment with benzyl-benzoate emulsion there is no medical reason for excluding a child with uncomplicated scabies from school.

Views on the sterilisation of clothing have undergone a change in the light of investigations by Dr. Kenneth Mellanby. He has shown that the importance of clothing and bedding as a means of dissemination of scabies has been much over-estimated, and in February 1943 the Ministry pointed out that in view of the small reinfestation or relapse rate which occurred when disinfestation was abandoned, it was simpler to repeat treatment in such cases than to expend the amount of manpower and material required on routine disinfestation in all cases. Emphasis was rather to be laid on the follow-up and treatment of family and other close contacts of the original patient including children of other families who were playmates with an infected child. Disinfestation was therefore not necessary as a routine procedure, though it might be justified when there was a high incidence of scabies among people living in overcrowded conditions occasionally using communal bedding and clothing. The parasites are killed comparatively easily and by very moderate temperatures, and ironing with an ordinary hot iron is quite effective for clothing or blankets.

Ringworm. One of the triumphs of the School Medical Service had been the enormous reduction in ringworm of the scalp which had been a major problem when the service began in 1908. During the war, however, epidemics occurred in war-time residential establishments for children as well as in the elementary day schools in some areas, notably Lincoln, Leicester, Portsmouth, Stoke-on-Trent, and certain districts in Hampshire and Warwickshire. The increase in ringworm was not general like that in scabies and in many areas the number of cases did not rise above the pre-war level.

Dr. J. T. Duncan, while at the Emergency Public Health Laboratory, Winchester, carried out an investigation by culture methods of the material from unselected cases of ringworm sent from many different parts of England. Some 265 cultures of ringworm were isolated, of which 154 belonged to 'animal' types and 111 to 'human' types. The genus *microsporum*, to which ringworm of the scalp in children is almost always due, was found in 211 cultures, 89 or 42·2 per cent. being of 'human' type (*M. audouini*) and 57·8 per cent. of 'animal' types, viz., *M. felineum* (35·1 per cent.) and *M. lanosum* (22·7 per cent.). J. G. Hare and P. Tate (1927) found that in London elementary schoolchildren with ringworm of the scalp 78 per cent. were due to *microsporum* types and of these 89 per cent. were due to *M. audouini* and only 2 per cent. to *M. felineum* and 2 per cent. to *M. lanosum*, 7 per cent. being due to various other species.[7] Dr. Duncan found that the *microsporum* types occurring in the Midlands and North were almost exclusively *M. audouini*, while in the south the 'animal' types predominated.

Dr. Roberts, in the School Medical Officer's (Dr. A. Williamson) Report for Portsmouth for 1945, co-operating with Dr. Duncan, showed that in Portsmouth the predominant infection was due to *M. lanosum*, whereas in the adjoining areas of West Sussex and Hampshire *M. audouini* was the commonest type. In the cases due to *M. lanosum*, contact with an animal, usually a cat suspected of suffering from some skin disorder, was traced in about a quarter of the cases.

Treatment. In the treatment of ringworm of the scalp, depilation by X-rays and subsequent application of a 1 per cent. ammoniated mercury ointment or Whitfield's ointment remained the method of choice. X-ray depilation is, however, not without risk of imperfect regrowth and should be administered only in a properly equipped skin radiotherapy department with trained technical staff. 'The occasional treatment of a sporadic case in a department normally devoted to other purposes is strongly to be deprecated.'[8]

Depilation by thallium acetate has never been approved by the Board, now the Ministry, of Education.

Impetigo. This highly infective condition gave much trouble in the early days of evacuation, and in some areas the number of infected children was such that special hostels became necessary for its treatment. Both pediculosis and scabies may lead to a secondary impetigo. The most successful treatment appeared to be the application of a 5 per cent. sulphathiazole ointment four or five times a day after a thorough removal of crusts.

ENURESIS

Troublesome as were these contagious skin diseases, enuresis gave rise to almost as much difficulty, and few authorities foresaw the extent of the problem which would be caused by it.

Even among older children it occurred far more than had been expected. The excitement of the time and journey, separation from the parents, entirely different environment and unfamiliar closet accommodation produced a large crop of temporary enuretics who speedily regained control if happily settled. Often, however, the condition seemed chronic. Enuresis is not readily revealed by parents, nor in peace-time is the advice of the school medical officer often sought. The normal incidence in public elementary school children at home is estimated at about 3 per cent. While local predisposing conditions may occasionally be found in chronic cases of enuresis, most cases are of neuropathic origin.

Bladder control during the night should be a part of every normal child's social training, and defective social training may therefore lead to enuresis and the behaviour troubles so often associated with it; but enuresis was not confined to children from bad homes. Treatment consists in trying to establish a normal emotional relationship between the child and his environment, and may be accomplished by a change of environment, by direct treatment or by both. Treatment in a sick bay or hostel was often effective, but to segregate enuretics in special hostels for long periods, as was sometimes done, was not good treatment. Most enuretics cleared up promptly with understanding treatment, and many of the others returned home.

DIFFICULT CHILDREN

The problem of the difficult child, which for some years prior to the war had been of concern to educational authorities was intensified by evacuation, placing the inherently unstable child in a strange and sometimes unsympathetic environment, and increasing the apparent number of difficult children, who, particularly the older ones, set the reception authorities a problem not unlike, though numerically less than, that of enuresis.

Dr. Susan Isaacs, in the *Cambridge Evacuation Survey*, 1941, found that at least 2 per cent. of children were unsuitable for private billeting on account of nervous symptoms or behaviour difficulties.

Many of these difficult children returned early to their homes in the evacuation areas. The real 'problem' child, though much less common, also presented an acute problem in certain areas which is referred to later. (See section on Child Guidance.)

SICK BAYS AND HOSTELS

At the outset of evacuation few reception authorities had prepared any or sufficient accommodation to receive children unfitted by infestation, enuresis or behaviour for billeting in ordinary houses, and it was immediately obvious that hostels for children with these conditions and sick bays for those suffering from minor maladies were essential. The

duty of providing both was laid upon the health authorities but their work was of course intimately linked with that of the School Medical Service. In later evacuations it was advised that beds equal in number to 2 per cent. of the evacuees should be maintained. The sick bays became, in general, well run and happy places and call for little comment. The hostels for difficult children are dealt with later (Child Guidance Section).

OTHER TREATMENT SERVICES IN WAR-TIME

Though inspection had to be sacrificed to a certain extent, the authorities strained every nerve to keep the treatment services in full operation, and generally it may be said they succeeded. Indeed, certain forms of treatment such as child guidance and speech therapy underwent considerable expansion during the war years.

Clinics for the treatment of diseases of the eye and defective vision, for diseases of the ear and defective hearing, and for orthopaedic defects, though in many instances temporarily dislocated by the calling-up of specialists for the Defence Services, carried out during the years 1939 to 1945, a volume of work which compared favourably with their output in normal times.

In Salford and Richmond, 'foot clinics' were established specifically for the treatment of school children.

In Bristol, where such a clinic was opened under the direction of a member of the Incorporated Society of Chiropodists, who worked in a voluntary capacity, the number of children treated in 1943 was 308 (treatments given 1,324) which in 1944 increased to 416 (treatments given, 2,115). Verruca headed the list of conditions treated in both years—114 in 1943 and 192 in 1944. Other conditions were hammer-toes, metatarsalgia, pes cavus and foot strain. Thirty cases in 1943 were referred to the orthopaedic department. In Salford, a 'foot clinic' under a qualified chiropodist was established in 1945 by Dr. J. L. Burn. Here again, the great prevalence of foot warts was noted. These were treated by the application of corrosive lotions and ointments which were painless and interfered little with school time. Severe cases were referred for local X-ray treatment to the local skin hospital, or for curetting, etc., by the dermatologist appointed to the School Medical Service. In view of the large number of children who wear ill-fitting shoes, the educational work of the chiropodist was very valuable and the co-operation of the shoe retailer along with that of the parents seemed necessary to make a practical advance in dealing with a serious problem.

The establishment of 'foot clinics' in charge of chiropodists as an extension of the School Health Service seems to be well worth the consideration of local education authorities. It is essential that the work of the chiropodist clinic should be linked up with that of the orthopaedic staff and the dermatologist.

The importance of the prevention or early correction of foot trouble is shown by the fact that, between June 1939 and December 1946 nearly a quarter of a million recruits (or 3 per cent. of all men examined) were put in Grade IIa on account of foot trouble or deformity; some 104,000 of them were under 25 years of age. Three per cent. of all women examined for the Services were placed in Grade IIa for the same reason.

DENTAL TREATMENT

In the early months of the war school dental work was often carried out under difficult conditions. Many schools were closed; some clinics were taken over to serve as first-aid posts while those which continued in operation as clinics were often made gloomy by the erection of blast walls and by blackout arrangements. Afternoon sessions had to be shortened so that children could reach home during the hours of daylight. There were often temporary uncertainties about the adjustment of expenditure between evacuating and receiving authorities, and these gave rise to doubts about the scope of treatment which could properly be carried out for evacuated children. In rural areas petrol rationing was often a problem for the dental officers of county authorities, since the conveyance of their equipment made it difficult for them to use trains or buses instead of a car. As the war progressed, many of these difficulties were overcome, but, in certain areas, some remained problems until the end.

One specially awkward problem caused by evacuation was the difficulty in some cases of getting in touch with parents to obtain their consent to the treatment of their children. The Board of Education advised that if there was evidence that the child had received dental treatment in the past, it might be assumed that the parent would raise no objection to any necessary further treatment. If, however, there was evidence to suggest that the parent had in the past consistently refused dental treatment for the child, emergency treatment only should be given. Information was not available to show what proportion of authorities applied this procedure, but the Board of Education never received a complaint from a parent about the dental treatment of an evacuated child without consent.

The recruitment of school dental officers, as of other dental practitioners, was controlled by the Central Dental War Committee. This committee decided that a local authority's senior school dental officer ought to be retained in the School Dental Service, but, otherwise, school dentists were recruited on exactly the same basis as private practitioners. No powers were available to the committee to prevent the movement from one authority to another or to private practice of officers who were for the time being above recruitable age, and there was therefore depletion of staff in some areas, but in few was it really serious. Many local authorities were able to obtain the services of

private practitioners on a part-time basis, of alien dentists, or of newly-qualified dentists who, for medical reasons, were not accepted for service with the Armed Forces.

One factor tending to ease the burden on those remaining in the School Dental Service was the war-time reduction in the incidence of dental caries. The statistical evidence for this reduction is scanty and it is therefore difficult to indicate its precise extent. There is, however, no doubt that it was substantial. Another dental disease, ulcero-membranous gingivitis, which affected many adults, did not constitute a serious problem for the School Dental Service, and no information was received of the occurrence of an outbreak on a large scale among school children.

The Interdepartmental Committee on Dentistry. In the early part of 1943, the Minister of Health and the Secretary of State for Scotland appointed a committee under the chairmanship of Lord Teviot, to consider and report upon:

> The progressive stages by which, having regard to the number of practising dentists, provision for an adequate and satisfactory dental service should be made available to the population.
>
> The measures to be taken to secure an adequate number of entrants to the dental profession.
>
> Existing legislation dealing with the practice of dentistry and the government of the dental profession.
>
> Measures for the encouragement and co-ordination of research into the causation, prevention and treatment of dental disease.

The committee made an Interim report in the latter part of 1944[9] in which 'a big expansion of the dental services available to school children' was regarded as "one of the essential foundations of a comprehensive service'. The committee continued its deliberations for another year, but its final report was not published until after the war, in 1946.[10]

NUTRITION

'A satisfactory state of nutrition in the child is the first essential to sound physical health.' . . . 'Defective nutrition stands in the forefront as the most important of all physical defects from which school children suffer.'[11] These great truths were for long honoured only in that malnourished children were fed to prevent waste of educational funds in the attempt to teach children, who, as the Education (Provision of Meals) Act, 1906, stated, 'are unable by reason of lack of food to take full advantage of the education provided for them'. But, in later pre-war years, unemployment in the early 1930s had drawn special attention to the nutrition of school children in the distressed areas; and the milk-in-schools scheme, begun in 1934, had heralded the revolution in school feeding which the Second World War was, at last, to bring about.

Thus it was that when food rationing, begun in January 1940, became severe in June of the same year, there was a growing apprehension lest

the nutrition of the children, already indirectly threatened by the disturbances of evacuation, loss of sleep, black-out ventilation and shelter-life, should deteriorate with the rationing of many foods, monotony of diet, and the increased prices of the foods still unrationed.

Advisory Committee. When early in 1941, therefore, a new Standing Committee on Medical and Nutritional Subjects was set up with the Chief Medical Officer of the Ministry of Health and Board of Education as its chairman, one of its principal duties was to keep constantly under review the state of nutrition of the population (and especially of the priority classes, including the school children) by means of surveys made by clinicians specially experienced in nutritional defects.

Haemoglobin levels were studied by the Medical Research Council at the request of the Ministry of Health.

Studies of the measurements and particularly of the growth rates of schoolchildren living in camp schools, compared with those of children living at home in the areas from which the camp school children came, were begun in 1940 by Dr. E. R. Bransby for the Ministry of Health and Board of Education, and were continued up to 1945. Whether advantage could be gained by the addition of vitamin concentrates to the normal diet of school children was also investigated.

Close attention was given to the annual reports of school medical officers, their assessments of nutrition and the recordings of average measurements; unfortunately, these reports were much less full than usual, and many authorities ceased to weigh and measure their children, though a few continued to furnish valuable special sections on nutrition.

Some of the factors tending to depress the children's nutritional state have already been mentioned, but other factors were introduced as the war went on which tended to maintain it—the supplementary rations, the increased provision of school meals and school milk, the improved nutritive qualities of the national bread and flour, and the increases in the employment and income of parents. Evacuation, though in many ways a disturbing factor, gave a great number of town children the benefit of change of air and diet, which for many was repeated several times. These things so far offset the adverse factors that, notwithstanding a period of anxiety during 1940–1, the nutrition in public elementary school children was well maintained throughout the war. Indeed there is some evidence that it may have improved—evidence derived from special surveys, reports of school medical officers, studies of average heights and weights, and of growth rates, and from other sources.

Special Surveys. These were begun early in 1942 for the Ministry of Health by Professor V. P. Sydenstricker of the University of Georgia, whose services and wide experience in deficiency conditions were secured through the generosity of the Rockefeller Foundation; he was followed by Drs. Hawes, Stannus, Adcock and Fitzgerald, all of whom had had special experience in deficiency diseases in the Colonial Medical

Service. No sure evidence of deficiency was found in some 20,000 persons of all ages, although many whose cases were thought suggestive of deficiency disease were submitted to special therapeutic tests in addition to those applied in the method of clinical survey now described.

Method of Clinical Survey. The clinical examination classified those examined into 'good', 'fair' or 'poor'—the first category corresponding to a combination of the first two categories, A-excellent, B-normal, used in the Ministry of Education method of clinical assessment. In addition the child was examined for many criteria, such as folliculosis, ichthyosis, petechiae, cheilosis, angular stomatitis, stomatitis or apthae, abnormal tongue conditions, fluorosis and caries, gingivitis, pyorrhoea or bleeding gums, blepharitis, injection of the conjunctivae, pinguecula, or vascularisation of cornea, tender muscles, oedema or diminution of co-ordination and vibratory sense in the limbs.

All these conditions are, in varying degree, 'pathological' but some are often to be found in the apparently well nourished. Their correlation with the nutritional grade was investigated by Adcock, Hammond and Magee. Three of them—folliculosis, gingivitis and corneal vascularisation —were selected for tabulation (see Table I) because they were regarded by some authorities as potential evidence of specific deficiency.

Folliculosis or Follicular Hyperkeratosis. This sign had been considered just before the war and in the earlier war years as likely to prove a useful index of vitamin A deficiency, as a severe form of the condition ('phrynoderma') associated with a dry skin and 'staring' hair, is seen in countries where malnutrition is prevalent and is pathognomic of severe vitamin A deficiency. Nevertheless, in this country it proved useless, for it was recorded in 2,392 (23·3 per cent.) of the 10,243 schoolchildren examined in the special surveys, and was more often seen in plump, healthy and well developed adolescent girls than in other children, especially in cold weather. Feeding tests with high concentrations of vitamin A and other vitamins gave no result. Stannus[12] suggests that this form was not nutritional in origin but identical with keratosis pilaris, an unimportant condition. Magee[13] found its correlation with the clinical assessment of a child negligible.

Whether *gingivitis* could be regarded as an index of nutritional defect remained doubtful, some regarding it as partly due to a deficiency of ascorbic acid, others to a deficiency of the B2 complex. It was recorded in 10 per cent. of the children in the special surveys, and was very prevalent among the Gibraltarian children in London in 1941.

While the evidence that corneal vascularisation can be due to riboflavin deficiency seems fairly convincing, the few cases (95 or 0·9 per cent.) seen in school children in these surveys were probably either due to the other recognised causes, such as exposure to bright light, heat or cold, or to past rather then present deficiency of riboflavin. Of the total of 95 cases seen 85 were discovered in the 5,906 children examined

between June 1942, and May 1944, and only 10 in the 4,337 children seen between June 1944, and December 1945. In their series of 1,067 children Adcock, Hammond and Magee[13] found no correlation between corneal vascularisation and clinical assessment, and it seemed that nutritional assessment was determined mainly by the value placed on the grading criteria (posture, muscular development, etc.) and very little, if at all, by the presence or absence of such clinical signs as pityriasis, folliculosis, gingivitis and the others enumerated.

TABLE I

Special Nutritional Surveys of School Children

Percentages in heavy type underlined

Clinician	Period	Number examined	Good	Fair	Poor	Folliculosis	Gingivitis	Corneal vascularisation
Sydenstricker .	June 1942 to January 1943	2,047	**63**	**34**	**2·7**	**13**	**10**	**0·6**
			1,289	703	55	262	200	13
Hawes, Stannus and (later) Adcock and Fitzgerald .	January 1943 to December 1945	8,196	**88·6**	**10·6**	**0·8**	**26**	**10·6**	**0·1**
			7,260	870	66	2,130	814	82

The big difference between Sydenstricker's clinical findings and those of his successors, though in some small part due to the period in which the surveys were made, is mainly due to the fact that the poor districts, many of which were in Scottish cities, in which his surveys were made, had almost all been specially chosen, because they had long been economically depressed before the war, and it was thought that in them, if anywhere, would the first sign of deficiency appear.

On the other hand, the 8,196 children surveyed by his successors in areas not so selected gave fair cross samples of the elementary school children of England and Wales.

It has already been mentioned that clinical assessment as practised in the School Medical Service divides children into four groups: 'excellent', 'normal', 'slightly subnormal' and 'bad'. Comparative trial showed that the 'good' in the special surveys generally corresponded to a combination of the 'excellent' and 'normal' groups of the School Medical Service, the 'fair' to the 'slightly subnormal' and the 'poor' to the 'bad'.

On these assumptions, Table II compares the combined percentages derived from the special surveys in England and Wales with those from the annual reports of the school medical officers. Agreement is

closer than might have been expected; the higher percentage in the 'poor' category in the specialists' surveys is probably due to their more elaborate methods, including examination by the slit lamp, which requires special experience as well as an elaborate apparatus.

TABLE II

Comparison: Special Surveys and Annual Reports

Clinician	Period	Number of children assessed	Good (per cent.)	Fair (per cent.)	Poor (per cent.)
Special Surveys					
Adcock, Fitzgerald, Hawes and Stannus . . .	1943 to 1945	8,196	88·6	10·6	0·8
The combined totals for England and Wales of all school medical officers as given in their annual reports.	1938	1,674,023	88·7 (14·5)	10·8	0·5
	1943	1,288,910	89·6 (15·3)	10·1	0·3
	1944	1,272,562	90·3 (15·9)	9·4	0·3
	1945	1,268,951	90·8 (16·3)	8·9	0·3

Clinical assessments of the nutrition of the school children examined during the special nutritional surveys 1943 to 1945, summarised and compared with the returns of the clinical assessments (made by school medical officers) of all children seen in routine medical inspections in England and Wales, during each of four years—1938 (the last year of peace), 1943, 1944 and 1945. In the latter the percentages of children assessed as 'excellent', and included in the 'good' are shown in brackets.

When the aggregated nutritional assessments of all children seen at routine medical inspection were compared, one year with another, over the ten years 1935-45, the range of variation was seen to be surprisingly small. But, despite the fact that the examiners undoubtedly became more rather than less critical with the general improvement in nutrition, the percentage in the 'poor' category—always small—steadily fell, and that in the 'excellent' steadily rose, during the decennium, and these trends persisted throughout the war years.

Nutrition of London Elementary School Children. London was the principal target for air attack throughout the war, and, with the exception of a few coast towns, her schools were more bombed, her shelters more used and more of her children evacuated and re-evacuated than those of any other city. After the first evacuation her schools, school clinics and feeding centres were for months out of operation. Nevertheless, the percentages of London children assessed as being either of slightly subnormal or bad nutrition in 1944 showed an improvement in every age group over 1938, although the 11-year-olds showed a slight retrogression from 1943. The physical condition of the entrants,

which in previous war years had shown a slight deterioration from 1938, had also improved by 1944, apart from some slight apparent increase in the percentage incidence of rickets in entrant girls, who showed 0·9 per cent. in 1944, compared with 0·4 in 1938.

Nutrition of Children in the Special Areas. In these areas the children's nutrition was generally maintained during the war, and, indeed, in many areas improved, owing to the increase in employment, and to the fact that the authorities of these special areas, mostly ill-provided before, made great efforts to provide meals and milk.

In Whitehaven, for example, the school medical officer wrote in 1945: 'The general standard of nutrition has never been higher, a view supported by the high rate of attendance and the freedom from disease'; in Glamorgan 'The level of nutrition has been maintained to a remarkable degree under war conditions', and in Merthyr Tydfil 'The nutritional standard of the children is maintained at a fairly decent level . . . due to the present economic conditions . . . greater employment and that children were able to have a good midday meal and milk'. A minority, however, seemed not to have improved, as in Gateshead.

Anaemia. Estimates of the incidence of anaemia based on visual and clinical examination are naturally fallible, but there seems to have been a trend towards improvement.

The 'normal' values for haemoglobin level in boys and girls at different ages are still uncertain, but the averages seem to have increased. In children the mean haemoglobin level rises steadily from 4 to 14 years. The Medical Research Council Committee on Haemoglobin Surveys[14] considers that it has been clearly shown that haemoglobin levels vary with family income, a finding confirmed by Mackay, Willis and Bingham,[15] who examined 493 children aged 4 to 14 years in a Surrey elementary school. Children of men in the Services had a lower mean level at all ages under 10 years than the children of civilians.

HEIGHTS, WEIGHTS AND RATE OF GROWTH

These valuable criteria in the assessment of the child's nutrition seemed likely to fall with rationing and war conditions. Special investigations were therefore begun by Dr. E. R. Bransby in 1940 for the Ministries of Education and Health, in the first place from data relating to the average measurements of some 395,000 elementary schoolchildren, including 160,000 Glasgow children, recorded in the annual reports of school medical officers and in articles by Yudkin[16] and Hay[17] and, secondly, in a special inquiry described later. The average measurements in the annual reports showed no significant changes from the pre-war averages of 1936–8. Reduction in average height and weight at some time during 1940–2 with recovery in 1943 was found in about half of the areas, and some half-dozen areas were still below pre-war levels in 1943, but by 1944 recovery was fairly general.

The slight regressions, usually seen in the older children about 12 years old, which occurred in some places during 1940–1–2 were probably due to the fact that protective foods, especially those containing first-class protein, were scarcer during 1940–1 than at any other time during the war; the use of the milk-in-schools scheme, which had fallen away when war began, remained low during 1940–1 ; and the increase in school meals did not begin till 1942. These regressions were generally made good by 1943.

Bransby's calculations from these data and from those of the special inquiry, now to be described, suggested that, on the whole, school children living at home were, at the end of the war, of better physique than children of corresponding ages before the war.

Special Inquiry into Growth Rates. Early in 1940 some 5,000 school children were evacuated from large evacuation towns to camp schools in rural surroundings, where they lived and were educated. There were no set holidays and, especially for the first three years, the children were in residence practically continuously, though there was much change of population. The children were weighed and measured within a few weeks of arrival, again one year later, and afterwards at three-monthly intervals. Children of corresponding ages still living at home in the areas from which the camps had drawn their children were also measured at the same intervals. Wide differences in the growth rates were found between individual camp schools. Analysis of the data showed but slight differences in successive years, although the average height of the older boys became somewhat less.

During 1943–4 the weight-growth rates of the boys living at the camp schools were reduced, while those of girls increased. Comparison of the height and weight growth rates of boys and girls living at camp schools with those of children living at home, showed clearly that the boys living in camp schools put on less weight than the corresponding boys living at home.

That children evacuated from large towns to boarding camp schools in rural districts should grow less than those who remained in the towns was unexpected. It is, however, well known that children at ordinary boarding schools tend to remain stationary or to lose weight during the term and to put it on rapidly during the holidays. That the camp schools at first had no regular holidays and later had fewer and shorter holidays than ordinary boarding schools was probably an important factor, and the constant exercises and largely open-air conditions at the schools probably required a larger calorie intake than home life did. Much attention was given to the diets provided at the camp schools and during the later years of occupation they were generally satisfactory.

In 1945 the growth of boys living in camp schools continued to be less than that of those living at home. Improvement in the growth of both boys and girls living at home was continued through 1944 and 1945.

Other observations. Glossop. E. H. M. Milligan, who, by continuous observations over many years, had shown the average measurements of Glossop children to be less than the averages for England and Wales, found their average measurements in 1944 better than those of 1934, and that their nutritional assessment percentages had likewise improved throughout the war.

Bromley. Here K. E. Tapper and A. Orgler found that the measurements of 9-year old and 13-year old children showed in 1943 and 1944 no deterioration from 1939. The nutritional assessment percentages of the boys were a little higher than in 1939.

Summary. From the available evidence it seems that the nutrition of the elementary school child was maintained, and probably improved, during the war. There was hardly any evidence of deficiency disease.

The main factors in maintaining the nutrition of children were as follows. In the first place, the nutrition of schoolchildren was wholeheartedly accepted as a vital national responsibility, and, after a period of hesitation, great concessions were made to them as a priority class, especially in milk, cheese, meat, fats and sugar. This was an integral part of the brilliantly successful food policy of the Government, which afforded a diet 'more than ever before in conformity with physiological requirements'[18] and made it available to everyone, irrespective of income, by rationing according to needs, by subsidies on staple foods, by home production and importation of suitable foods in suitable amounts, and by lend-lease arrangements. Schoolchildren, in common with everyone else, shared in the nutritional advantages conferred by the higher milling ratio for national flour and bread, the extraction rate for which was raised to 85 per cent. in April 1942, and in the fortification of margarine by the addition of vitamins A and D.

The number of children receiving dinners in school (as will be shown in the next section) increased tenfold, while the nutritional value of the dinners was generally improved during the war, and the percentage of milk-takers rose from the pre-war 55 to 75 per cent.

Secondly, there were other various but potent factors: the increase in wages and employment; the comparative freedom from influenza; the decline of certain other infectious diseases and the improvement in the nutrition of entrant children, due to the ever increasing effect of the nation-wide effort in maternity and child welfare work.

Provision of School Meals and Milk. In the previous section it has been shown how vital for the health and nutrition of British children was this provision, upon which the war had a more far-reaching and beneficial effect than it had upon any other social service.

Before the war there was in operation an old scheme designed to feed, for the most part without payment, malnourished and necessitous children, who by reason 'of lack of food were unable to take full advantage of the education provided for them'. In 1938 these children, who

received solid meals in 'feeding centres', numbered some 110,000. There was great variation in the proportion fed in different areas, often unrelated to the real need, and the meals were, in many areas, deficient in quality, particularly in meat, and roughly served. Though the provision was of value in preventing the severer forms of malnutrition, it rarely had any educational value and, of course, did nothing for the more normal child. This 'feeding centre' system, which operated in large towns, was supplemented by a relatively very small provision of meals in 'canteens', mainly in rural districts, in which normal children living at long distances from their schools received dinners in school on payment. Altogether some 3·9 per cent. of all elementary school children took dinners in school: 110,000 free in 'feeding centres' and 50,000 on payment in canteens. To this limited provision, a valuable supplement was added by the Milk-in-Schools Scheme, which began in 1934, and by which, just before the war, 2,500,000 children (55 per cent.) were taking milk in school at a much reduced price or free of charge.

On this meagre provision of solid meals war-time conditions worked a complete transformation and, after raising the proportion of milk-takers in school from 55 to 76 per cent., ultimately led to the provision of free milk for all children. This transformation did not begin at once, for, in September 1939, feeding centres were closed in all evacuation and neutral areas, and this, together with the assumption that the billeting allowance was sufficient to cover all meals for evacuated children, in October 1939, brought free dinners to their lowest ebb for 50 years; at the same time the proportion of children who took milk in school fell to 40 per cent. of the total. Yet we shall see that by the end of the war nearly two million children were having school dinners and over 70 per cent. were having milk.

Although history proverbially repeats itself, this sequence was almost the exact reverse of that in the War of 1914–18. In 1914, in the term before its outbreak, 120,000 children received free dinners. When war was declared, in expectation of widespread distress (an expectation fortunately not realised) great efforts were made to increase the number fed, which in the first war winter of 1914–15 rose to nearly 600,000. (There was, at this time, scarcely any milk provided in schools.) The increase of employment and the evanescent prosperity of war soon, however, reduced the number of dinners, and by 1918 it had sunk to about 75,000.

In September 1939, with the closure of the schools, and for fear of bombing, all feeding arrangements for the children remaining in the evacuation (and at first in the neutral) areas, were abandoned. In the reception areas, the Board urged the extension of existing canteens or the provision of new ones for payment meals for evacuated children, but the number of communal meals provided for evacuated school children was relatively small, because of the natural disinclination of the billetor to

pay the price out of the small billeting allowance, and to the inertia of the reception authorities, two-thirds of whom said that no communal meals were needed. By March 1940, when the evacuees had dropped to about 400,000, new canteens for about 14,000 evacuees had been established, and were attended also by some 8,000 additional local children. School meals on payment had risen by this date from 50,000 to about 80,000.

Before the war one of the worst defects of school dinners had been a deficiency in meat, and when meat rationing for restaurants was established on the basis of 60 per cent. of their pre-war consumption, this already great deficiency of meat in school canteens was much accentuated. Generally those meals which pre-war had been the most inadequate became still worse, and some canteens gave practically no meat. Up to the end of 1940 there was therefore a grave danger that children receiving these deficient meals might be worse fed than those who had dinner at home, but unless much better meals could be given there seemed little justification for advocating their provision.

The first twelve months of the war had thus had a most adverse effect on the school meals and milk services. Largely on the initiative of the Lord Privy Seal, Treasury sanction was obtained to improve the grant on this service, and rates were fixed ranging from 50 per cent. to 92 per cent. of the authority's expenditure on meals with an average of about 70 per cent., and Circular 1520 was issued on July 22, 1940, announcing this improvement.

The Battle of Britain, subsequent bombing, renewed evacuation, and the threat of invasion, led to the setting up of a 'communal meals division' (later the War-time Meals Division) of the Ministry of Food which, through the local authorities, began to establish British Restaurants and to provide shadow emergency feeding sources for at least 10 per cent. of the population of the larger towns; factory canteens were rapidly developed, and school feeding became an essential element in the general policy of adding to the ration of certain classes by catering services and of safeguarding the feeding of the population in any emergency of bombing or invasion. Between July 1940 and September 1941 dinners in elementary schools (free and on payment) doubled to 280,000 which with 145,000 dinners in secondary schools made a total of 425,000 meals a day. The number of children taking school milk rose to 2,993,000 in October 1941, well above the highest pre-war figure despite a fall in the total school population.

In December 1940 the distinction between feeding centres and school canteens was ended, and all were now termed school canteens.

Difficulties of Rationing. In February 1941, the school canteen allowances were two-pennyworth of meat per meal; half an ounce of fat and one-fifth of an ounce of sugar per meal. The meat allowance was cut to a half-pennyworth per meal in June 1941, in line with the allowance for restaurants, giving from this source only 6 g. of first-class

protein per meal instead of the minimum of 18 to 20 g. required for a sound midday meal for children. Public opinion, strongly in favour of the provision of school meals during the second half of 1940, now became doubtful not only about the possibility of their extension, but also about their quality and nutritional value.

But the need for extension was urgent. In May 1941 no solid meals either free or on payment were provided by 4 English and 2 Welsh counties, 11 English county boroughs, 61 English and 4 Welsh boroughs and 3 English and 1 Welsh urban districts. No free solid meals were provided by 24 English and 5 Welsh counties, 15 English county boroughs, 74 English and 4 Welsh boroughs, and 4 English and 1 Welsh urban districts. One Welsh county made no provision whatever for meals or milk.

The percentage of children receiving, either for payment or free, solid meals in many areas was totally inadequate to the obvious need. For example, at Huddersfield with 12,475 children, where the average weights were already low (12-year boys 77·7 lb. compared with London 83 lb. and 12-year girls 79·4 lb. compared with London 86·1 lb.), weights were lower in 1940 than for several previous years. Here the percentage of children receiving solid meals in December 1940, was 0·5 per cent. all free, and the percentage receiving milk was 57·4, of whom only 1·5 per cent. received it free.

The first nine months of 1941 formed the period of greatest difficulty with an ever-increasing demand, uncertainty as to a sufficient allowance of food, and lack of equipment, staff and buildings, and the competition of other Departments with almost equally urgent needs.

Milk. By early 1940 the proportion of children participating in the milk-in-schools scheme had fallen to about 40 per cent., but by the end of 1940, despite bombing, about 2,240 children were taking milk. In December 1940 it became impossible in many areas to continue to supply school milk in separate one-third pint bottles, which particularly in junior and infant schools, greatly increased the burden upon the teachers, who were responsible for distributing the milk and collecting payments. Teachers had already been much perturbed at the inroads made by their many extraneous duties upon the time for their primary duty of teaching. In October 1941 schoolchildren were given a priority home allowance of milk of half-a-pint and a further priority allowance under the milk-in-schools scheme of one-third or two-thirds pint a day for children who paid. Necessitous children receiving free milk at school could have two-thirds or one pint if the local authority permitted and the school medical officer ordered it.

The number of children in elementary and secondary schools receiving milk had increased to almost 80 per cent. in February 1942. The proportion of children taking two-thirds of a pint rose from 19 per cent., in February 1941, to 40 per cent in May 1944, and to 46 per cent. in

February 1946, though even at the end of the war nearly half the necessitous children having free milk in school received only one-third of a pint a day.

Stimulus of War to Increase in School Meals and Milk. In October 1941 the President of the Board of Education and the Minister of Food agreed to provide school meals on a larger scale, to increase the number of children taking school milk from the then ratio of 60 per cent. to as near as possible 100 per cent., to raise the rate of grant in effect to an average of 80 per cent., to use the proposed emergency cooking depots to supply school meals, to supply equipment from the Ministry of Food 'pool' (transferred to the Ministry of Works in January 1942), and to give an improved scale of allowances of rationed foods for school canteens, with certain priority arrangements for unrationed food. The Government attached high importance to the rapid achievement of these steps to enable school canteens to serve the balanced meals necessary for the health of schoolchildren. Prefabricated huts for essential new buildings would be supplied, and a grant of 100 per cent. of the cost of free milk for necessitous children and of the cost of handling milk in school would be made. The normal price to be charged to parents for meals should cover, but not exceed, the cost of the food itself. Authorities might in future base their provision of free milk and free or part-payment meals solely on evidence of financial need, that is, without evidence that the child was actually under-nourished. This reversed, after ten years, an unhappy decision which had brought the Board's administration into discredit.

The new allowances of food. The standard in calorie value was raised to about 1,000 calories for senior children, in first-class protein to 20 to 25 g. and in fat of all forms to 30 g. The allowances of meat and sugar were doubled and that of jam nearly doubled, with a special allowance of cooking milk linked with the allowance of dried separated milk previously given. Other unrationed foods were covered by 'points'. The daily quantities of food required for satisfactory dinners were set out in a table, the new food allowances were stated in rationing terminology, and specimen menus and recipes were drawn up.

By October 1942 a million dinners a day in England, Scotland and Wales were being served. In the spring of 1943 the Government decided to aim at a service sufficient to provide dinners for 75 per cent. of the children in attendance, which was the expected maximum demand even if the charge for meals were abolished. The reason given was the need to safeguard schoolchildren fully from nutritional dangers arising from the war, but this decision was also influenced by an unfavourable outlook in the Atlantic battle and by the Parliamentary debate on the Beveridge Report in February 1943.

Authorities were asked to undertake an accelerated programme, and to help them, the Exchequer undertook the whole cost of establishing

and equipping canteens, partly by the free supply of huts and equipment through the Ministry of Works and partly by payment of 100 per cent. grant on approved expenditure. A series of standard plans was prepared by the Ministry of Works, in close collaboration with the Board's architect and the senior school meals service inspector, for kitchens, dining rooms and sculleries in prefabricated huts, and the Ministry of Works undertook the complete erection and equipment of canteens to these designs at the request of the authorities, made through the Board. By the middle of 1944 the Ministry of Works had been asked to erect kitchens for 320,000 dinners a day, and dining rooms (allowed only in exceptional cases) for 51,000. Authorities could, however, plan and erect canteens in the ordinary way if they preferred, except that they were required to use prefabricated huts for new buildings. More than two-thirds of the work was given to the Ministry of Works under this scheme, the remainder being carried out by the authorities themselves, though very largely on the lines of the standard plans. Higher and elementary education were placed on the same footing as regards Exchequer aid for school meals.

Preparations for the opening of the Western Front necessitated the imposition of a secret ban on building, which held up many of the larger canteen projects in the spring of 1944. This was followed in the autumn by severe and prolonged difficulties from the V-bomb attack and the concentration of building labour on housing repairs in the London area. The result was delay, discouragement and falling off in activity on the part of authorities.

Renewed Evacuation. In the renewed evacuation due to the V-bomb attack steps were take to simplify the granting of free meals for evacuee schoolchildren. School milk had already been made free of charge to all these evacuees as an addition in kind to the billeting allowance.

Finally, despite all delays and disappointments, the new programme, initiated in 1943, and revised at the beginning of 1945, had attained a large measure of success through the energy and zeal of most authorities. The daily number of dinners in October 1945 was 1,840,000. In many areas the standard of meals reasonably fulfilled the high aim set in 1941. An important part of the development of the service was the extended appointment of organisers of school meals, qualified in dietetics or cookery and having had experience of large scale catering, to supervise the dietary, the purchase of food, and staffing. The development of the service during the war is shown in Table III.

In conclusion, it should be pointed out that space has precluded any detailed description of the great efforts by which this war-time development was achieved. The goodwill of the Minister of Food and of his Department was unfailing, the efforts of the administrative officers and inspectors of meals of the Ministry of Education heroic, and in most cases the local education authorities and their officers and organisers

displayed the utmost keenness. The result well repaid the toil and the cost.

The development of the provision of milk and meals and the granting of extra rations for schoolchildren were the main factors in producing the remarkable fact that, after six years of total war, no evidence could be found of any decline in the physique and health of British children.

TABLE III

Number of Pupils having Dinners and Milk on a Normal Day in Primary and Secondary Schools (1)

	Meals[3]		Milk[4]		
	Dinners	Number having dinner as percentage of No. present	Total number having milk	Number having milk as percentage of No. present	Number having at least two-thirds of a pint
		per cent.		per cent.	
1938–9[2]	150,000	4·0	2,500,000	55·0	?
1940, July[2]	130,000	3·5	2,100,000	46·0	?
1941, February	279,000	6·5	2,479,000	57·6	?
1942, February	607,000	14·0	3,386,000	77·9	?
1943, February	1,048,000	23·5	3,371,000	76·8	1,056,000
1944, February	1,495,000	32·8	3,428,000	76·3	1,257,000
1945, February	1,650,000	36·3	3,265,000	73·0	1,229,000
1946, February	1,898,000	41·6	3,269,000	71·5	1,400,000

[1] The figures relate to public elementary schools and grant-aided secondary schools, as these terms were understood before April 1945. From 1943 junior technical schools are included. Nursery schools are included from June 1945. Special schools are excluded.

[2] These figures are estimated and relate to public elementary schools only.

[3] Excluding meals served to boarders.

[4] Including milk served to boarders. The minimum amount of milk consumed is one-third of a pint daily. The figures of pupils consuming two-thirds of a pint (which are included in the preceding total) relate to public elementary schools only before June 1945.

MORTALITY AND INFECTION IN CHILDREN

On the whole mortality among children was much lower than in the War of 1914–18. Before the First World War mortality rates from all causes for infants had been falling since about 1900, and for older children since about 1860.

During the First World War the infant mortality rate continued its decline, but the rates in older children, on the whole, rose a little—particularly in 1918 owing to the pandemic of influenza. After the war the rate of decline was accelerated, particularly in the age group 1–5.

In the Second World War, 1939 was a particularly good year, but in 1940 and 1941 rates rose. Thereafter they declined again even more rapidly than before the war.

Between the two wars a great change had occurred. Measles and whooping cough were very important causes of death in young children

in the First World War, but their mortality had declined markedly by the second. The mortality of the miscellaneous group of respiratory diseases—chiefly broncho-pneumonia—had also greatly fallen. Scarlet fever, which had been so important a cause of death in the latter half of the nineteenth century, had already become less deadly by 1914; between the wars its mortality became insignificant, and in England and Wales in 1944 only 82 deaths in children were recorded.

The deaths in children under 15 from diphtheria, which in 1938, the last year of peace, numbered 1,117, rose in 1940 to 2,300 and in 1941 to 2,390. Thereafter, thanks to the intensified immunisation campaign, they fell rapidly, and in 1944 numbered 818; this decline, happily, was accelerated in the subsequent years.

The most important exceptions to these favourable trends in child mortality and morbidity were the epidemic diseases of the nervous system—poliomyelitis and cerebro-spinal fever, the former, however, perhaps more important as a cause of permanent disability than as a cause of death. The epidemic of cerebro-spinal fever of 1940–1 was the worst recorded in this country and if the new therapeutic weapon of the sulphonamides had not been available it would undoubtedly have caused a high mortality. Even so, it killed 1,343 children under 15 in 1940. The year 1938 had been the worst recorded for poliomyelitis, but the war years were singularly free of it, though this fortunate experience was not to last long.

The other great group of causes of death in children which showed little decline over the war years was that of deaths from violence. In the year 1940 5,895 deaths of children under 15 were assigned to this group, 1,107 being assigned to road traffic accidents and 2,610 to operations of war. This was the peak year for operations of war, which throughout the war years, and including subsequent deaths from this cause in 1945, caused the deaths of 7,778 children under 15 years.

Mortality and infection among children during the war years are more fully dealt with in the Report of the Chief Medical Officer of the Ministry of Education for the years 1939–45,[19] from which Tables IV and V are taken.

CHILD GUIDANCE

The war applied a powerful stimulus to child guidance, which in this country had before been but slowly developing. The first effect, however, was to bring its development to an abrupt stop. Clinics lost their staffs either to the Forces or the rapidly expanding psychiatric service. The London Child Guidance Clinic had to close, although the training of psychiatric social workers was continued under difficult conditions at Cambridge, with the practical training divided between Mill Hill and Oxford. Local education authorities who were without clinics had

so many still more urgent matters to attend to that any addition to their school medical service was impossible.

TABLE IV

England and Wales: Death Rates 1911–45

(Rates per 1,000 living in each group, Infant Mortality per 1,000 births)

	*Infant mortality	1–5 years	5–10 years	10–15 years
1911–15	110	16·2	3·4	2·1
1916–20	90	14·6	3·8	2·5
1921–5	76	10·3	2·5	1·7
1926–30	68	8·6	2·4	1·6
1931–5	62	6·6	2·2	1·4
1936	59	5·5	2·0	1·2
1937	58	5·1	1·9	1·2
1938	53	4·6	1·9	1·2
1939	51	3·5	1·5	1·0
1940	57	4·8	2·0	1·4
1941	60	5·3	2·1	1·4
1942	51	3·4	1·5	1·0
1943	49	3·3	1·4	1·0
1944	45	2·8	1·4	1·1
1945	46	2·6	1·2	0·9

* Based on related live births from 1931.

TABLE V

England and Wales: Important Causes of Death in Children of School Age in the War Years 1940–44 *compared with those in the Peace Years* 1931–5. (*Rates per* 100,000)

5–10				10–15			
1931–5		1940–4		1931–5		1940–4	
Diphtheria	41	Violence*	35	Tuberculosis	22	Violence*	19
Violence	28	Diphtheria	26	Violence	15	Operations of war	18
Bronchitis and pneumonia	23	Tuberculosis	17	Heart disease	13	Tuberculosis	16
Tuberculosis (all forms)	22	Operations of war	16	Bronchitis and pneumonia	11	Heart disease	8
Measles	8	Bronchitis and pneumonia	10	Diphtheria	10	Diphtheria	6
Appendicitis	8	Appendicitis	5	Appendicitis	7	Bronchitis and pneumonia	6
Heart disease	7	Cerebro-spinal meningitis	5			Appendicitis	5
		Heart disease	4			Rheumatic fever	4
		Measles	3			Cancer	3
		Rheumatic fever	3			Cerebro-spinal meningitis	2
All causes	218	All causes	166	All causes	141	All causes	118

* Excluding deaths due to war operations.

The already inadequate supply of newly-trained workers became much less, and there was a mere trickle of psychiatrists and psychologists available for child guidance. Existing clinics struggled to cope with the ever increasing work with a decreasing staff.

Hostels. The first evacuation in 1939 suddenly exposed the problems of 'difficult' children, and the behaviour of certain children in many reception areas caused consternation. Authorities through their billeting officers had to find billets for children whose bad habits prevented their being received into private households.

The Ministry of Health, when planning the evacuation scheme, had foreseen that special accommodation with selected staff would be necessary for a small proportion of evacuated children, whose care and supervision would place an undue burden on the ordinary householder, and in September 1939, some reception authorities had already set up hostels.

But most of the children who were found troublesome or enuretic after arrival, had not been known by the education authority to be 'difficult', for most of their troubles had not been visible during school hours, or reported by the parent. Evacuation at once brought to public notice, not always sympathetic, troubles before known only at home.

Once billeted, such children were left to the foster parent's care until things became so trying that she demanded their withdrawal. But, in many other children previously normal, the uprooting from all their familiar associations, transference to strange surroundings and the fear of the unknown caused anxieties and psychological disturbances which needed skilled aid and understanding to adjust them.

Throughout the summer, autumn and winter of 1940–1, when the second great evacuation was taking place, and when many new hostels were established, the first task of billeting authorities was to see that each individual arriving in the reception areas was provided with shelter and, in the case of unaccompanied children, with proper care. At such a time of pressure, once a hostel had been set up, little attention could be given to the individual problems of the children admitted to it. It was some time before there could be a proper classification of hostels and of the children in them. By degrees, however, this was done, in many areas by pooling hostel resources between different authorities or by county councils taking over or setting up hostels, as recommended by the Shakespeare Committee in its Report on Conditions in the Reception Areas (January 1941).[20]

The conception of the purposes which these hostels 'for difficult children' should fulfil was modified further as it was realised that simply to provide shelter and care or even a happy and well-ordered routine was not enough; but that the children should be made fit for ordinary life by rebuilding their stability and confidence, so that after a time they could again be billeted.

Arrangements were also made for local education authorities who wished to arrange residential treatment for their own maladjusted children, particularly those displaying asocial behaviour, to admit them to these hostels under the provisions of Section 80 of the Education Act, 1921.

But, even after expansion and differentiation, these hostels could meet only a small part of the ever-growing demand; many children, who should have been admitted to a hostel had, perforce, to receive either treatment by less effective methods, or no treatment at all. Staffing difficulties, particularly the shortage of domestic staff, at times made it impossible to use hostels to their full capacity, and a few hostels had to be closed for a time until staff could be obtained. Nevertheless 'in July 1943, there were just over 3,400 children in 225 hostels, in which psychiatric services were in varying degrees available.' The later evacuations in July and August 1944 led to the opening of a number of new hostels, and in February 1945 there were 236 hostels, 45 providing psychiatric treatment, 109 with psychiatric advice available and 82 other hostels for 'difficult' children.

Thus, though the treatment provided fell far below either the requirements or the ideal, much good work was achieved despite great difficulties.

C. P. Blacker, in his survey of the mental health services, wrote: 'The value of these hostels has impressed all observers, and the demand is general that in some form they be perpetuated after the war'. The Ministry, early in 1945, suggested to local education authorities the desirability of continuing their use and that they should consider without delay whether they could take over the administration of them under the Education Act, 1944, and several suitable hostels were taken over.

CLINICS

The urgent need for these clinics became more and more apparent to local education authorities as the war went on. While a few difficult children could be treated at hostels or at existing clinics, little or nothing could be done for most of them. The problem was causing the authorities much anxiety on account of the harm done to the children themselves by their untreated maladjustments, and the repercussions thereof caused much concern. More and more local education authorities accepted the principle of child guidance and tried to set up a clinic, though the acute shortage of skilled personnel precluded such provision being generally made. Gradually the number of child guidance clinics increased, and in the mid-war years was :

	1942	1943
Fully staffed	34	47
Under medical direction but without fully qualified psychologists and/or psychiatric social worker	24	18
No psychiatrist but qualified psychologist and/or psychiatric social worker	4	3
	62	68

By 1945 the total number of clinics had risen to 79, of which 57 were wholly maintained and 6 partly maintained by local education authorities. 'In the last analysis education is itself child guidance and the development of an adequate psychological service covering the very broad field . . . (of child guidance) can make a major contribution to the development of the educational service as a whole' (W. P. Alexander).[21]

PSYCHOLOGICAL EFFECTS OF AIR RAIDS ON CHILDREN

Children of school age generally stood up to the strain of air raids very well and seemed, on the whole, affected by them even less than adults. Any assessment of their effects is complicated by the fact that they were accompanied by other factors prejudicial alike to mental and physical health—removal from home to strange places and lack of sleep in uncomfortable and ill-ventilated shelters. Moreover, in many heavily raided cities the more 'nervous' children were usually evacuated.

But the fact remains that, despite the fears of child psychologists before the war, there were very few cases of severe nervous disorder among children due to war conditions. Between the outbreak of war and December 1940, two special neurological centres near London admitted only two children between the ages of 5 and 15. The medical officers of the London County Council had during their visits to rest centres and schools an exceptional opportunity of making inquiries and of observing for themselves the effects of air raids, and the attitude of the children was described by one of them, Dr. Helen Clark, thus:

> 'The mental and physical condition of these children appears to be practically unaffected. A considerable number look on nights "in tube" or "under the arches" as a fresh excitement. Some who have spent the autumn in the country and have now returned to go away with their mothers under Plan VII have told me about things they had been allowed to do, and enjoyed. When asked if they wanted to live in the country or in London when they grew up, they said without a single exception, that they wanted to be in town. This because so many more interesting things happen there. Fear of raids was not alluded to . . . "planes overhead" seemed to be causes of interest rather than fear.'

It was the reaction of the adults in charge that determined the reaction of the child.

Annual reports of many school medical officers contained similar observations. Thus Dr. Geffen (Enfield 1940) said 'Enfield children have learned to take air raids in their stride. They are not unduly frightened of them and we are not having children brought to us suffering from the war complaint of nerves as a result of air raids'. And Dr. Hogben (Tottenham 1940) wrote: 'As far as could be ascertained the children showed few signs of mental or physical stress or psychological disturbance except, of course, in the case of children

who had sustained some personal loss'. These general impressions were supported by H.M. Inspectors, school teachers, child guidance workers and others who had close contact with children.

Evidence from convalescent homes and residential open-air schools, to which children, who showed signs of nervous instability as a result of bombing, were admitted, suggested that when these children had been removed to quiet surroundings and healthy environment they quickly regained a normal poise.

In spite of considerable disorganisation a number of child guidance clinics in bombed cities continued at work. Dr. Francis H. Bodman,[22] Director, and Miss Dunsden, Psychologist to the Bristol Clinic, in a survey of 8,000 Bristol children in February 1941, found that some 300, or about 4 per cent. of this large sample showed some signs of strain, either purely psychological or psychosomatic. Of the 300 children showing signs of strain, 120 showed definitely psychological symptoms, which were seen twice as often in the 5–7 group as in the 11–14 group. Some 170 children suffered from psychosomatic disorders, and this form of anxiety disguised as physical symptoms was a characteristic reaction of the 11–14 group. Taking both types of reaction together, the younger children felt the strain and lack of sleep more than the older ones, who could repress their feelings to conform with adult standards with greater success. Half of the cases occurred in the infant group (5–7), another third in the junior group (8–10), and less than a quarter in the senior schoolchildren.

Dr. Bodman studied more closely 54 (mostly younger) children who were in-patients at the Children's Hospital and had undergone a particularly terrifying experience when the hospital was severely damaged by high explosive bombs, and they had to be transferred to another hospital at the height of the raid.

> 'Soldiers were crunching through a litter of broken glass, fallen plaster, and blown-in blackout material, picking children out of cots and beds and, tucking them under their arms, running down the steps and dumping them pell-mell into the lorry. The hospital was in darkness, and the only light came from the fires raging in the City below. A very heavy barrage was in progress and heavy high-explosive bombs continued to fall quite close to the hospital. Most of the children were transferred by lorry to my hospital; a few babies were carried in the arms of the soldiers the quarter of a mile, while spent fragments of "flak" were buzzing down freely. All 54 children were evacuated without a scratch, and the only serious casualty among the nursing staff was the night sister, who had been cut by glass.'

In his follow-up Dr. Bodman, with difficulty, traced 51 children, of whom 7 had died—3 of cerebrospinal fever, 1 of diphtheria, and 3 of illnesses for which they were originally admitted. Of the 44 survivors 5 still had symptoms which could be directly attributed to their

experience on the night of the raid—a percentage of 11. This was barely three times the number found six months earlier by Miss Dunsden in her survey of the school population in general.

Dr. Bodman's conclusions were:

> 'Of the children exposed to a major air raid 61 per cent. showed signs of strain for a period of between three weeks and two months.
>
> 'After 7 months 11 per cent. of children still show persistent symptoms.
>
> 'Persistent symptoms have not occurred in children under 1 year or over 5½ years of age.
>
> 'The incident is assimilated in varying degrees, according to the stage of the development of the child's personality.
>
> 'The earliest reaction is that to sirens and noise in general. In the walking child there is an attempt to run to safety. Later, in the talking child, there is an attempt to reject formulation of the experience, followed by an effort at describing or rehearsing the incident, the description becoming more elaborate as the child is more mature. About the age of 7½ the tendency is for the child to accept the incident as an adventure. Finally, about 11½, a sense of responsibility for others appears.
>
> 'The reaction to subsequent raids was on the whole remarkably slight. Out of 8 children who had severe later experiences only 2 showed pardonable anxiety, and they made rapid adjustment.
>
> 'The most striking finding of this survey is the extraordinary toughness of the child, and his flexibility in adapting to potentially threatening situations.'

Dr. Mary Burbury,[23] Medical Director of the Manchester Clinic, analysed the effects both of evacuation and of air raids on children attending the clinic, a selected group in which an unduly high proportion of symptoms of disturbance would be expected:

> 'It is striking that there seems to be little relation between heavily bombed areas and anxiety about raids. This point is strengthened by the fact that in another group of clinics, situated in reception areas, we have received from parents more complaints of children being anxious and disturbed by talk of raiding or sound of sirens, and that of these cases only two are evacuated from heavily raided areas; the rest have experienced little more than the sound of sirens or distant guns.
>
> 'The general conclusions . . . would seem to be that, whatever the ultimate outcome, the immediate effect of evacuation, which is separation from parents and a known and accepted environment, is worse than the immediate effect of raiding—that the fantasy, waking or dream, of the raid is provocative of greater anxiety than the reality.'

Dr. H. M. Cohen, in his report (Sheffield 1940) wrote:

> 'Fortunately, in this area children have not spent much time underground nor in other shelters, and accordingly the findings of the examinations are very much as the previous years . . . the good health of the children has been well maintained and any symptoms noted are nervous in type. These manifestations include nightmares, somnambulism,

hysteria, sobbing, enuresis, being afraid to go into a room alone and terror on hearing the sirens.

'It is interesting to find that each school medical officer can only give a few such cases, with the observation that in most of these children the condition amounts to a sudden exaggeration of previous slight signs.'

Dr. E. K. Macdonald in his report (1940) on Leicester which had suffered rather from frequent alerts than from severe bombing, wrote:

'No increase has been observed in chorea, tics or sleep walking. Children over six who were previously stable are quite unperturbed and as cheerful as ever, though one medical officer notes that all children who have been near bombs or whose houses have been wrecked show a definite fear of the night.

'Children over six who were previously unstable and highly strung show signs of increased nervous tension such as jumping at noises and difficulty in getting to sleep, while a few enuretics have relapsed.

'In children under six the reaction depends upon that of the parents; particularly the mother. When the mother is not unduly nervous or controls her emotions the child is unaffected. If the mother is extremely nervous, the child shows signs of nervous tension, such as screaming when the sirens go, failing to settle down to sleep, and fearing to be left alone.

'Infants under eighteen months of age are quite unperturbed.

'It has been noted that children at the clinics welcome the sirens and are extremely cheerful in the shelters. Apparently they enjoy the change from the ordinary routine of life. Some mothers report that tiny children regard going to the shelters as a new and pleasant adventure.'

Writing of the work of the child guidance clinic Dr. W. M. Frazer (Liverpool) said:

'It is gratifying to report that few cases had to be referred in consequence of air raids though some of the children under treatment for other reasons showed an increase in nervousness from this cause. In the opinion of the clinic workers a most important factor in these matters is the attitude of the parents.

'A war condition that has shown a marked effect is the breaking up of the family unit, such as the enforced absence of the father, and the inability of some of the mothers to shoulder their increased responsibilities whereby the structure of the family has become less stable and behaviour disturbances have developed in the children.'

In general the evidence from H.M. Inspectors of Schools, school medical officers, teachers and others working in the heavily bombed cities of England and Wales was likewise re-assuring. There had been, of course, individual cases showing signs of stress. Children who had been in close proximity to exploding bombs, or who had sustained physical injury, or loss of relatives or friends could hardly be expected to go psychologically unscathed. Children who were nervously unstable,

particularly those who were in the care of over-anxious or injudicious parents or adults, were more likely to be affected than others. Most of those who showed signs of psychological stress quickly recovered when removed to a more peaceful and healthy environment.

Taking the child population as a whole, it may be said that it had stood up to aerial bombardment and its accompanying terrors with the same courage and fortitude as was displayed by the civilian population generally.

SPEECH THERAPY

The treatment of speech defect. During the war increased interest was aroused in speech therapy and more attention than ever before was given to the needs of the child handicapped by speech defect. The ascertainment of these children, with provision for their treatment, became a statutory requirement and speech therapists were given a definite place in the school health service and were no longer regarded as teachers; local education authorities increased their treatment facilities as far as the supply of trained speech therapists allowed; the speech therapists re-organised their profession, founded a college and introduced a common syllabus of training and a common examination; and, finally, the Board of Registration of Medical Auxiliaries gave recognition to speech therapists and admitted them to the National Register of Medical Auxiliaries.

The incidence of speech defect is much higher among boys than among girls; from 0·5 to 1 per cent. of English school children stammer and 1–2 per cent. have speech defects that require treatment; and it was surprising that there was no appreciable increase in nervous speech disorders, especially stammering, despite air raids, alerts, and the disturbance of family life by evacuation, by fathers and brothers being called up and by mothers having to go out to work.

A school population of about 10,000 justifies the appointment of a whole-time speech therapist; but some authorities have a higher standard, e.g., Leyton had two whole-time speech therapists for a school population of about 10,000 children.

The number of speech therapists employed by education authorities in England and Wales steadily increased so that at the end of the war about 120 were employed. To provide a satisfactory service, however, about 500 whole-time therapists would be required, so that there was still great need for increased training facilities.

In 1945 the Minister provisionally approved and promised financial help for the establishment of a residential special school for children, which would provide facilities for the intensive study of aphasic children, and of those with severe speech defect, by a team of workers including neurologists, psychologists, speech therapists and teachers, and would also be used for training students of speech therapy.

Co-ordination of Therapy. It is essential that speech therapists should work under the supervision of the school medical officer through whom all children in need of treatment should be referred to the speech treatment clinic.

There are occasions when the speech therapists should co-operate closely with the ear, nose and throat surgeon, with the dentist or with the child guidance team, though in practice the number of children with speech defect—usually stammering—who require treatment at a child guidance clinic is small.

Speech therapists should be encouraged to take up hospital appointments; the school and hospital clinics together give more variety of work than either does alone and prevent the therapist getting into a groove.

At the end of the war about fifty hospitals in England and Wales were providing treatment facilities for patients with speech defects.

Clinic facilities for the practical training of students worked well in Kent, Middlesex, Surrey and Croydon; students, under the supervision of the authority's speech therapist, helped materially with the work of the clinic, and enabled more children to be treated than the therapist could cope with when working alone.

THE EFFECTS OF WAR ON THE SPECIAL SCHOOLS

Before the war nearly 60,000 variously handicapped children were being educated in special schools. There were 359 day special schools with some 37,000 pupils and 250 residential special schools with some 23,000 pupils. Total war, though it imposed strain upon all, probably hit the handicapped child as hardly as any, and though many residential special schools suffered little interruption of work or change of staff, the effect of the war on the day special schools was disastrous.

Day Special Schools. Of the 359 day special schools, 133, with some 14,000 pupils, were for mentally defective children; 104 were open-air schools with about 13,000 'delicate' children; 47 educated 5,000 crippled children; 46 taught 2,750 blind and partially blind, and 26 were for 1,800 deaf and partially deaf children. Nearly all these day special schools were in great cities, and very few in reception areas.

As these handicapped pupils could not be billeted in the ordinary way, they were evacuated in parties with their own teachers and helpers to camps, mansions or hotels. They did not attend the local elementary schools, but were educated in their new premises which they sometimes shared with other schools of the same type, and the units thus formed were certified as 'residential special schools for evacuated children'. In the first evacuation the London special school children had for the most part been sent to East Anglian or South-eastern camps, mansions or hotels, made suitable for their occupation by the London County Council at no little cost. In June 1940 these had to be abandoned and as by this

time nearly all the convenient premises in safe areas had been otherwise taken, the parties often had to be split up again. Bombing of areas at first classified as neutral or reception increased the demand for premises which, by the spring of 1941, became almost impossible to find, except in the most remote areas where it was difficult to induce staff, especially domestic staff, to live.

The proportion of day special scholars evacuated in 1939 had been high but, early in 1940, the drift back to the cities had become so large that day special schools were re-opened, but the air raids of the following autumn and winter caused a fresh outflow of children, and some of these re-opened special schools were closed again. As, later in 1941, the air danger lessened some were re-opened, but in London and Liverpool where there was great pressure on school accommodation, classes had to be held in rooms in any school which had free accommodation, or in small local groups of a few children under one or two teachers, which made classification impossible. Thus, on those special children who remained in or drifted back to the bombed areas the effects of improvised premises, sometimes damaged or dirty, poor attendance, lack of classification, irregular transport, teachers who did not know the children or who changed frequently, and of broken nights spent in shelters were wholly bad. Moreover, taken together, the numbers in the residential special schools for evacuated children and in the day special schools, were in some cases, such as London, but half the peace-time number. Ascertainment of new cases was disorganised for months, and even when ascertained most of these had to remain in ordinary schools, for there were hardly any special schools in the reception areas.

Residential Special Schools. Of the 23,000 children in those 250 special schools which had been residential before the war, 6,500 were cripples, for the most part requiring hospital treatment; 4,000 were delicate, in residential open-air schools; 2,500 were in sanatoria for pulmonary tuberculosis; 1,900 in blind schools; 2,700 in deaf schools; and 480 in 8 residential schools were children with rheumatic heart disease. Many of these schools were in safe areas and carried on normally. Those which were evacuated had the advantage of having staffs experienced in residential school methods and 24-hour care of their children, and soon settled down in the new premises. They suffered far less from the drift back than did the evacuated day schools.

As many of these schools were provided by voluntary bodies, great responsibilities fell on their managers, who had not the resources of local government behind them. They often had to find their own premises to go to, either on lease from owners or by requisition. Some few of the smaller schools, mainly those for delicate children who might be dealt with in such an emergency as normal children, closed down.

For a description of the various expedients improvised to meet the diverse needs of all the various types of handicapped child, reference should be made to 'The Health of the School Child, 1939–45' (82–90).[19]

After the concentrated bombing of 1940–1, the units which had been day schools gradually lost children to their home areas where schools were re-opened; and shortages of teaching and domestic staff gradually became more severe, imposing a strain on those who remained, felt all the more in the absence of danger.

The most serious of all the handicaps from which all the boarding special schools suffered was the difficulty of recruiting and keeping domestic staffs; and there was hardly a school in which domestic staff was not the most worrying problem to managers and head teachers.

HEALTH

The health and nutrition of the children in the special boarding schools was well maintained. Health in 1939–40 was extraordinarily good; there was rather more sickness during the winter of 1940–1, but the amount was no more than was normal before the war, and this freedom from abnormal sickness continued till the end.

The advantages of catering for large numbers were nowhere better demonstrated than in some of these residential schools, and supplies of milk were maintained throughout at a high level.

The advantages which accrued to the children from their war-time experiences were not confined to closer acquaintance with life in the country. Living under emergency conditions in far more intimate contact with children than in peace-time, the staffs came to appreciate more fully the children's need for emotional attachment to adults as parents' substitutes, and a greater warmth of feeling between staffs and children resulted. More responsibility had to be given to children and their response showed that they were capable of assuming more than had often been realised.

In conclusion, it may be said that though most special school children lost some education, and though some children, who would have had special education but for the war, were denied it, owing to the measures taken, and the solicitude shown for the children's interests by the central and local authorities and by their teachers and parents, the losses in most cases were small in comparison with the peril. Great credit is due to those authorities who, in the face of such difficulties maintained something like pre-war facilities and attendance, and to those who were responsible for the arrangements for ascertainment, provision of premises, enforcement of attendance, and transport. The teachers who made their classes so attractive that their children preferred to come to school rather than to stay away, deserve a special mention.

PHYSICAL EDUCATION

The outbreak of war curtailed the gradual development of civil physical education. Teachers of this branch are younger than most teachers and have specialist qualifications, especially valuable for the training of new entrants to the Forces ; a large proportion of them therefore enlisted at once or were in age groups to be called up soon after general mobilisation. At one time no less than ten county areas in Wales had neither an organiser nor a qualified teacher of physical training. Continuous changes in staff, evacuation, requisitioning of buildings, fields and baths, and shortage of equipment led inevitably to a general deterioration in civil physical education. Almost equally serious was the deterioration in the hygiene of exercise; the habit of changing into gymnastic kit before, and of taking shower-baths after, exercise, which had contributed so much to social education, largely disappeared, owing to the loss of shower-baths to anti-gas decontamination, shortage of kit, towels and laundry, and a reluctance, with the risk of air raids, to insist on changing and the use of shower-baths even when they were available. Of all schools the most affected by these adverse conditions were the boys' grammar and modern schools, which lost nearly all their physical training staff, and so were deprived of most of their advanced gymnastic work, as well as regular coaching in athletics.

The call-up of men teachers in age groups did, however, make possible certain adjustments in staffing to meet losses as they occurred, and tribute is due to many women organisers and teachers who helped with the boys' training and to the many older men teachers who filled the gaps created by the enlistment of younger colleagues. Although most women organisers and specialists remained at their civil posts, many enlisted in the various women's services. The staffing problems thereby created were increased by the above-mentioned temporary transfer of many women specialists to boys' classes.

In swimming only a few authorities could maintain their peace-time arrangements and generally this subject suffered much, especially at first.

Training of teachers. The three recognised diploma courses for men at Carnegie College, Leeds, Loughborough College and Goldsmiths' College, London, were closed throughout the war, and this loss of six years in the training of men specialists was long to retard the progress of physical education in boys' schools and classes.

The six women's physical training colleges offering a three years' course continued their work, though some had to move to distant and less convenient premises.

The advanced courses in physical education in some of the women's two-year training colleges continued during the war, except in those which were evacuated.

The number of advanced courses in the men's training colleges was halved.

Local courses conducted by organisers of physical education, often totalling 50 hours over a period of 10 weeks and held in school time, were run at centres in Bradford, Liverpool, Manchester, Middlesbrough, Rochdale, Wigan and York. These especially encouraged the older men teachers and married women who had returned to teaching in the emergency, after being out of touch for years with physical education, for, by attending these lecture demonstrations, they were enabled to use the special war-time scheme for senior schools with effect.

The Youth Service. The black-out, the disorganisation of family life and the closing of clubs and classes, all increased the need of boys and girls aged from 14 to 20 for recreative activities. War brought to the voluntary youth organisations loss of personnel, requisitioning of premises and a serious drop in income from voluntary sources, and thus made their position critical. The Government therefore made the Board of Education responsible for looking after the needs of young people who had left school, and the expansion in the provision and maintenance of facilities for their social and physical training thus began to become what is now known as the Youth Service. This was built on the foundations laid by the national voluntary associations who had worked in this field in the past—the Brigades, Y.M.C.A., Y.W.C.A., Boy Scouts, Girl Guides, the National Association of Boys' Clubs, the National Association of Girls' Clubs and Mixed Clubs, and kindred bodies—and by those local education authorities which had exercised their powers under Section 86 of the 1921 Education Act. The Youth Service was to be a normal educational service concerned with the leisure activities of young people between 14 and 20 years of age and no longer in full-time attendance at school. It made no attempt to impose any rigid system of uniformity, but was meant to develop the work in each area in accordance with local needs and tradition, to give guidance, and to assist development through the administration of Exchequer grants. This policy gave the Youth Service an adaptability which was especially helpful in the transition from war to peace.

Investigation into the Effects of Physical Training during Working Hours on Young Industrial Workers. In the latter part of 1940 the Board of Education initiated an investigation into the effects on the general health and production efficiency of young industrial workers of their systematic release during working hours for a period of physical training. The investigation was made possible by the ready co-operation of the following firms: Messrs. Mather and Platt, Manchester; Messrs. Montague Burton, Leeds; L.M.S. Railway Works, Derby; Messrs. Albert Gill Ltd., Team Valley Trading Estate; Messrs. Gill, Stronghold Works, Bradford; and Messrs. R. Hirst, Hammerain Mills, Bradford.

A small office committee was responsible for the investigations. It had one of the Board's staff inspectors for physical education as chairman, with the Board's Senior Medical Officer, the Board's staff Inspector of Training Colleges, and H.M. Inspectors attached to the physical education and technological branches of the Board as members, and an administrative officer as secretary. Mr. Kenneth R. Evans of Metropolitan Vickers Limited was co-opted a member because of his knowledge of production in industry. A standard form of investigation was drawn up in consultation with the Committee for Research in Physical Education of the Medical Research Council under the chairmanship of Professor A. V. Hill, M.P.

The central idea was that in each centre or works there should be selected two or three groups each of about thirty boys and girls, each group arranged to represent a cross-section of the type and age of worker under test. Intelligence tests, physical development, type of occupation in the works etc., were used to adjust the first selection, and every participant was medically examined.

One group was released for forty-five minutes' physical training on each working day of the week. Another group remained at work during that period. This continued for a period of three months after which these two groups were changed over. After each three months the groups were medically re-examined and their production efficiency re-assessed. Where there were three groups the same procedure was adopted except that the third group was released for a forty-five minute 'leisure period', i.e. without physical training.

The difficulties of assessing productive activity, and indeed of assessing any effect of physical training during the exceptional conditions of war-time were, of course, enormous, but, in spite of these and the fact that the number of young persons concerned in these tests was too few to permit conclusions to be drawn, there was agreement that the classes had been an excellent innovation from the point of view of industrial welfare. It seemed that the release of young industrial workers for physical training during working hours had been markedly beneficial to their physical well-being; that human relations in the factory had been improved, that the workers felt happier, supervision was easier; and that in many types of work the period of physical training could be adjusted so that there would be no net loss of production.

The boys developed better muscular control and were much improved in cleanliness and pride of appearance. The girls gave the impression of becoming more alert and happy in their work. Posture was greatly improved in both boys and girls. An exception was, however, seen in adolescent girls of poor physique who had exhausting daily work. Here physical training was not found beneficial—a finding only to be expected.

Health Education. Many of the problems of war emphasised the need for further education in personal hygiene, and there was a rapid advance

in public opinion, especially in the matter of sex education. The Board of Education, which previously had no decided policy in the matter, published in 1943 a pamphlet entitled: 'Sex education in schools and youth organisations'.[24] This showed how little was done in most schools and, indeed, in one-third of all schools, whether elementary or secondary, nothing whatever was taught on the subject. The pamphlet did not, however, express very decided views and the subject does not lend itself to brief summarising. *The Health of the School Child* (1939-45)[19] considers this question in more detail than can be given here.

THE EDUCATION ACT, 1944

In the introduction to the foregoing account of the work of the School Medical Service during the Second World War it is shown that the Service owes its birth and development largely to the fact that the need for such an organisation was revealed in previous wars. The improvements in the provisions for child health and welfare under the Education Act of 1944, however, were brought about not as a result of war but in spite of it.

Between the First and Second World Wars considerable progress was made in the educational field. In 1921 a consolidating Education Act was passed which embodied the Education Act of 1918 (known as the Fisher Act), and in 1936 a further Act provided, *inter alia*, for the raising of the school-leaving age to 15 as from September 1, 1939. Here, however, war intervened to postpone this particular advance; but it did not prevent the formulation of plans for the future and, despite air bombardment, evacuation and the threat of invasion at home, and the gigantic task of meeting the paramount needs of the Armed Forces oversea, the foundations of a far-reaching reform were steadily laid.

In July 1943, the Government's proposals for Educational Reconstruction were set out in a White Paper[25] in amplification of the Prime Minister's Four-Year Plan of Social Reform broadcast on March 21, 1943 in which a prominent place had been given to 'a broader and more liberal education with equal opportunities for all'. Before the end of that year a Bill, broadly based on the White Paper proposals, was presented to Parliament, and in the following year it reached the Statute Book as the Education Act, 1944. Before briefly noting the medical aspects of this measure, two changes in nomenclature may be noted, which are not without significance : (1) for the first time since 1899 when the Board of Education was created, legislative sanction was given to the name of the Department as the *Ministry* of Education, and the President became the *Minister* ; (2) the School *Medical* Service gave place to the more positive and constructive School *Health* Service, by which it was henceforth to be known.

Medical Inspection. Under the 1944 Act (Sec. 48) medical inspection became compulsory. Any pupil at a maintained school, county college

or other educational establishment must, if required by an authorised officer of a local education authority, be submitted for medical inspection, and a fine could be imposed for non-compliance without reasonable excuse. This legislative change, however, made little difference in practice, as the proportion of 'objectors' to medical inspection had been almost negligible. But as the obligation was deemed to include dental inspection, it was welcomed especially by school dentists and did something to relieve the anxiety which some of them felt as to their powers of inspecting children under the 1921 Act.

Although the Board of Education had always encouraged local authorities to invite parents to be present at periodical medical inspections, there was, prior to the 1944 Act, no statutory obligation to that effect. Regulations made under the Act made it clear that parents of day pupils must, so far as practicable, be given the opportunity to be present.

As regards frequency of inspection, the Minister prescribed by regulations that :

> (*a*) every pupil admitted for the first time to a maintained school be inspected as soon as possible after the date of admission;
>
> (*b*) every pupil attending a maintained primary school be inspected during the last year of attendance at such a school ; and
>
> (*c*) every pupil attending a maintained secondary school be inspected during the last year of his attendance at such a school.

These three inspections were regarded as the most that could be enforced for the time being, with the available medical man-power; but provision was made for additional inspections on the direction, or with the approval, of the Minister, and it was contemplated that when county colleges should be established their students would be similarly liable to inspection.

In addition to the local education authorities' powers of inspection of schoolchildren, they were authorised, under Sec. 34 of the Act, to require the parent of any child between the age of two and five years to submit the child for medical examination. This power, given to enable the authority to ascertain and to provide for the special educational needs of maladjusted or handicapped 'toddlers', was especially useful in securing early medical, surgical or other ameliorative treatment by which the child's handicap might be minimised or abolished, thereby improving the health and well-being of the child and possibly removing the need for special educational treatment later on.

Medical Treatment. Comprehensive facilities for free medical treatment were to be made available 'either under the Education Act or otherwise' for pupils in attendance at any maintained school or county college. Before Section 48 of the 1944 Act came into force, local education authorities had only to provide treatment of defects of eyes, ears and

teeth, enlarged tonsils and adenoids and other minor ailments found in public elementary schoolchildren. The extension of treatment to cover secondary schools was a logical development of obvious value, and the provision for young people in the county colleges, yet to be established, would similarly bring to the adolescent advantages not hitherto enjoyed. Further, Section 78 of the Act enabled local education authorities to make arrangements for medical inspection of pupils in non-maintained schools, and also for those receiving primary or secondary education under the authority's arrangements other than at school.

The School Health Service plans for medical inspection and treatment were obviously related to the Government's proposals, which had already been issued in the form of a White Paper[26] but had not yet been presented as a Parliamentary Bill, for a comprehensive National Health Service. Meanwhile, local education authorities were urged to make the following facilities readily available free of cost to the parents:

> Treatment of minor ailments, diseases of the ear, nose and throat and defective hearing, diseases of the eye and defective vision, orthopaedic and dental treatment, child guidance, speech therapy and the treatment of rheumatism. They were next advised to:
>
> (1) obtain the services of consultants, e.g., aurists, ophthalmic surgeons, dermatologists, and specialists in children's diseases;
>
> (2) arrange with hospitals for any necessary in-patient and out-patient treatment of children suffering from the conditions listed above;
>
> (3) extend the range of their responsibilities for hospital treatment and to pay for such treatment given to patients sent by the local education authority or to other patients for whom they agreed to accept responsibility;
>
> (4) improve the provision for treatment in rural areas, and for this purpose to make, if necessary, arrangements with general practitioners;
>
> (5) arrange with private dental practitioners for the carrying out of emergency dental treatment where clinic facilities are not available.

Handicapped Children. For blind, deaf, and physically or mentally defective children much had already been done, usually in 'special' schools; but the 1944 Act went considerably further. The certification of children by local education authorities as mentally or physically defective was abolished ; the authorities were required to ascertain all children needing special educational treatment, including 'maladjusted' children, and to provide appropriate facilities in the ordinary schools for those less severely, and in special schools for those more severely handicapped. Parents were granted the right to ask for the examination of any child over 2, with a view to its being given such special education as it might need. (The provisions relating to the ascertainment and special educational treatment of handicapped pupils are more fully

described and discussed in the Report of the Chief Medical Officer of the Ministry of Education for the Years 1939–45: *The Health of the School Child*; H.M.S.O., 1947.)

CONCLUSION

For nearly forty years the State has recognised a special responsibility for the health of schoolchildren. In its health aspects, therefore, the Education Act of 1944, which provided for wide advance in this field, may be regarded as less of a creative than an evolutionary measure. As already noted, it was a natural development of existing legislation and practice, and its conception was not influenced by, nor could its birth have much effect upon, the health of the school child during the six years of war with which this history deals. The provisions of the Act or of regulations made under it concerning the use of the School Health Service for research, the qualifications of medical officers and school nurses, the appointment of senior dental officers, the duty (previously a power) to provide meals and milk at all maintained schools, and the power to prohibit or restrict the employment of children are not examined here for none of these affected the school child during the war. But they held much promise for the future health and welfare of schoolchildren, and the Act which gave them sanction and impetus may be regarded as one of the major constructive achievements of the nation at war.

REFERENCES

[1] Report of the Interdepartmental Committee on Physical Deterioration (1904).
[2] Report of the Interdepartmental Committee on Medical Inspection and Feeding of Children attending Public Elementary Schools (1905).
[3] Home Office. Report of Committee on Evacuation, Cmd. 5837, London, H.M.S.O., 1938.
[4] MELLANBY, K. (1941). Report on Incidence of Lice, summarised in a memorandum which accompanied Ministry of Health Circular 2306 and Board of Education Circular 1544, March 17, 1941.
[5] BUSVINE, J. R., and BUXTON, P. A. (1942). *Brit. med. J.*, **1**, 464.
[6] Scabies Order of November 1941.
[7] HARE, J. G., and TATE, P. (1927). *Report of the School Medical Officer for London*, 1927.
[8] SHANKS, S. C. (1944). Min. of Health and Emer. Pub. Health. Lab. Service, *Monthly Bulletin*, **3**, 188.
[9] Interim report of Interdepartmental Committee on Dentistry (The Teviot Committee) (1944) London, H.M.S.O., 1944.
[10] Final report of Interdepartmental Committee on Dentistry (The Teviot Committee) (1944). London, H.M.S.O., 1946.
[11] The Health of the School Child. Annual Report of the Chief Medical Officer of the Board of Education for 1934, p. 10. London, H.M.S.O., 1935.
[12] STANNUS, H. S. (1945). Min. of Hlth, and Emer. Pub. Hlth. Lab. Service *Monthly Bulletin*, **4**, 76.
[13] ADCOCK, E. W., HAMMOND, W. H., and MAGEE, H. E. (1947). *J. Hyg., Camb.* **45**, 1, 65.
[14] Medical Research Council Report No. 252. 'Haemoglobin levels in Great Britain in 1943 (with observations upon Serum Protein Levels) by the Committee on Haemoglobin Surveys'. (1945). London, H.M.S.O.
[15] MACKAY, H. M. M., WILLIS, L., and BINGHAM, K. (1946). *Brit. med. J.*, **1**, 711.
[16] YUDKIN, J. (1944). *Brit. med. J.*, **2**, 201.

[17] HAY, H. R. (1943). *Publ. Hlth.*, **56**, 12,139.
[18] MAGEE, H. E. (1946). *Brit. med. J.*, **1**, 475.
[19] The Health of the School Child, Report of the Chief Medical Officer of the Ministry of Education, 1939–45. London, H.M.S.O., 1947.
[20] Min. of Health, 1941. 'Report on Conditions in Reception Areas' by a Committee under the chairmanship of Sir Geoffrey Shakespeare, M.P.
[21] ALEXANDER, W. P. (1946). *Education*, **87**, 290.
[22] BODMAN, F., (1941). *Brit. med. J.*, **2**, 486.
[23] BURBURY, W. M. (1941). *Brit. med. J.*, **2**, 660.
[24] Board of Education, 1943. 'Sex Education in Schools and Youth Organisations'.
[25] Cmd. 6458, *Educational Reconstruction*. London, H.M.S.O., 1943.
[26] Cmd. 6502. A National Health Service London, H.M.S.O., 1944.

CHAPTER 2

MINISTRY OF LABOUR AND NATIONAL SERVICE

A. INDUSTRIAL MEDICINE

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INTRODUCTION

THE aim of this chapter is to present a review of the activities of the Factory Department so far as these were related to the special war-time conditions throughout the manufacturing and other branches of industry which come within the purview of the Factories Act. It is not possible in this brief survey to give in detail the evidences of the response of the workpeople to the call of the country at bay and of the intensity of their exertions through six long years under conditions of danger and deprivation, while maintaining their morale and tenacity of purpose and the hard core of a resistance which was never overcome. Enough has been said, however, to indicate to an observant eye, reading between the lines of the factual statement, the spirit of the time and to show how, in the exigencies which arose, the administration of the legal provisions for the safety, health and welfare of the workpeople was carried into effect.

Some of the data on which this narrative is based have been obtained from unpublished official sources, but much the greater part has been derived from the Annual Reports of the Chief Inspector of Factories published during the war years, to which reference can readily be made.

FACTORY DEPARTMENT

The origin of the Factory Inspectorate is recorded in Section 17 of the Act of 1833 entitled 'An Act to regulate the Labour of Children and Young Persons in the Mills and Factories of the United Kingdom'. Since that time the function of the inspectorate has been extended to ensure compliance with the law of the land for safeguarding the health, safety and welfare of all workers in manufacturing and allied industries within the purview of the Factories Acts. In 1833 four inspectors were appointed, with authority to appoint sub-inspectors as occasion required. In the last normal year of peace, 1937, the authorised staff of inspectors numbered 281. The Factories Act of that year[1] came into force on July 1 1938.

Even before the outbreak of war exceptional statutory duties were laid on the inspectorate under the Civil Defence Act, 1938[2], particularly

in relation to the provision of shelter against air attacks for numerous factories, and from April 1939 onwards a part of the staff was fully occupied with this work. In general terms, the Civil Defence Act entailed the provision of air raid shelter in those factory premises and commercial buildings, in certain 'specified areas', in which more than fifty persons were employed. Responsibility was placed on the Factory Department for ensuring compliance in some 12,000 factories employing in all about 2½ million persons. In 1940 the original programme of shelter construction in factory premises was completed and a total number of 13,000 schemes was dealt with by the Inspectorate.

At this time it was the policy that all persons should take cover during air raid alert periods, but when France collapsed the policy was revised, as alert periods became frequent and of long duration, threatening serious loss of production. Thus the system of roof spotters was introduced, with imminent danger signals and emergency protection at the workplaces, to enable work to continue until the last moment. These arrangements were highly successful and, without legal compulsion but with consultation between employers, workers and special committees, afforded a striking example of the value of co-operation in industry. With the changing course of the war and the occupation of France and the Low Countries by the enemy, the conception of 'vulnerable areas' largely disappeared, and towards the end of 1940 the shelter scheme was extended throughout the country to all factories with over fifty persons employed, and thus included a further 4,000 factories.

Under the Civil Defence Act, the factory inspectorate were also called upon to take part in training and equipping A.R.P. personnel in factories employing over thirty persons. This included measures for receiving air raid warnings, directing workers to shelters, training and equipping first-aid, fire-fighting and anti-gas squads. The Factory Department continued through 1941 to act as agent for the Ministry of Home Security in the provision of air raid shelters and fire prevention. The department dealt with 17,000 factories for shelter and over 20,000 under the Fire Prevention (Business Premises) Orders.

By an Order in Council made in June 1940[3] the functions of the Secretary of State under the Factories Act, 1937, etc., were transferred for the period of the war to the Minister of Labour and National Service, and the factory inspectorate was seconded or transferred to the latter's department. A Factory and Welfare Department was established in the Ministry and the factory inspectorate was attached to it to continue their work for safety, health and welfare in factories, while a new body of local officers, known as welfare officers, was established to deal with welfare matters outside the factories, such as lodging, transport, day nurseries and the reception of transferred workers.

Though the main activity of the factory inspectorate was the day-to-day work of the district inspector and his staff in the individual

factory, the advances made and the range of work covered both in the districts and by the headquarters staff, were illustrated by some of the special tasks that had to be dealt with. War-time increased these tasks in many directions—an old risk arose in a new guise, a substitute material suddenly proved poisonous, or a new material introduced new hazards. Much of the work thus done was secret. The medical, engineering, and electrical inspectors were consulted more and more on new processes by firms as well as by other Government departments and the Services.

During 1944, as a result of the relief from practically all the war-time emergency work that had fallen to the factory inspectorate, the staff were able to return to a great extent to their ordinary duties.

CONDITIONS IN FACTORIES

Production Activity and Output. The decline in normal trade which set in towards the end of 1937, continued into 1938. This was due in large part to the feeling of uncertainty caused by the international situation, but by the end of 1938 there was a greatly increased demand for defence requirements of all kinds. Production was distributed widely to prevent dislocation of ordinary trade and this helped to alleviate unemployment in some depressed areas. In response to national demand new aerodromes sprang up all over the country, the naval yards became busy, the production of guns, munitions and vehicles progressed rapidly, and the output of aircraft was vastly increased.

New ordnance factories were erected in the Midlands and North-east of England and in Scotland and Wales, and in the North-west of England many thousands of men were employed in the building of huge munition works. Activity increased in the iron and steel trades, shipbuilding turned over to naval construction, and chemical manufacture was largely expanded in connexion with armaments.

HYGIENE IN THE FACTORIES

Lighting. The neglect of preparation for war led to the difficult conditions produced in September 1939 by the blackout. Under the immediate pressure of the Defence Regulations, large numbers of factories were blacked out without sufficient regard to the resultant interference with ventilation and natural lighting. In many cases the only way to obtain obscuration in the time allowed was to paint the windows with black paint and this meant working in artificial light throughout the 24 hours. There was evidence that working in artificial light during day-time was affecting the workers and resulting in loss of output, so efforts were made to restore daylight as far as possible by replacing the black paint by blinds and shutters.

The Departmental Committee on Lighting in Factories was asked to review the changed conditions, and in June 1940 they submitted a

Report[4] recommending a substantially higher standard of lighting than had previously been suggested as a legal minimum. As a result the Factories (Standards of Lighting) Regulations, 1941[5] came into force in those factories in which shifts and long hours were worked involving the substantial use of artificial illumination. Satisfactory improvement followed the application of the Regulations and new war-time factories and many larger factories generally attained a good standard, though restrictions in the supply of labour, materials and fuel required care in applying the new standards where the need was greatest. In spite of these restrictions extensive improvements in lighting were found, even in smaller factories, during 1942, including numerous excellent examples of illumination with fluorescent lighting, which was becoming increasingly popular.

The process of re-admitting daylight to blacked-out factories continued throughout 1942, but much trouble arose from the factories designed and built without windows or roof-lights at a time when bombing was at its height. Although in many of these factories the standard of artificial lighting was good, the department formed the opinion, based on complaints they received and the attitude of managements and workpeople, that the admission of even a small amount of daylight was well worth while. By 1943 the improvement in illumination in factories was considered most striking, particularly in large factories. Progress was limited in speed and scope by restrictions imposed on the installation of fluorescent tubular lighting. The improvement in standard was not uniform, however, which was often due to faulty maintenance arising from labour shortage. In this year, too, progress had been made in altering methods of obscuration so as to admit daylight. Some of the factories still remaining completely blacked-out were large works engaged on war production. Complaints continued to reach the department from factories where permanent blackout was retained and there was undoubted relief from the feeling of being 'shut in' when daylight was restored. At the end of hostilities in Europe the complete removal of blackout became possible and was one of the most welcome reliefs from war-time conditions.

Ventilation. Not only was lighting interfered with by the rush to screen lights, but ventilation of factories also suffered. The smaller works that depended on natural ventilation suffered most when ventilation openings were blocked up by makeshift screens without regard to the effects on air movement. A pamphlet, *Factory Ventilation in the Blackout*, was issued by the department as a help to the small occupier and with the aid of the inspectors conditions were gradually improved. In larger factories artificial ventilation was more easily applied, but where furnaces were used, as in steel works, for example, obscuration was difficult, though most necessary, and conditions were, for a time, bad, owing to inadequate dispersion of heat. In processes where injurious

gases and fumes were produced, natural means of ventilation could no longer be relied upon to maintain concentrations sufficiently low to be safe, and mechanical means of ventilation, especially localised near the points of origin of the noxious substance, were required. Omission of this precaution was followed by cases of poisoning. 'Blackout anaemia' was a term used by some doctors to designate a condition characterised by pallor, impaired digestion and lassitude and thought to be due to anxiety, overwork, bad ventilation or high temperature in the workrooms.

Many improvements in the ventilation of factories were made in the closing months of 1939, and in 1940 the inspectors continued to follow up the problem, spending whole nights in factories working night shifts, especially where conditions were worst, as for example, in bakehouses, foundries and rubber works. Great ingenuity was exercised in improving ventilation by means of light traps to doors and windows, rotary agitator-blades driven by the overhead shafting, the introduction of a plenum system, the use of unit-heaters for circulating warm or cool air according to the season, or by a system of extractor fans and suitably placed air inlets. Control of high temperatures in hot processes was further enhanced by lagging hot pipes and vessels, by providing water-cooled doors for furnaces, water 'curtains' to intercept radiant heat, and movable exhaust hoods over molten metal pouring pots. In connexion with the special problem of steel works Inspectors of Factories were lent to the Ministry of Home Security to help in controlling, at the same time, glare and bad ventilation. In co-operation with the Ministry of Fuel and Power and the Institution of Gas Engineers, special attention was given in 1943 to conditions of ventilation and temperature in gas works and an advisory pamphlet was prepared embodying suggestions for improvement.

The problem of ventilation at night was still far from being solved in many factories in 1942, although considerable improvement had been achieved. Night shifts were being worked in dispersed factories that were not designed for the numbers employed during the war and where blackout had been hastily improvised without regard to ventilation.

In the matter of ventilation the psychological attitude of the workers was found to be linked more closely with the visual effect of permanent blackout than was sometimes realised. Complaints about ventilation were more likely to come from factories with moderate ventilation and permanent blackout than from those to which daylight was admitted, even though the ventilation was no better. In the former, folk 'felt boxed-in' and this feeling resulted in criticism of the ventilation.

The growing interest taken by factory workers in the subject of ventilation was shown by the increased number of complaints received

by the Factory Department on this score during the war years: in 1938 there were 567; in 1942, 1,073, and in 1944, 885. In many cases, where complaints were not substantiated on investigation, the cause could be traced to the psychologically depressing effect on the workpeople of working continuously by artificial light when they knew there was daylight outside.

With the end of hostilities in Europe, the daytime conditions could be restored in gas works, steel works, blast furnaces, coke ovens and other similar industries, and with the passing of this war-time inconvenience, credit was due to the workers for the way in which they had accepted conditions which, at the best, were far from good.

Temperature. Three severe winters and the fuel economy campaign led inspectors to give particular attention during 1942 to the problem of adequate heating. Apart from the weather, the manner in which the campaign was conducted goes far to explain the absence of complaints. Close touch with those responsible led to the advice of the department being accepted that the reduction of working temperatures in most workrooms might lead to a loss of output that would far outweigh any gain in fuel economy, quite apart from any increased accident risk and effect on the health and comfort of the workers. On these grounds factories were omitted from the Control of Fuel Order, No. 2, 1942.[6] Under the Ministry of Fuel and Power the campaign was conducted on scientific lines and resulted in an improvement of the heating arrangements especially in the larger factories where fuel officers were appointed. These officers made tours of the factory, took temperatures and supervised heat controls, with the result that, while waste of heat was avoided, a check was placed on insufficiency of heating, heat loss was prevented and waste heat was utilised. Increasing use of unit heaters gave a method adaptable and efficient, with the additional advantage of assisting the ventilation of large shops. Air-conditioning was developed of necessity in those factories without the possibility of natural ventilation through permanent blackout. In a modern glass works a constant temperature of 72° F. was maintained by means of wall panels through which cold water circulated, and a plenum air ventilating system. The introduction of an additional plenum system in another glass works resulted in a fall of temperature in the neighbourhood of the machines from 110°–115° F. to below 90° F. One of the influences of the fuel economy campaign during 1944 was towards a reduction of working hours. Many firms decided that the only way they could cut down consumption of fuel was by reducing the hours of work. First the night shift, then overtime, after that Saturday afternoon work, and finally Saturday morning work was given up, leading thus, indirectly, to the five-day week, aided by the high absence rate for Saturday mornings and, in some areas, by the disturbing effects of bombing on night shifts and late hours.

GENERAL HEALTH AND WELFARE

During the War of 1914–18 valuable lessons had been learned about the importance of safeguarding the health and welfare of the workers if a satisfactory output of munitions was to be secured and maintained in a time of stress. During the early years of that war the work had been undertaken by the Factory Department and afterwards developed and carried on with the advice of the Health of Munition Workers' Committee. In the intervening years the welfare of the workers in certain industries, and in certain respects, had been provided for by Welfare Orders made under the Police, Factories, etc. (Miscellaneous Provisions) Act, 1916, and the legal status thus given in particular instances had influenced the raising of the general standards of welfare throughout industry, which, in the meantime, the Factories Act of 1937 made compulsory. Thus, washing facilities, accommodation for clothing, seats, drinking water and first aid were provided. There remained for special attention, on the outbreak of the War of 1939–45, the need for canteens and a greater degree of personal attention on the part of managements to the workers who, in the conditions of war, were involved in special difficulties, and in the case of many, had their first experience of industry or of a new kind of work in industry.

MEDICAL WELFARE AND SUPERVISION

The need for this personal attention to the welfare of the workpeople was realised early in the war, and the subject was discussed at a Departmental Conference held at the Home Office in May 1940. In July, the issue of the Factories (Medical and Welfare Services) Order, 1940[7] clearly showed to industry one direction which its efforts in this connexion should take. The Order enabled the Chief Inspector of Factories, on behalf of the Minister, to give directions to the occupier of a factory, in which was carried on the manufacture or repair of munitions of war or any work on behalf of the Crown, requiring him to make arrangements for one or more of the following services: (*a*) medical supervision of persons employed in the factory; (*b*) nursing and first-aid services; (*c*) supervision of the welfare of persons employed.

Medical Supervision. There had existed a nucleus of medical supervision in industry for many years, through the Examining Surgeons, formerly called Certifying Factory Surgeons, appointed by the Chief Inspector of Factories under the Factories Acts. Their duties included the examination of all young persons under 16 on becoming employed in factories, of boys under 18 for certain employment at night, and of persons employed in certain processes, subject to special regulations, involving a special risk to health, such as lead, chrome, radioactive materials, and certain chemicals. Certain of the duties of the examining surgeon could be carried out by a doctor appointed by the Chief Inspector at the request of the employer, in a given factory, generally

the works doctor, and called 'Appointed Surgeon'. There were from 1,777 to 1,862 examining (or appointed) surgeons holding office during the war years 1939 to 1945. Many occupiers of factories availed themselves of the special experience which the examining surgeons had of industrial conditions and occupational diseases, by arranging for an extension beyond their official duties to supervision, to a varying extent, over first-aid, the general health conditions in the factory, and persons employed on specially hazardous work not covered by regulations. Thus a service of works medical officers developed and many firms, apart from those carrying on processes subject to special regulations, engaged medical men to advise them on health questions throughout the factory. The Memorandum on Medical Supervision, 1940[8] proved its value as a guide to employers. A large number of doctors were engaged to give part-time service in factories in their districts, and the number who were giving their whole time to medical supervision increased to 150 in 1941. At the end of 1942 there were some 850 works medical officers exercising substantial medical supervision at factories, about 160 of them giving whole time to this work, in addition to examining surgeons and others rendering medical service of a more limited or specialised kind. About 7 per cent. of the works doctors were women. At the end of 1943 there were 174 full-time works doctors in 205 factories, and 744 attending part-time in 1,150 factories; in all, 918 works doctors in 1,355 factories. At the end of 1944 the numbers were 180 full-time in 275 factories, and at least 890 part-time in 1,320 factories; in all, not less than 1,070 works doctors in 1,595 factories. This increase in the numbers of medical practitioners devoting all or a substantial part of their time to the claims of manufacturing production was made in the face of the higher priorities given to the Armed Services, and to the institutional and domiciliary requirements of the civilian population. These figures of the numbers of works doctors include those engaged in the medical supervision of workers in munition factories directly under the control of the Ministry of Supply, and classed as Royal Ordnance Factories. From 1943 to the end of 1944 there was an average of slightly over 60 doctors employed full time, in about 22 ordnance factories, and 24 doctors employed part time, in about 25 factories. These numbers decreased gradually during 1945 as the factories diminished in number and the personnel was reduced. This reduction in numbers of doctors was not observed during the same period in factories other than Royal Ordnance Factories, but remained steady at about 110 doctors giving whole time, and increased in the case of part-time doctors from 720 to 903 doctors, with a slightly greater relative increase in the number of factories so served, from 1,107 to 1,337.

The higher proportion of doctors employed in Royal Ordnance Factories was largely due to the concentration of workers on dangerous

processes. The rapid expansion of explosives production introduced labour unused to the type of work involved, with consequent exposure of many hundreds of workers to new hazards. The statutory requirements of the Factories Act and the Chemical Works Regulations provided for periodical examination of workers in certain processes and the provision of ambulance rooms with trained persons in charge. In addition there were many aspects of the work which called for prompt medical and nursing attention, and these problems were solved by the setting up of a Factory Medical Service in each Royal Ordnance Factory, consisting of a well equipped surgery, a medical officer and trained nursing staff. The duties were organised so that a nurse was available at any time during the day or night, and a doctor was in attendance by day and could be called during the night. The medical officer and his staff examined all workers at the beginning of their employment and did any subsequent periodical examinations in accordance with statutory requirements. Workers found to be seriously affected by the dangerous processes were transferred to other work or discharged on the advice of the medical officer. By these methods and by keeping adequate records, he was able to assess the general level of health in the factory, to recognise ill-health directly attributable to working conditions, and to advise upon suitable protective measures. With regard to the treatment of accidents, the organisation of the medical service was designed to secure treatment where the accidents occurred, and to this end the workers received training in first aid to enable them to deal at least with the accidents most likely to occur near their workplaces, while avoiding delay in sending for medical aid. Thus, acid splashes, thermal burns and physical injuries were tackled in the first instance by fellow workers, and in places where noxious gases were likely to be encountered specially trained workers were available at all working hours, who were capable of using approved methods for self-protection and rescue and resuscitation of the victim.

Nursing and First-aid Services. The place of the trained nurse in industry was well established during the First World War and was recognised officially in the Order of 1917[9] in regard to ambulance and first-aid arrangements at blast furnaces, copper mills, foundries and metal works. This Order required that the ambulance room be placed under the charge of a qualified nurse, or other person trained in first aid, and this became a standard requirement in subsequent Orders. Industrial nursing became so important that special courses of post-graduate training were made available in 1935 by the Royal College of Nursing in conjunction with the Bedford College of Women, covering an academic year and granting a certificate. During the war two shorter courses of three months and six weeks respectively were conducted for selected candidates by the Royal College of Nursing and partly sponsored by the Ministry of Labour and National Service. The Birmingham

Accident Hospital and Rehabilitation Centre in conjunction with the University arranged, in 1942, a scheme of training for industrial nurses taking part in the work of the hospital wards. At the Royal Albert Dock Hospital special courses of training for nurses employed at Royal Ordnance Factories fostered a high standard of surgical technique and an appreciation of the special problems of rehabilitation of injured workers in these factories. At the outbreak of war the number of nurses employed in first-aid service of industry was increasing and it continued to increase freely until the pressing claims of essential services brought about a measure of control of the recruitment and distribution of nurses. The Ministry of Labour and National Service issued, in September 1943, a manual for the guidance of hospital authorities on the subject, in which the shortage of nurses was pointed out and an Order was made on August 20, 1943, requiring notification of any termination of employment of nurses and midwives to the local office of the Ministry. Steps were also taken to compile a register of trained nurses and midwives, to keep a record of undergraduate nurses, and to encourage hospitals and other institutions to employ on a part-time basis nurses whose home circumstances prevented their engaging in whole-time nursing. It was, therefore, when the call of industry for nurses was increasing that other claims for their services became more urgent and a balance had to be struck between them; nurses with home ties and responsibilities, classed as immobile, frequently found that their services during the time they could spare were welcomed by factories in the neighbourhood. The numbers of nurses available for service in industry was variable and never easy to determine. At the end of 1942 there were in industry approximately 4,000 nurses with hospital training; by August 1943 this figure had risen to the peak of 8,385. During 1944 the number fell to about 7,600 with, in addition, about 200 male nurses. About half of the women and 10 per cent. of the men were State Registered Nurses.

In addition to the service given to industry by trained nurses, much essential first-aid work was carried on by workers who had gained proficiency in rendering first aid to the injured through the training afforded by the St. John Ambulance Association, the British Red Cross Society, and the St. Andrew's Ambulance Association. The Factories Act of 1937 requires first-aid boxes of prescribed standards and numbers to be provided in every factory, and, in those factories in which more than 50 persons are employed, the first-aid box must be placed in charge of a person trained in first aid. The standard of training of those in charge of first-aid boxes was not prescribed, but the holding of a certificate of any of the organisations mentioned above was taken as evidence of proficiency. Guidance on questions of first-aid services in factories was given in the Welfare Pamphlet No. 4, published by H.M. Stationery Office (5th edition, 1945). A report on the subject of

First-aid in Industry was published by the British Medical Association in July 1939, in which additional suggestions were made in regard to training in the special problems of Air Raid Precautions, and anti-gas measures, which had become an essential part of industrial first aid.

Passive Air Defence introduced a new factor into the first-aid services in industry, as many factories engaged in production of munitions were regarded as 'vital factories' and therefore targets for enemy air attack. In order to promote operational efficiency and economy in buildings and equipment a plan was worked out for combining the day-to-day requirements of the factory ambulance rooms with those of the first-aid posts required for air raid precautions. By doing so it was hoped to avoid confusion involved in the first-aid staff changing to protected quarters on the sounding of an 'alert', particularly in the dark or after an attack without warning. To achieve the necessary co-ordination, representatives of the departments chiefly concerned (Admiralty, and Ministry of Supply, Aircraft Production and Labour and National Service), formed a committee in 1941 to study the design and construction of ambulance rooms, first-aid posts and cleansing stations in factories. With their Report,[10] submitted in July 1942, particulars were given of six type-plans of factory ambulance rooms and first-aid posts for premises in which various numbers of persons were employed at any one time, from 31 to 100 in type A, to 2,001 to 5,000 in type F. Details were also given of the principles of design and construction for gas and splinter-proofed buildings, of ventilation and gas-filtration, and the lay-out of rest rooms, casualty loading points, water supplies, cleansing facilities for gas contaminated casualties, equipment, storage, and accommodation and personnel. Under the Civil Defence Act (523 (1) and (2)) Factory Inspectors received reports from occupiers of factories employing more than thirty persons, stating the measures they were taking to train all workers in the routine to be followed in air-raids, to train and equip a suitable proportion to give first-aid, to deal with the effects of gas and to fight fires.

CANTEENS FOR WORKERS

One of the more important contributions to the health of industrial workers during the war was the widespread development of factory canteens and other arrangements to enable workers to get hot mid-day meals and other catering services, including meals for night shifts. This not only provided food over and above the domestic rations, but also helped to counteract various factors militating against good health, such as long and tiring journeys to and from work, work at inconvenient times and other war-time conditions.

The Factory Department took a large part in persuading and helping firms to establish factory canteens and also in securing canteens at docks and at sites of building and civil engineering operations,

especially in remote country areas. In so doing they had in the background certain Orders made by the Minister of Labour and National Service under Emergency Powers under which the establishment of a canteen in such cases could, where necessary, be legally directed.

Early in 1941, Factory Canteen Advisers with special knowledge of domestic science, nutrition and catering, were appointed to assist the Inspectorate and to advise employers about the many problems connected with large-scale feeding. These problems were very numerous under war-time conditions and the difficulty and strain of providing good wholesome meals for large numbers punctually and at regular intervals, despite uncertainties of supply, were severe. In 1941 the energies of all were devoted in the main to the actual setting up of canteens; later the chief preoccupation was with the quality of the meals and the service. The advisers spent much of their time in the kitchens advising canteen staffs on the best use to make of available foodstuffs and equipment, on methods of cooking which conserve the nutritional value of the food, on balancing menus and introducing new dishes and attractive service.

While maintaining war-time supervision over the establishment and development of canteens, special problems such as the needs of night workers were dealt with by the canteen advisers. The absence of catering facilities outside the factories at night made the workers more dependent on factory canteens than they were by day. Besides routine visits paid at night by inspectors and advisers, a special survey of the night meals service was made in about 300 factories towards the end of 1942. The results of this survey were reassuring. In 232 of the factories, employing 89 per cent. of the workers in the factories surveyed, no serious criticisms could be made; most of the canteens were considered satisfactory without qualification, and the workers expressed approval. In the remaining 68 factories criticisms were made regarding the food, which was insufficient in quantity or in variety or was reheated food left over from the day-shift service.

Considerable attention was given to the special nutritional needs of young persons under 18. The White Paper 'Youth Registration in 1942'[11] summarised the results of a follow-up of the registration of young persons under the Registration of Boys and Girls Order, and outlined the steps the Government proposed to take to deal with some of the conditions to which attention was drawn. This statement was made in comment on the use of factory canteens by young persons:

> 'It appears that some young people do not use the canteen facilities which have been made available at most of the larger industrial establishments. They are too often content with scanty meals which do not provide sufficient nourishment, and they need to be educated to make full use of the facilities in factory canteens, which provide adequate hot meals during the dinner hour break. This is all the more important when

so many mothers are unable to cook suitable meals at home because they themselves are engaged in full-time or part-time employment on war work.'

The accuracy of this observation was well known to the inspectors and factory canteen advisers, who had continually drawn the attention of employers to the special needs of young persons. The Chief Inspector addressed a letter to all employers with canteens urging them to consider how young persons could be encouraged to use the canteen facilities. The letter met with a good response and roused a lively interest in the subject. The number of firms offering the main meal to young persons at a reduced price increased, and some enthusiastic employers combined this with weighing and measuring the youngsters from time to time, with results which often proved the efficacy of the movement.

Besides the special consideration given to young persons, attention was directed to the nutritional needs of persons employed in factories who suffered from digestive troubles. Many good caterers proved that they could provide, out of the total allocation of foods, a satisfactory special menu for such workpeople, and they were encouraged to co-operate with the works' medical officers or the patients' own doctors.

In assessing how far the factory canteen contributed to the maintenance of health and efficiency of the workpeople, the development of subsidiary services was noteworthy. The supply of refreshments during mid-spell breaks was taken advantage of by a very large proportion of the workers and many who did not take the main meal used the canteen for snacks and beverages.

The table below shows the steady progress in the growth of the number of canteens serving hot meals from 1941–5:

TABLE I

Canteens

Date	Factories employing more than 250	Factories employing less than 250	Docks	Building sites	Totals
December 1941	3,165	2,530	110	787	6,592
December 1942	4,340	4,141	160	868	9,509
December 1943	4,875	5,704	176	782	11,537
December 1944	5,046	6,584	179	245	12,054
December 1945	4,833	6,862	180	179	12,054

INDUSTRIAL DISEASES AND POISONING

By Section 66 of the Factories Act 1937 'every medical practitioner attending on or called in to visit a patient whom he believes to be suffering from lead, phosphorus, arsenical or mercurial poisoning, or

anthrax, contracted in any factory', is required to send a notice to the Chief Inspector of Factories giving the name and address of the patient and of the factory where he was employed, and stating the disease. In addition to those five diseases, the following were notifiable under various Orders:[12] toxic jaundice due to tetrachlorethane or nitro- or amino-derivatives* of benzene or other poisonous substance; epitheliomatous ulceration due to tar, pitch, bitumen, mineral oil or paraffin, or any compound, product or residue of any of these substances; chrome ulceration due to chromic acid or bichromate of potassium, sodium or ammonium; poisoning by carbon bisulphide, aniline poisoning, and chronic benzene poisoning; manganese poisoning; compressed air illness; toxic anaemia. Notification of cases of lead poisoning was also required under the Lead Paint (Protection against Poisoning) Act, 1926, which came into force on January 1, 1927, when it occurred in a person employed in painting buildings.

The numbers of cases, and deaths, notified from these causes during the seven years, 1939 to 1945, are given in Table VI (Industrial Diseases). These figures do not necessarily represent all the cases of these diseases which have occurred in industry, but the statistics have been maintained since 1900 and they have some comparative significance.

Lead Poisoning. Lead poisoning is not, over all, a special risk in wartime; the general trend of the number of cases was towards diminution, and in 1944 the lowest recorded figure was reached, namely, 41 cases, including 5 fatal. Most noteworthy is the complete absence, for the first time in history, of lead poisoning in the pottery industry, once a prolific source of cases. While this is no doubt partly due to the diminished activity of the industry in the war period, it is chiefly the result of the gradual adoption of leadless or 'low-solubility' glazes. In 1940 an increase of cases of lead poisoning in the manufacture of electrical accumulators and in processes involving contact with molten metal, was caused by increased working hours and less attention to hygiene, but was balanced by a reduction in the cases in other industries as, for example, the painting of buildings, in which the number reached the then lowest recorded figure in 1939, at 15, and continued to fall gradually until 1943, when it reached four. One instance of the increase of lead poisoning in war industry was that due to leaded petrol for testing aero engines, carburettors and fuel pumps. Five such cases in 1944 were attributed to ethyl petrol. Four of them occurred in carburettor jet calibration testing, involving considerable exposure to leaded petrol fumes, as well as skin contact with the liquid. The symptoms were those of poisoning by organic lead compounds: insomnia, apprehension, wild dreams and mental confusion. By co-operation with

* These are the terms of the Order, but the chemical compounds intended to be specified would be more correctly designated amino-derivatives.

the departments concerned unleaded petrol was substituted for testing purposes. In 1942, 16 out of 43 workers employed at a short-distance testing range were affected by cordite fumes and lead nickel dust produced by the impingement of bullets on deflection plates and continuously blown back into the workroom through the firing apertures. Eight of the workers showed signs of lead absorption, with blue line on the gums and punctate basophilia. Adequate ventilation, and firing against a stream of water, prevented further cases. During the five years 1940 to 1944, 24 cases of lead poisoning occurred in the process of casting lead bronze, from which the extremely fine fume is not stopped by the most highly efficient dust respirator. Localised mechanical exhaust draught is indispensable where fume is evolved in the casting of lead alloys.

Phosphorus Poisoning. Notifications of phosphorus poisoning have been rare since the prohibition of the use of white phosphorus for the manufacture of matches in January 1910. During the war years only four cases were notified.

Mercurial Poisoning. During the seven years 1939 to 1945 inclusive, 42 cases of illness, including one death, from mercurial poisoning were notified. The commonest cause of industrial mercurial poisoning within recent years has been from exposure to the vapour of the metal in the manufacture of instruments containing mercury, especially thermometers, barometers and electricity meters; it depended on the evaporation from small globules of mercury spilled about the benches and floors of the workplaces, aided by the somewhat high temperature usually prevailing there. Of the 42 cases notified, 17 arose from this cause.

Arsenical Poisoning. Contact with compounds of arsenic accounted for 17 notified cases of poisoning in the seven-year period. Of these, five were fatal, all of the deaths being due to cancer of the lung, three following employment in the manufacture of sheep dip, and one in a chemical worker on sodium arsenite. The relation between exposure to arsenical dust and pulmonary carcinoma has received attention from the department for some years, with the co-operation of the principal manufacturers, and a committee was set up under the auspices of the Industrial Health Research Board to examine the problem. The fifth fatality was due to the inhalation of arsenic trichloride during the manufacture of anti-fouling paint. Three cases notified as arsenical poisoning would be more accurately classed as gassing accidents as they were due to accidental momentary exposure to a sternutatory war-gas (D.A.). They suffered only temporary symptoms without sequelae.

Manganese Poisoning. Since manganese poisoning became notifiable in 1936 only three cases had been reported to the department. The second of these occurred in 1943 in a man employed in crushing ferromanganese for two years, who developed the characteristic signs of

expression, voice, articulation and gait. The third case occurred in 1944 following a period of four years employment in grinding manganese ores.

Carbon Bisulphide Poisoning.—Four cases were notified during the war years, all of which arose from exposure to vapour of carbon bisulphide used in the viscose process of manufacture of artificial silk or transparent paper. The symptoms were moderate or slight in each case and consisted of digestive disturbances, headache, muscular weakness and tremor, some temporary changes in vision and mental hebetude.

Chronic Benzene Poisoning. Reported cases were classified as chronic benzene poisoning if there was anaemia of the dyshaemopoietic type with subcutaneous haemorrhage or bleeding from mucous membranes after exposure to benzene. A dyshaemopoietic anaemia alone without those characteristic signs was classified as toxic anaemia. Benzene (C_6H_6) or commercial benzol is chiefly used in industry as a solvent, especially for rubber, and as a constituent in thinners for cellulose solutions and certain inks and paints. During the seven-year period 11 cases, including 6 fatalities, were notified. Two of the cases, one fatal, occurred in the manufacture of leather cloth; in the fatal case the man was employed 52 hours a week, on night shift, at spreading machines, when the ventilation was impaired by blackout. Another fatality, in 1944, was a young assistant works chemist engaged on testing cellulose solutions containing benzene; an improvement in localised ventilation for this factory had been designed by the firm, but could not be done because of shortage of labour and material. Two women workers on rubber solutions, one on gas masks, the other on insulating tape, died from benzol poisoning; a man employed in the bookcloth industry in mixing benzol solution died of aplastic anaemia. Other cases occurred: from dipping hospital bedsteads in paint containing the solvent; from cleaning electrical switchboards in an electrical engineering works; from photogravure printing, and in the treatment of bones for fertiliser, the last mentioned case being fatal.

Aniline Poisoning. Aniline poisoning is more correctly a symptom group characterised by headache, dyspnoea, cyanosis, giddiness and nausea, and is sometimes known as 'anilism'. It is not confined to poisoning by aniline but, for purposes of notification, includes the characteristic syndrome when it arises from exposure to absorption, by accidental inhalation, ingestion or, especially, through contact with the skin, of any nitro- or amino-compound of benzene, or its homologues. By far the commonest cause during the war years was trinitrotoluene (T.N.T.). Thus a total of 699 cases of aniline poisoning were notified during the seven-year period, and of these 562 (81 per cent.) were due to T.N.T., 504 cases occurring in Royal Ordnance Factories and 58 in other places under the Factories Act. The numbers occurring in the different years are shown in Table II. None of these cases of anilism was fatal.

It may be of interest to consider at this point two other notifiable diseases which are symptom groups and which, like aniline poisoning, may be caused by T.N.T., and to see how far these conditions were due to that explosive. These are toxic jaundice and toxic anaemia.

Toxic Jaundice. Toxic jaundice, due to tetrachlorethane or nitro- or amino-derivatives of benzene or its homologues or other poisonous substance, became notifiable on January 1, 1916 following a high incidence of severe cases with many fatalities, during the early part of the First World War, from the use of tetrachlorethane in cellulose solutions used in coating aircraft wings, and the manufacture and manipulation of the high explosive T.N.T. in the production of munitions of war. According to Legge,[13] toxic jaundice, and not T.N.T. poisoning, was specified in the Order so that as definite and clearly-marked a sign as possible should be given of the stage when notification was deemed necessary. He believed that for every case of toxic jaundice there were at least thirty persons affected by T.N.T. in minor degree necessitating absence from work.

No case of toxic jaundice was notified during 1939. During the six years 1940 to 1945 a total of 125 cases, including 30 deaths, were notified. The figures for each year are given in Table II:

TABLE II

Poisoning due to T.N.T.

Notified cases of Toxic Jaundice, Toxic Anaemia and Aniline Poisoning

	1939	1940	1941	1942	1943	1944	1945	Totals
Toxic Jaundice .								
(*a*) R.O.Fs.* . .	—	13^{1}	41^{12}	25^{5}	9^{1}	11^{1}	6^{1}	105^{21}
(*b*) Other . .	—	5^{2}	—	1	5^{2}	—	—	11^{4}
Total	—	18^{3}	41^{12}	26^{5}	14^{3}	11^{1}	6^{1}	116^{25}
Toxic Anaemia								
(*a*) R.O.Fs. . .	—	—	—	6^{2}	4^{2}	4^{2}	1	15^{7}
(*b*) Other . . .	—	—	—	1^{1}	2^{2}	2^{2}	1	6^{5}
Total	—	—	—	7^{3}	6^{4}	6^{5}	2	21^{12}
'Aniline' Poisoning								
(*a*) R.O.Fs. . .	1	50	218	155	41	21	18	504
(*b*) Other . .	—	4	—	12	21	15	6	58
Total	1	54	218	167	62	36	24	562
Grand totals	1	72^{3}	259^{12}	200^{8}	82^{7}	53^{6}	32^{1}	699^{37}

The principal figures relate to cases, the raised figures to deaths.
* R.O.F.—Royal Ordnance Factory.

In the whole series of cases of toxic jaundice due to T.N.T. notified during the seven-year period, there were 48 males, with 9 deaths (19

per cent.) and 68 females with 16 deaths (23·5 per cent.); a total of 116 cases with 25 deaths (21·5 per cent.). The average period of employment with T.N.T. before the illness was in 46 males (excluding 2 for which duration was not stated) 5·88 months, in 68 females it was 5·42 months; in 8 fatal cases in males (excluding one not determined) the average period of exposure was 3·56 months, and in 16 fatal cases in females the average period of exposure was 2·92 months.

Toxic Anaemia. This symptom group became notifiable in March 1942 with the intention of bringing to the notice of the department cases of dyshaemopoietic anaemia due to the action of X-rays, radioactive substances and any chemical compound capable of producing this effect. It was well known that contact with T.N.T. was liable to cause an anaemia of a progressive type with or without the more common condition of toxic jaundice. During the seven-year period altogether 21 cases of toxic anaemia, after contact with T.N.T., were notified, of which 12 were fatal. Fifteen cases, with 7 fatal, were of workers in Royal Ordnance Factories, and 6 cases with 5 deaths occurred in other establishments.

Summary of Aniline Poisoning. To sum up the position regarding systemic poisoning of workers by T.N.T. as distinct from dermatitis, there were notified during the years 1939 to 1945, from toxic jaundice, 116 cases including 25 (21·6 per cent.) fatal; from toxic anaemia, 21 cases including 12 (57 per cent.) fatal; from anilism, 562 cases with no deaths; a total of 699 cases of poisoning by T.N.T., with 37 (5·4 per cent.) deaths. The only comparison possible with conditions during the War of 1914–18 is in regard to toxic jaundice, since it alone of the three forms of poisoning due to T.N.T. was notifiable then from January 1916 only. During the years 1916, 1917 and 1918 a total of 404 cases of toxic jaundice due to T.N.T. were notified to the department; of these, 106 (26·2 per cent.) were fatal. This gives a rate of notification of 11·2 cases for each month during the three years 1916 to 1918. During the War of 1939–45, over the whole period 1940 to 1945, omitting 1939, in which no case was notified and only four months were under actual war conditions, the total number of cases of toxic jaundice due to T.N.T. was 116 including 25 (21·6 per cent.) fatal; the rate of notification during this period was 1·6 per month.

Aniline poisoning, or 'anilism', due to contact with substances other than T.N.T., was notified in respect of 132 cases, or 19 per cent. of the total compared with 562 cases due to T.N.T. in the same period. Compared with previous years the incidence from 1939 to 1945 showed an increase over the preceding seven-year period, which gave a total of 49 cases and was similar to the earlier period, 1925 to 1931, in which 138 cases were notified. The other causative agents, and the numbers of cases, were: aniline, 61; nitro- and dinitro-benzene, 26; para-nitrochlor-benzene, 10; chlor-aniline, 9; paratoluidine, 7; para-nitro-

aniline, 5; dinitrochlor-benzene, 4; metanitraniline, 3; and in the process of aniline black dyeing, 2.

Toxic jaundice due to contact with poisonous substances other than T.N.T. was responsible for 9 cases, with 5 deaths, during the period 1939 to 1945. The cause in 5 cases, all fatal, was chlorinated naphthalene used principally as a coating agent for electric condensers; the earliest notified case from this cause was in 1940. Arseniuretted hydrogen accounted for 3 cases and dinitro-benzene for one. Toxic anaemia due to causes other than exposure to T.N.T. numbered 19 during the four-year period from 1942, when it became notifiable.

The incidence of illness due to contact with trinitrotoluene (T.N.T.) was estimated from data obtained from a group of Royal Filling Factories over a period of thirty-four months, from August 29, 1942 to June 30, 1945 (Table III). The populations at risk were taken from the monthly returns of persons engaged in processes exposing them to contact with T.N.T. in the filling departments. The average monthly number exposed to contact over thirty-four months was 8,339. The number of cases of toxic jaundice was 34, an average of 1 per month or 0·12 per 1,000 employed per month. The number of cases of toxic anaemia reported during the period was six, or 0·02 per 1,000 per month. The data for gastritis and anilism due to contact with T.N.T. covered only 11 months, from July 29, 1944 to June 30, 1945; the average number employed per month in contact with T.N.T. was 7,915. There were reported during the 11-months period 119 cases of gastritis (1·37 per 1,000 per month) and 47 cases of anilism (0·54 per 1,000 per month).

TABLE III

Nature of illness	Average number exposed per month	Average cases per month	Cases per 1,000 employed	Period
Toxic jaundice	8,339	1·00	0·12	34 mth.
Gastritis .	7,915	10·82	1·37	11 ,,
Anilism .	7,915	4·27	0·54	11 ,,

Compressed Air Illness. During the seven years 1939 to 1945, 18 cases were notified, with two deaths. Of these, 12 cases were notified in 1939 all following work under comparatively low pressure of about 18 lb. to the square inch above normal, in tunnelling works in extension of London underground railways.

Anthrax. The number of cases of anthrax notified during the seven years of war was 153, including 21 deaths. This number shows little variation from the total number for the preceding seven-year period of 163 cases with 19 deaths. The figures for the separate years show that in 1939 the number was relatively high for hides and skins, with 19

cases and 3 deaths, and in 1940 a relatively high number was notified from wool, viz. 17 cases with 3 deaths. Apart from a somewhat high figure for hides and skins in 1942, the numbers of notifications on account of anthrax show a general decline from the usual incidence. This decline was apparently due to the smaller quantities of raw materials which are frequent sources of infection, that entered the ports of this country from countries in Asia and Africa, the principal groups of those materials being wool, horsehair, hides and skins. Some materials, particularly goat hair, have to be disinfected on import. Separate figures are given for sources and years in Table VI. All the cases notified during the period 1939 to 1945 were of the cutaneous form known as 'malignant pustule'.

The change in methods of treatment of malignant pustule are of some interest. Anti-anthrax serum was the method of choice in the earlier years of the period under review. In each of the years 1939, and 1940 there were 18 cases, including 2 fatal, treated by serum alone; in 1944 and 1945 there were, respectively, 2 cases with one death and 1 non-fatal case. Excision alone was entirely abandoned some years ago; excision with serum was done in 7 cases during the seven years and all of them were cured. Serum, combined with administration of organic arsenicals, such as novarsenobillon, neokharsivan and the like, was used in 38 cases with five fatalities, and serum with sulphonamides in 10 cases with 2 deaths, and these two drug groups have also been used alone or together in 4 cases in all, with recovery. Penicillin was a newcomer in 1944, used first in combination with serum and sulphonamides in 2 cases with 1 death. It was used in 6 recovered cases in 1945, once alone, twice with serum, and 3 times with serum and arsenicals. The method of treatment was not stated in 9 cases, with 2 deaths, and in 6 cases, with 5 deaths, no specific treatment was used. It must be remembered in recording methods of treatment for cutaneous anthrax, that the development of the lesion may be very rapid and the case desperate in four or five days from the time of infection; the efficacy of treatment, therefore, can only be judged if all the circumstances are known, especially the lapse of time from the first evidence of infection and the commencement of treatment, and the site of the lesion. The figures commented on are shown in Table IV.

Epitheliomatous Ulceration. Epitheliomatous ulceration due to tar, pitch, bitumen, mineral oil, paraffin or any compound, product or residue of any of these substances, became notifiable in January 1920. During the period 1939 to 1945 the total number of cases notified was 1,147, including 109 fatalities; of these 506, with 3 deaths, were due to pitch; 342, with 20 deaths, to tar; 6, with 1 death, to paraffin; and 293, with 85 deaths, to oil. The figures for each year and the separate groups of causative agents are given in Table VI. In the seven-year period before the war, 1932 to 1938, the total notifications of epitheliomatous

TABLE IV

Anthrax Treatment

	1939	1940	1941	1942	1943	1944	1945	Totals
Serum (alone)	18^{2}	18^{2}	9^{1}	15	8	2^{1}	1	71^{6}
Serum + excision	2	1	3	1	—	—	—	7
Serum + arsenicals	12^{2}	12^{2}	3	4	5^{1}	2	—	38^{5}
Serum + sulphonamides	—	4^{1}	4^{1}	—	1	1	—	10^{2}
Arsenicals (alone)	1	1	—	—	—	—	—	2
Sulphonamides (alone)	—	—	—	1	—	—	—	1
Arsenicals + sulphonamide	1	—	—	—	—	—	—	1
Serum and penicillin	—	—	—	—	—	—	2	2
Serum, penicillin and arsenicals	—	—	—	—	—	—	3	3
Serum, penicillin and sulphonamides	—	—	—	—	—	2^{1}	—	2^{1}
Penicillin (alone)	—	—	—	—	—	—	1	1
No specific treatment	1^{1}	—	1^{1}	1	2^{2}	1^{1}	—	6^{5}
Not stated	2	1	2	3^{1}	1^{1}	—	—	9^{2}
	37^{5}	37^{5}	22^{3}	25^{1}	17^{4}	8^{3}	7	153^{21}

The principal figures relate to cases, the raised figures to deaths.

ulceration were 1,105 cases, with 226 deaths, showing a number slightly below that for the war period. The difference is explained chiefly by an increase in the number of notified cases due to pitch and tar, with 848 cases and 23 deaths for the war years, and 677 cases and 90 deaths for the earlier period; this increase is balanced by a decrease in the numbers of cases due to oil in cotton mule spinners; these numbered 257 with 74 deaths, in the war period, and 381 with 138 deaths, in the earlier period. More remarkable than the variation in the number of cases is the reduction in the case mortality rates. In the pitch and tar group of occupations the reduction appears to be from 13·3 per cent. in the pre-war period, to 2·7 per cent. for the period of the war. The figures do not represent a true measure of the case mortality in this group because a number of the affected persons notified as cases of epitheliomatous ulceration were actually suffering from a keratotic new growth or 'pitch wart' (which is amenable to treatment, for example by low voltage X-rays, and for which workmen's compensation is payable during absence from work for treatment) and the numbers of notifications were therefore augmented by the inclusion of consecutive notifications in respect of the same individuals reporting for treatment of later developing warts. In cotton mule spinners, however, the case was different. There was a decrease in the number of cases during the war period, when 257 cases were notified compared with 381 in the preceding seven years; this decrease may have been due partly to the fall in the number of workers in the cotton trade, which became depressed even before the war; but, in view of the long latent period

usually observed in the development of the disease, this explanation is not entirely sufficient. In this occupational group most cases were diagnosed as epithelioma before notification, so that the reduction in case mortality from 36·2 per cent. to 28·8 per cent. is probably reliable.

In the Interim Report of the Joint Advisory Committee of the Cotton Industry on Mule Spinners' Cancer and Automatic Wiping-down Motions (H.M.S.O. 1945) recommendations were made for the prevention of mule spinners' cancer; these include specifications for oils used for lubrication of spinning mules, devices to prevent splashing of oil, and periodic medical examinations.

Chrome Ulceration. Chrome ulceration, that is, ulceration due to chromic acid or bichromate of potassium, sodium or ammonium or any preparation of these substances, occurring in a factory, became notifiable on January 1, 1920. Chrome compounds cause dermatitis or eczema on sensitive skins, but the lesion intended in the Order is the circumscribed ulcer, or 'chrome hole' resulting from the action of chrome compounds on the skin or mucous membrane which, on the skin, is almost always at the seat of an injury, though this may be, and usually is, a very small abrasion or puncture wound; on mucous membrane the ulcer is usually situated over the cartilaginous part of the nasal septum, and frequently leads to perforation. The processes in which the condition arises most commonly are in the treatment of metal articles by the electrolytic methods of chromium plating and anodic oxidation. The latter process was frequently used in aircraft manufacture and during the period 1939–45 the number of cases occurring in anodic oxidation was 198, compared with 39 cases in this process in the preceding period, 1932–38. The figures for anodic oxidation are included in 'Other industries' in Table VI. Also included in this group are the cases of chrome ulceration due to non-electrolytic treatment of metal parts to prevent corrosion; there were 47 cases from these processes in the seven-year period. In 1943, 131 cases were reported of chrome ulceration arising from the sieving of sodium chromate in the manufacture of smoke bombs, and in 1944 a further 31 cases were reported from this unusual cause. The total number of cases of chrome ulceration reported from all causes during the period 1939–45 was 913 compared with 604 cases for the period 1932–8.

Dermatitis. Unlike the industrial diseases already considered, dermatitis was not compulsorily notifiable, but it had been the practice over many years for firms to report cases voluntarily, in order to obtain advice on the control of this disabling, although rarely fatal, condition. Because of this voluntary basis of notification and the absence of data regarding the numbers at risk in the various processes in which the disease arises, no reliable statistics can be compiled for examination. The trend shown by the annual notifications for the seven years before the war was a gradual increase from less than 500 cases in 1932 to nearly 3,000 in

1939. That is not to say that there was an increase of incidence of that extent in that time, but rather that the practice of voluntary notification had increased. This view is almost certainly correct, as the numbers notified in later years approached those for which compensation was paid, allowing for the wider industrial spread of the Workmen's Compensation Acts compared with that of the Factories Acts. During the seven years which include the period of the war the number of notifications had risen from 2,952 in 1939 to a peak of 8,926 cases in 1943, though there was a slight decrease to 8,180 in 1944, with a further fall to 5,996 in 1945. The fact that a fall in numbers was recorded at the end of the war period points to a possible causal relationship with the impact of activities concerned with the war.

Of the thirty-five industries and processes under which the notifications of cases of dermatitis are classified, the largest groups are chemical manufacture, and engineering, including mechanical, electrical and transport engineering.

In the chemical group the cases increased from 477 in 1939 to the peak of 2,824 in 1942, falling to 1,707, 1,151 and 688 in the next three years; the decrease was probably due to a slackening of production of explosives, or to the effect of selection of workers who were less susceptible, or had become resistant to the action of such explosives as tetryl, T.N.T. and fulminate of mercury, which are very liable to cause dermatitis, or to both factors. Another factor which undoubtedly exercised a similar effect was improved methods of working and the acquisition of more expert technique through training of the workers.

In the engineering group the rise in the number of cases was from 517 in 1939 to a peak of 3,201 in 1943, followed by 3,195 and 2,233 in 1944 and 1945 respectively. The peak was reached later than in the chemical group, was flatter, and did not show so great a fall in 1945. This was influenced, no doubt, by the relatively smaller proportion of new workers compared with the chemical group, though the actual number was very great, and to the continuance of similar types of industrial activity on the turn-over from war work to the manufacture for peace-time use of goods having some of the dermatitis-producing characters of war-time products. Thus, general munitions gave place to baking machinery, landing craft to prefabricated houses, parachutes to shirts, machine guns to carpet sweepers, rubber boats to air cushions, camouflage netting to artificial flowers, and shells to agricultural implements.

Dermatitis occurring in workers in a group of filling factories was reported in those exposed to contact with trinitro-toluene (T.N.T.), trinitro-phenyl-methyl-nitramine or tetryl (C.E.), and mercury fulminate, over a period of thirty-four months as follows: the average monthly population exposed to contact with *T.N.T.* was 8,339; the number of cases of dermatitis was 1,151 equal to an average of 33·85

per month (4·06 per 1,000 per month). The average number of workers exposed to C.E. per month during the period was 10,642; the number of cases of dermatitis was 8,183 over the period, equal to an average of 240·68 per month (22·61 per 1,000 per month). The average number of workers exposed to contact with mercury fulminate per month during the period was 3,935; the number of cases of dermatitis was 3,749 over the period, an average of 110·26 per month (29·41 per 1,000 per month).

The seasonal incidence of C.E. dermatitis is an interesting point. The general opinion in this country was that the condition was most prevalent in summer, and various theories have been advanced in support of this view. In a careful statistical study [14], carried out in Australian fuse-filling factories, it was shown that the greatest risk of rash occurred in the spring months and the smallest in mid-summer. In estimating the seasonal incidence other important factors must be considered, for example, the period of contact before the first attack which may be within a few days or only after several weeks' exposure (in the Australian experience the peak rash-rate was found between the fourteenth and twenty-fourth days of service), but the data available for the group of Royal Filling Factories referred to are not sufficient to show clearly or definitely the seasonal incidence of C.E. dermatitis. However, they tend to confirm the Australian experience, because the highest incidence occurred between the third and fifth months of the years 1943, 1944 and 1945, and the lowest incidence in 1943 and 1944 was reached in the late autumn.

TABLE V

Incidence of Dermatitis amongst Workers exposed to contact with T.N.T., C.E. and Mercury Fulminate, respectively, in a group of Filling Factories

Explosive	Average number exposed per month	Average cases per month	Incidence per 1,000	Period
T.N.T. . .	8,339	33·85	4·06	34 mth.
C.E. . . .	10,642	240·68	22·61	34 ,,
Mercury fulminate	3,935	110·26	29·41	34 ,,

THE USE OF RADIOACTIVE SUBSTANCES IN INDUSTRY AND THE EFFECTS ON THE WORKERS

The demand for instruments with luminous dials was greatly increased by the outbreak of war and the expansion of aircraft construction. The radioactive materials used for luminising were compounds of radium or mesothorium, usually mixed with other mineral salts and made into a paste by mixing with mucilage or varnish; the dry material was, for some purposes, filled into capillary tubes. The serious effects on the health of workers exposed to radioactive

TABLE VI

Industrial Diseases

Particulars of the cases of industrial poisoning or disease notifiable under Section 66 of the Factories Act, 1937, and under Section 3 of the Lead Paint (Protection against Poisoning) Act, allowing comparison with previous years, are given below.

Disease and industries	Reported cases						
	1939	1940	1941	1942	1943	1944	1945
Lead poisoning	109[6]	108[6]	59[5]	72[8]	46[5]	41[5]	45[2]
1. Smelting of metals	8	11	9	3	7[1]	2	5
2. Plumbing and soldering	3	4	5	3	1	1	2
3. Shipbreaking	4	6	1	3	—	1[1]	1
4. Printing	—	—	—	1	1	—	—
5. Other contact with molten lead	5	21[1]	9	13	9	6	1
6. White and red lead works	10	17	1	7[1]	5	2	5
7. Pottery	7[3]	6[3]	4[3]	6[2]	2[2]	—	—
8. Vitreous enamelling	4[1]	1[1]	—	—	—	—	1[1]
9. Electric accumulator works	4	15	11[1]	10	4	3	16[1]
10. Paint and colour works	13	7[1]	3[1]	1	4	5	6
11. Coach and car painting	1[1]	—	1	—	1	1	1
12. Shipbuilding	5	1	1	5[1]	—	—	1
13. Paint used in other industries	2	5	2	3	2	1	—
14. Other industries	28	4	4	11[2]	6[1]	11[2]	3
15. Painting of buildings	15[1]	10	8	6[2]	4[1]	8[2]	3
Phosphorus poisoning	—	—	1	—	2	1	—
Mercurial poisoning	10	5	5	1	4	7	5[1]
Arsenical poisoning	4[2]	2[2]	—	6	2[1]	3	—
Manganese poisoning	—	—	—	—	1	1	—
Carbon bisulphide poisoning	1	1	1	—	—	1	—
Aniline poisoning	12	64	249	204	79	55	31
Chronic benzene poisoning	2	3[2]	1[1]	1[1]	1[1]	1[1]	1
Toxic jaundice	—	20[4]	44[13]	27[6]	16[4]	12[1]	6[2]
Toxic anaemia	—	—	—	14[2]	7[4]	12[6]	7[2]
Compressed air illness	12	3[2]	—	—	1	1[1]	1
Anthrax	37[5]	37[5]	22[3]	25[1]	17[4]	8[3]	7
1. Wool	11[1]	17[3]	7[1]	7	6[1]	3[1]	—
2. Horsehair	2	2	3[1]	2	—	1	1
3. Hides and skins	19[3]	13	9	15[1]	8[3]	4[3]	5
4. Other industries	5[1]	5[2]	3[1]	1	3[1]	—	1
Epitheliomatous ulceration	160[31]	166[15]	128[11]	113[8]	160[15]	205[20]	215[9]
1. Pitch	74[1]	85[1]	59	52	54	99[1]	83
2. Tar	34[7]	34[3]	30[4]	33[2]	57[1]	61[3]	93[1]
3. Paraffin	—	1	1[1]	—	1	—	3
4. Oil	52[23]	46[11]	38[6]	28[6]	48[14]	45[17]	36[8]
Chrome ulceration	159	121	103	89	226	121	94
1. Manufacture of bichromates	7	14	13	14	9	12	14
2. Dyeing and finishing	5	6	6	2	—	4	1
3. Chrome tanning	8	4	5	4	7	2	—
4. Chromium plating	91	57	29	24	23	18	30
5. Other industries	48	40	50	45	187	85	49

The principal figures relate to cases, the raised figures to deaths. Fatal cases not reported in previous years are included as both cases and deaths.

substances, which were liable to arise in the absence of adequate precautions, were well known, and immediate steps were taken to devise methods of protection. The measures adopted were, in the first instance, worked out with co-operation from the Air Ministry and the advice of Professor W. V. Mayneord, and were embodied in a code of rules as Appendix XV in the Manual for Medical and Dental Officers of the Royal Air Force, 1940, and in the Factories (Luminising) Order, 1942.[15] The Order limited the age and hours of employment of the workers and provided for periodic medical examinations with the power to suspend from contact; it required the provision of localised ventilation, protective screens at the work benches and means of avoiding contamination with the material, including protective clothing, washing facilities and supervision by a responsible person. The Factory Department followed closely the effects of the Order, and, in addition to the statutory periodic medical examinations required by the Order, a medical inspector of factories maintained a survey over all the workers engaged in the luminising processes, by clinical and haematological examinations. As a result of these surveys an Amending Order[16] was made in July 1943, which added to the principal Order a provision requiring a period of three months' interruption of employment in the process after twelve months in such employment.

In April 1943, arrangements were made with the National Physical Laboratory for estimating the weekly dosage of radiation to which workers were exposed, by the use of dental films worn during working hours and later examined. From these film tests the National Physical Laboratory found that almost all the luminisers were exposed to less than 1·0 roentgen per week, the great majority to less than 0·1 roentgen per week. In a few factories, however, groups of workers were exposed to heavier dosages which in some cases exceeded 5·3 roentgens per week. The excessive dosage was traced to faulty technique, contamination of benches, overalls, etc., but some of the films were over-exposed by leaving them in overalls or near a direct source of radiation during the night. The numbers of luminisers employed on the process increased from about 300 in 1940 to about 560 in 1944. These were distributed in factories numbering about 40 in 1940, increasing to about 70 in 1944, in groups varying from one or two luminisers to a maximum of 47.

Dr. Ethel Browning, the Medical Inspector of Factories entrusted on behalf of the Factory Department with the examination of the luminisers, observed first in 1942 a slight chronic dermatitis of the fingers—red areas of atrophic and sometimes scaly appearance of the skin immediately above the nail fold. This was found in a fairly large number of operatives, 85 in 1943, who had been employed for more than a year up to the end of 1943. After that time this condition was rarely found, probably owing to the effect of the Amendment Order of 1943 requiring an interruption of contact after twelve months' employment,

and partly to the more general use of a paint container devised by Professor Mayneord which prevented almost all exposure to beta radiation from the paint in the container.

Estimations of the radon content of the air exhaled by luminisers after forty-eight hours' removal from exposure were made by Professor S. Russ, in 1943, in about 100 operatives chosen because of some deviation in the blood picture, and further examinations by direct X-ray measurement were carried out by Dr. L. H. Gray. The object of these examinations was to determine the presence of radioactive material in the body. One man engaged thirty years on work with radioactive material showed a retention of 0·3 micrograms.

Blood examinations made by Dr. Browning showed, where changes had occurred, only slight deviations from normal limits and with no evidence of a tendency to aplastic anaemia. Evidence of slight depression of the bone marrow was present as leucopenia in about 4 per cent. of those examined, and none showed a total white cell count below 4,000 per c.mm. Slight relative hyperactivity of the bone marrow was more frequent and in 21 per cent. a white cell count between 7,000 and 8,500 was present. In 2 per cent. leucocytosis was found and in 11 per cent. abnormal cells of the myeloid series or Turk cells, and in two cases plasma cells were seen in the stained films.

During the first half of 1946 Dr. Browning followed up 167 women luminisers who had left work in contact with radioactive substances for periods of from one to five years. The duration of employment of these workers ranged from one year to twenty-five years. None showed symptoms of serious ill-health which could be attributed to their former occupation. To the 167 operatives followed up 21 children had been born; and one had had three children in the preceding five years. Of the 21 children, 17 appeared perfectly normal, two were still-born, one died at the age of two years, and one was apparently slightly cretinoid. The blood pictures after leaving work with radioactive material showed three striking points of difference: a fall in the number of red cells where this had been relatively high for this class of women and a slight but irregular fall in the haemoglobin; the complete disappearance of the abnormal cells which had been noted in 36 of the 167 women when they were engaged on the work; and a reduction in the number of cases showing relative lymphocytosis with a high normal, i.e. 6,500 to 8,500 white cell count. Out of 83 cases formerly showing it, only eight now did so, but in 12 it was present for the first time. Leucopenia present formerly in 19 cases was still present in 7 of them. Neutropenia found formerly in only 2 cases was still present in 1 of these and was found for the first time in 4 others. The result of this follow-up confirmed the earlier impression that the initial effect of exposure to small amounts of radioactive substances is one of hyper-stimulation of some part of the haemopoietic system.

X-RAYS IN INDUSTRY

Investigations similar to those carried out on luminisers were made into the effects on the health of workers engaged on X-ray plants. In 1943 a few X-ray operatives were examined in order to correlate the blood picture with an exposure to X-rays above the tolerance dose of one roentgen per week, as indicated by the dental film. Only a few factories showed evidence of exposure exceeding 0·3 r. per week and blood examinations were made of 11 operatives in seven factories. Leucopenia was found in one and relative lymphocytosis in two. At a factory where an excessive exposure was found, one man had severe leucopenia at the first examination; a month after removal from exposure to X-rays the white cell count had risen from 2,900 to 4,700 per c.mm. In 1945 twenty-one industrial X-ray operators were examined. The symptom most commonly found was lassitude, while possibly significant blood changes noted were relative lymphocytosis in seven, leucopenia and neutropenia two each. Several X-ray burns were met with during these examinations; one, on the scalp, caused alopecia which lasted seven weeks.

THE PNEUMOCONIOSES

Because of the long latent period in the development of the diseases in this group, and the chronicity of their course, it is not to be expected that the influence of the war would be shown in the records available immediately after the cessation of hostilities. Some of the industries and processes in which silicosis, the most important of the diseases in the group, occurred with baneful influence were undoubtedly more active in war production. Whether any effects of this will be found when the results of exposure during the war have had time to show themselves remains to be seen; (the average duration of employment was thirty-four years in 844 fatal cases of silicosis investigated by the Factory Department between 1929 and 1944). There are reasons for thinking that evil results of activity during war years will not arise, at least in some industries, because, from them, the essential causative factor, free silica, had been removed. This is especially the case in the grinding of metals in which the sandstone grinding wheel had been replaced, during the twenty years preceding the war, by non-siliceous abrasive wheels in all but a few processes; and the sandblasting of metals, in which the use of quartzose sand or other siliceous abrasive has been gradually replaced by metal grit or other non-siliceous material.

Less pertinent to the impact of war on industrial medicine, but notable as an achievement in this field, was the gradual elimination of powdered flint from the china branch of the pottery industry, and its statutory prohibition by the revised Regulations for the Pottery Industry. This was a result of co-ordinated research work, in which the Home Office,[17] the Medical Research Council[18] and the pottery

industry participated and carried to a successful issue in spite of the war. The effect of this concerted effort has been to remove the menace of silicosis from future generations of workers in this branch of the industry.

In industries and processes in which this fundamental principle of substitution could not yet be adopted, preventive measures of dust elimination and suppression were applied, and an amelioration of the conditions resulted generally throughout the industries to which they were applicable. New processes, however, arising for the most part sporadically, and introduced or conducted by persons ignorant of the noxious properties of the materials they handled (and the delayed action gave no immediate warning), were not amenable to the same degree of control; these are represented in the last group of industries in the following table :

TABLE VII

Silicosis: Average Number of Deaths per Year

Industry or process	1935 to 1938	1935 to 1944	1941 to 1944
Pottery . . .	52	48	41
Sandstone . . .	95	85	67
Grinding of metals .	23	17	10·5
Sandblasting . .	11	9	5·5
Miscellaneous (including manufacture of scouring powders) . . .	19	21	26
Totals	200	180	150

ACCIDENTS DUE TO GASES AND VAPOURS

Cases of injury from the immediate effects of the inhalation of gases and vapours occurring as the results of accidents are distinguished from the effects of prolonged exposure in the course of work at a process by reporting the former occurrences as accidents. The duty of reporting such accidents is placed by the Factories Act (Sect. 64) on the occupier of the factory in which the accident occurred, who is required to report it to the inspector of factories for the district in which the factory is situated. The accident becomes notifiable only if it causes loss of life to a person employed in the factory, or if it disables any such person for more than three days from earning full wages at the work at which he was employed. The requirements differ therefore from those for the fourteen industrial diseases which are notifiable forthwith, both by the doctor making the diagnosis and by the employer. The returns given for acute poisoning by gases or vapours as the result of accident include only those in which the persons have been disabled for more than three days or have died as the result of the accident. Many slight cases arise

in which recovery and return to work occur within three days, so that the statutory figures are not a true indication either of the number of cases or the amount of disablement caused.

The number of cases of accidental poisoning by gases and vapours for the seven years before the war, i.e. 1932 to 1938 inclusive, was 1,095, including 117 fatalities. The numbers notified during the seven-year period covering the war years, 1939 to 1945, were 3,899 cases and 187 fatalities. The numbers for the different causes in the seven years are given in Table VIII. The excess of the numbers during the war years over those of the preceding period was largely due to increased exposure in the production of munitions, especially in the manufacture of chemicals, including explosives, and in metallurgical work. In the former group of causes, particularly noticeable was the increase in cases due to nitrous fumes, from 57 with five deaths to 901 with ten deaths; due to chlorine, from 86 cases, to 327 cases with two deaths; and smaller though substantial increases due to hydrogen sulphide and sulphur dioxide.

The increase in carbon monoxide poisoning is related chiefly to metallurgical processes. In the earlier period the cases of poisoning by CO were 556 with 64 deaths; during the war years the numbers were 1,391 cases with 118 deaths; the main classes of the sources of the gas are given in (*a*) to (*d*) in the table.

Among the cases recorded in the group 'Other' were about 120 due to carbon tetrachloride, which occurred in the manufacture of a chemical, dichlorbenzanilide, known as anti-verm. The process was a new one and production was carried on in a large new bomb-proof windowless building specially designed for the protection of the machinery from bomb blast. General ventilation was provided by mechanical means to secure five changes of air per hour, combined with localised exhaust ventilation at parts of the process where escape of carbon tetrachloride might be expected. A ventilation value twice that provided had been advised by the Factory Department before the building was constructed, but other counsels prevailed. As a result, there were cases of poisoning, 15 during 1940, 63 in 1941, and 40 in 1942. None of the cases was fatal and the general symptom complex was fairly constant. The illness began suddenly with a feeling of abdominal tension accompanied by anorexia, nausea, vomiting and diarrhoea, and lasted, typically, about two weeks. The symptoms disappeared as suddenly as they came, but left lassitude, nervousness and a strong dislike of the odour of carbon tetrachloride. After an investigation into the effects of this process on the workers, Stewart and Witts (1944)[19] suggested that both the mental hebetude and the gastro-intestinal upset were due to the action of carbon tetrachloride on the central nervous system. The difficulties of establishing satisfactory ventilation for control of a heavy vapour, such as that of carbon

tetrachloride in a building designed primarily to withstand bombs, was illustrated by this occurrence, in which over a period of 2½ years about 200 workers had been discharged or transferred from the process, and at which only 75 were working at one time in contact with the solvent.

TABLE VIII

Accidents due to Gases and Vapours

	1939	1940	1941	1942	1943	1944	1945	Totals
Carbon monoxide:								1,391[116]
(*a*) Blast furnace	27[4]	61[13]	55[2]	41[4]	46[6]	36[5]	37[1]	303[35]
(*b*) Power	24[1]	60[1]	65[9]	116[4]	112[4]	111[7]	82[5]	570[31]
(*c*) Coal	18	17	38[4]	28[1]	18	21[3]	42[4]	182[12]
(*d*) Other	15	24[6]	80[9]	64[2]	55[7]	41[6]	57[8]	336[38]
Carbon dioxide	2[1]	4[1]	9[2]	3	—	1	1	20[4]
Sulphuretted hydrogen	6[2]	9[2]	17[1]	9[2]	12	7	6	66[9]
Sulphur dioxide	2	15	16	22	28	9	12	104
Chlorine	29	39	43	52[1]	58[1]	59	47	327[2]
Nitrous fumes	9	236[2]	217[1]	220[2]	135[4]	55[1]	29	901[10]
Ammonia	1	4	13[2]	6	9	8[2]	12[1]	53[5]
Benzol	1	4[1]	7[2]	10[4]	1[1]	1	6[1]	30[10]
Naphtha	1	—	1	—	—	2	—	4
Petrol and benzine	2	2	10[2]	2[1]	2[1]	2	1	21[4]
Trichlorethylene	9[2]	14[1]	39[2]	18	87[2]	16[1]	14	197[9]
Nickel carbonyl	10	17	6	37	30	37	15	152
Phosgene	—	3[1]	46	9	9	3	—	70[1]
Hydrochloric acid	—	—	1	4	2	3	1	11
Hydrocyanic acid	—	—	2	1	—	1	—	4
Bitumen, creosote, tar, oil	1	—	2	—	2	1	1	7
Other	27[1]	76[2]	115[4]	134[3]	89	36	64[7]	541[17]
Totals	184[11]	585[21]	782[41]	776[25]	695[27]	450[25]	427[27]	3,899[187]

The principal figures relate to cases, the raised figures to deaths.

One of the less frequent causes of accidental poisoning was ethylene chlorhydrin, an intermediate in the formation of ethylene glycol by hydrolysis from chlorine and ethylene. A fatal case of poisoning from this compound occurred when a foreman opened a process tower to correct an obstruction. The symptoms, coming on after a short interval, were very severe nausea and sickness, staggering, collapse with weak, rapid pulse, dyspnoea, cyanosis, unconsciousness and death. Post mortem, there was slight congestion of the cerebral cortex, marked oedema of the cerebral hemispheres, slight congestion of the mucous membranes of the trachea and numerous petechial haemorrhages on the pericardium. Ethylene chlorhydrin was also the cause of a reportable accident to a process worker, in which another man and six women were less seriously affected, through a temporary defect in the plant due to incorrect fixing of a flange. These cases occurred during the period 1940 to 1942.

Hydrogen phosphide, an infrequent source of industrial poisoning, was the cause of nineteen workmen being disabled from work for more than three days on a naval vessel undergoing repair in a Royal Dockyard, in 1940. The gas was given off from some calcium phosphide from old buoys which became wet and spontaneously ignited. The symptoms were soreness of the chest, slight cough and nausea. All the men recovered.

Diphosgene (trichlormethylformate) vapour caused ten women employed as machinists in a general engineering works to suffer symptoms of headache, discomfort in nose and throat, nausea, deranged stomach and weakness. The accident occurred when a bottle containing the chemical was broken in a store room, and the contents, saturating other materials in contact, evaporated during blackout when the doors were closed and ventilation was thereby reduced. The chemical was probably intended as a medium for testing A.R.P. filters and was not directly connected with the process on which the affected women were engaged.

Cadmium fumes caused the temporary disablement of seven men when a deposit of very finely divided cadmium in the screening chamber of a metallisation plant became ignited by a cigarette end. The smouldering powder gave off fumes of cadmium oxide which caused immediate symptoms of irritation of the eyes, nose and throat and tightness of the chest, followed later by pain in the chest, dyspnoea and cough, anorexia, nausea, vomiting, headache, shivering or rigors and prostration. Although only 7 men were disabled for more than three days, twenty-two men in all were affected by the fumes in varying degrees. In those most affected, the delayed symptoms, the chief of which was dyspnoea, became severe some hours after exposure. The cases arising from this incident were the subject of an article by Ross (1944).[20]

Methyl bromide, the highly toxic property of which has been described fully in recent medical literature, caused 26 cases, including 6 fatalities, during the period 1939 to 1945. Of these, 14 cases, including 2 deaths, occurred in the manufacture of methyl bromide through defects in the plant or mistakes in conducting the process; 3 cases with 2 deaths were reported in the process of filling fire extinguishers; 2 cases, 1 fatal, in emptying returned or defective extinguishers, and 7 cases, including 1 fatality, in accidental release of the vapour from fire-extinguishers. To the 26 cases mentioned must be added 11 cases, with one death, reported as poisoning by methyl bromide in the process of filling fire extinguishers during the winter of 1939–40, in a factory in which the ventilation was impaired by the arrangements for blackout. Many of the accidents with methyl bromide were due to a lack of appreciation of the high degree of toxicity of the vapour, coupled with the difficulty of detecting its presence in the atmosphere owing to the faintness of the odour. Precautions were needed for the enclosure of containers on the fume-chamber principle, with localised exhaust

draught at open points; the possibility of adding a 'stenching' substance was being considered for processes such as disinfesting foodstuffs where release of vapour in special confined spaces was necessary.

Phosphorus oxychloride, a heavy liquid giving off vapour at ordinary temperatures, is a chemical compound used in the manufacture of calciferol and flavine. Eleven cases of accidental gassing by phosphorus oxychloride were reported during the war years. There were no fatal cases; four were severe, three moderately serious, and four slight. The gassing occurred as the result of sudden exposure to the vapour from a defect or failure in the plant, a mistake in operating the process, or from spilling the liquid. The immediate symptoms were cough and a choking sensation, irritation of the upper respiratory passages and breathlessness, and in two cases nausea. In one case consciousness was lost for a short time, and in another case there was cyanosis. In the more severe cases there was an increase of the dyspnoea some hours after the exposure, and a prolonged period of bronchitis. Breathing apparatus with air-line was provided for process workers, but in those affected the apparatus had been put off too soon or was defective.

STATISTICS OF ACCIDENTS FROM ALL CAUSES

Where an accident occurs in a factory which either causes loss of life to a person employed in it, or disables any such person for more than three days from earning full wages at the work at which he was employed, written notice, with certain particulars, must by Sect. 64 of the Factories Act, be sent to the inspector of factories for the district. The numbers of accidents notified under this Section are published annually in the Annual Report of the Chief Inspector of Factories. In the Report for the year 1945 the statistics of accidents for preceding years are analysed and compared, and, though these have only a limited degree of interest in the medical history of the war, it may be worth while to observe the impact of the activities of the war years on the numbers of accidents and their distribution in age and sex groups.

The fluctuations in accident totals from year to year are largely governed by variations in the volume and distribution of employment which tend to mask the other influences at work. Accident totals, by themselves, are therefore no criterion of the position as regards progress in accident prevention. They should properly be studied in relation to the man-hours worked, as is done in those individual factories where safety officers collect the necessary data. Accurate statistics of this kind were not available on a national scale at the end of the war but some indication of the position can be gathered by comparing the number of accidents with estimates of the number of persons employed in manufacturing industries. These estimated numbers are given in Table IX, which does not include persons employed in docks, buildings under construction or civil engineering sites :

TABLE IX

Estimated numbers of Persons in thousands employed in Works subject to the Factories Act, but omitting Docks, Ships, Building Operations and works of Engineering Construction

Year	Males		Females		Totals
	18 and over	Under 18	18 and over	Under 18	
1938	3,130	490	1,430	540	5,590
1939	3,420	480	1,590	520	6,010
1940	3,410	500	1,830	530	6,270
1941	3,480	490	2,080	510	6,560
1942	3,500	480	2,500	480	6,960
1943	3,460	470	2,610	460	7,000
1944	3,360	440	2,500	420	6,720
1945	3,150	400	2,150	400	6,100

With the aid of these figures accident rates have been calculated and are given in Table X. These estimates are but rough indications of the general trend of accident rates in the country as a whole and do not take into account the widely varying risks inherent in the different industries or the length of exposure to the hazards of the occupations:

TABLE X

Approximate Accident Rate per 1,000 *of the Persons shown in Table IX*

Year	Males		Females		All persons
	18 and over	Under 18	18 and over	Under 18	
1938	37	46	10	14	29
1939	36	46	11	15	28
1940	35	52	13	16	34
1941	49	55	21	18	38
1942	53	59	28	22	43
1943	53	58	28	21	42
1944	51	55	25	20	40
1945	49	54	20	18	37

A graphic representation of the trend of accident incidence and changes in the years of war may be seen in the chart (p. 339), extracted from the Annual Report for 1938 illustrating the variation in accidents and numbers employed between 1924 and 1938 and which has now been extended to cover the war years. The chart shows that in times of increased industrial activity not only was the number of accidents higher but the ratio of accidents to numbers employed also increased. This increase reflects the longer exposure to risk through lengthened

hours of work, the effects of fatigue and the influx into industry of less skilled and experienced workers, and lays emphasis on the need in such times for special attention to safety measures and proper training and supervision.

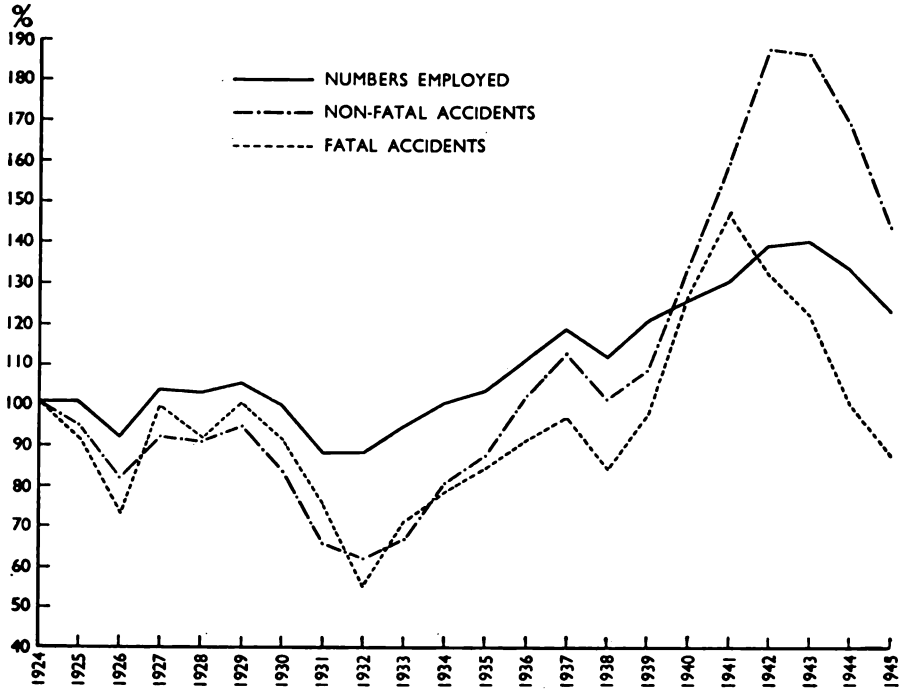

TABLE XI

Fatal and Non-fatal Accidents, showing fluctuations from 1938 to 1945

Year	Fatal accidents	Variation on previous year	Variation on 1938	Non-fatal accidents	Variation on previous year	Variation on 1938
		per cent.	per cent.		per cent.	per cent.
1938	944	—	—	179,159	—	—
1939	1,104	+ 17	+ 17	192,371	+ 7	+ 7
1940	1,372	+ 24	+ 45	230,607	+ 20	+ 30
1941	1,646	+ 20	+ 74	269,652	+ 17	+ 50
1942	1,363	− 17	+ 44	313,267	+ 16	+ 75
1943	1,221	− 10·5	+ 29	309,924	− 1·1	+ 73
1944	1,003	− 17·8	+ 6	281,578	− 9·1	+ 57
1945	851	− 15·2	− 10	239,802	− 14·8	+ 33

It will be noted from Table XI that, although the number of non-fatal accidents fell substantially in 1945 it remained considerably higher than in 1939—a year partly under war and partly under peace conditions and with employment at much the same level as in 1945 and

therefore comparable. Several factors may account for this, for example, the urge to remain at work in spite of injury in the earlier, more critical period of the war, and on the other hand, the war weariness of the later years together with less incentive for production may have produced this effect. Fatal accidents are not subject to such considerations, and it will be seen from the chart above that the proportion of fatalities to persons employed between 1925 and 1945 was lower in every year than in 1924, with the exception of the period 1940–1, when it is likely that extra risks were taken in the rapidly intensified production drive. Put in another way—during the five-year period 1936–40, one reported accident in 183 resulted fatally compared with one in 242 in the period 1941–45. It does not seem an unfair inference that there has been a decline in the severity rate as well as in the frequency rate of accidents generally.

Accidents to Women. There was a great increase in the number of accidents to women during the war years because of the increase in the number of women employed and the transfer of women from the safe industries of their peace-time employment to the accident-producing processes of munitions, coupled with the direct employment of new entrants in these dangerous processes. The peak was reached in 1943 when the number of accidents was 400 per cent. above the number for 1938, while the estimated increase in the number of women employed was only about 90 per cent. During 1944 and 1945 the position was gradually reversed. In 1945 the number of accidents to women fell by nearly 30 per cent. of that of 1944, though the estimated number employed fell by only 14 per cent. The reasons for this were probably a reversal of the processes which led to increase, namely, replacement of women by men in the more dangerous work and increased skill and experience among the women who remained.

Accidents to Young Persons. Table X shows the consistently higher rate of accidents among boys under 18 when compared with that of men. The rate for girls was lower than that for boys and, from 1941, was lower than that for women, reflecting the more dangerous work on which the women became engaged. The ordinary risks of work are accentuated for youngsters by lack of experience and skill and often by ignorance of the possible dangers.

But other factors, more definitely connected with the peculiar war-time conditions, played a part, though to what extent will probably never be known. One of these factors was undoubtedly fatigue arising from extraneous duties imposed upon, and readily accepted by, the civilian population generally and by the boys under age for recruitment in particular; in an accident to a boy of 17 investigation disclosed the fact that, in addition to working a forty-nine hour week, he did 10 to 15 hours a week Home Guard duty and had had to 'stand-to' all the previous night.

These conditions call for a high standard of safety precautions and even more urgently for special measures of training and control during the most dangerous period of their employment. In the early years of the war the increasing volume of raw recruits to industry called for a commensurate increase in trained safety officers and vigilance on the part of foremen and other supervisory staff on whom the training and supervision of young persons almost entirely devolved. This was at the time when skilled men were scarce, and intensive training schemes for safety officers were arranged and carried out by the Factory Department in co-operation with safety organisations, to which reference has been made.

Accidents to Old People. The tenacity and devotion of elderly people in staying in work, or returning to work after retirement, is shown in the number of accidents reported to persons between 70 and 80 years of age. Their contribution to the war effort passed almost unnoticed, but they helped many a factory to keep going when they might have felt entitled to enjoy the leisure they had earned. Loss of agility and alertness, an inevitable concomitant of advancing age, showed itself in the relative frequency of strains and falls as accidents to elderly people. In one district analysis of accident causation showed that whereas only 10 per cent. of accidents to juveniles was due to falls, in persons over 60 years of age the proportion was three times as great. With the encouragement given to older people to remain at, or to resume, work in the interests of production, suitable jobs under suitable conditions were, in general, selected for them for which their impaired physical condition was yet adequate.

Accidents—Nature of Injury. Although the statutory return made by employers in respect of every reportable accident has to state the nature of the injury the particulars are not reliable enough to enable statistics to be compiled. This is not necessarily the fault of the person making the return on the employer's behalf, but, in the circumstances in which accidents occur in the industries included in the reports, the accurate recording of the nature and extent of the injury is seldom possible. The same is true of the degree and duration of incapacity because no further report on an accident is legally required unless it proves fatal.

There are, however, eight classes of accidents which have some medical interest and for which factual data are, in normal times, collected and published in the Annual Reports of the Chief Inspector of Factories, but no figures were published for the five years 1940 to 1944. These figures have been obtained from Departmental records for those years and they are set out in Table XII, together with the corresponding figures for 1939 and 1945 :

Table XIII summarises the work of the Factory Department for the whole period of the war and gives some indication of the immensity of

TABLE XII

Causation of Certain Accidents reported during the years 1939 to 1945

Causation	1939	1940	1941	1942	1943	1944	1945	Totals 1939 to 1945	Percentage of all accidents
Gassing—non-fatal	173	554	742	751	668	425	397	3,710	0·21
fatal	11	31	41	25	27	25	28	188	
Electricity—non-fatal	558	700	874	991	1,263	1,197	906	6,489	0·37
fatal	29	32	51	51	58	32	31	284	
Burns, by fire—non-fatal	407	565	735	794	810	726	623	4,660	0·26
fatal	16	25	75	35	19	22	18	210	
Burns, by hot or corrosive substances—non-fatal	8,307	10,650	12,167	14,658	14,654	13,037	10,791	84,264	4·58
fatal	26	26	33	42	20	23	21	191	
Eye injuries from particles—non-fatal	4,753	5,480	713	9,246	9,054	7,950	6,571	43,767	2·37
fatal	1	—	2	2	—	—	—	5	
Eye injuries other causes—non-fatal	3,751	4,265	5,306	6,501	6,843	5,796	4,844	37,306	2·02
fatal	—	—	2	3	3	2	3	13	
Immersion in fixed vessels containing scalding or corrosive fluids—non-fatal	136	120	117	113	127	142	72	827	0·08
fatal	11	4	4	5	3	13	2	42	
Sepsis—non-fatal	21,492	24,317	27,130	33,117	32,720	29,793	24,309	192,878	10·39
fatal	36	31	20	13	10	11	15	136	
All reported accidents—non-fatal	192,371	230,607	269,652	313,267	309,924	281,578	239,802	1,837,201	
fatal	1,104	1,372	1,646	1,363	1,220	1,003	851	8,559	

TABLE XIII

Administration of the Factory Acts from 1939 *to* 1945

Subject (1)	1939 (2)	1940 (3)	1941 (4)	1942 (5)	1943 (6)	1944 (7)	1945 (8)
Authorised staff (inspectors)	320	332	366	389	441	440	440
Expenditure* (excluding central office clerks and pensions)	£235,754	£242,513	£287,238	£314,229	£350,297	£358,051	£368,067‡
Factories, etc.:							
1. Factories (with power)	173,501	172,402	174,759	178,454	181,154	179,939	180,944
2. Factories (without power)	64,669	61,007	59,560	58,270	56,364	48,837	44,162
3. Docks, etc.	3,093	3,072	3,408	3,150	3,161	2,987	2,927
4. Warehouses	5,527	5,712	5,400	5,884	6,067	5,768	5,777
5. Buildings	8,222	5,619	4,482	3,468	2,742	2,532	3,609
6. Works of engineering construction	995	737	709	591	411	311	622
7. Premises under S. 154, Factories Act 1937	991	1,039	1,032	1,029	1,043	1,031	995
8. Firms registered under Lead Paint Act, 1926	27,119	27,000	28,212	27,465	28,223	28,207	28,261
9. Textile works under particulars section:							
(i) Factories (with power)	5,764	5,740	5,792	6,015	6,059	6,646	6,652
(ii) Factories (without power)	693	649	626	672	650		
Visits to: 1. Factories (with power)	193,483	195,059	180,009	203,308	233,658	273,954	249,739
2. Factories (without power)	23,516	21,278	10,114	10,234	15,593	31,467	26,291
3. Other places under Acts	7,060	45,475	17,079	22,993	8,710	11,619	12,063
Number of visits before or after legal hours	11,939	9,044	5,567	10,757	10,084		
Other official visits and attendances	36,728	32,845	88,536	81,078	71,991	63,852	45,337
Prosecution (charges)	1,310	882	998	1,217	1,548	1,244	1,255
Prosecutions relating to regulations	133	82	89	104	167		
Cases of poisoning	506	530	613	552	562	469	412
Reported Accidents: 1. Fatal	1,104	1,372	1,646	1,363	1,220	1,003	851
2. Non-fatal†	192,371	230,607	269,652	313,267	309,924	281,578	239,802
Dangerous occurrences	661	604	486	622	691	759	680
Examining (or appointed) surgeons	1,777	1,702	1,752	1,837	1,872	1,862	1,864
Medical examinations:							
1. For employment of young persons (14–16)	406,575	400,875	326,184	269,887	246,715	231,546	224,197
2. Young persons re-examined (S. 99 (3) (c))							
(*a*) Under 16 years of age	3,566	3,607	3,677	3,411	2,863	3,066	3,876
(*b*) Over 16 years of age	918	168	1,175	1,794	1,067	2,271	1,972
3. For employment of boys over 16 at night	9,404	10,404	9,425	7,866	7,624	5,831	5,048
4. Under Regulations, etc.	377,969	391,622	419,701	345,057	378,334	354,116	344,958

* Relates to the financial year commencing April 1. † On basis of three days of incapacitation. ‡ Provisional figure.

the task with which the department had to cope in order to maintain the highest possible output under conditions of varying difficulty.

ARRANGEMENTS OUTSIDE THE PLACES OF EMPLOYMENT TO SAFEGUARD HEALTH OF WORKERS

Note by the Safety, Health and Welfare Department of the Ministry of Labour and National Service on some arrangements with which they were particularly concerned.

MEDICAL AND NURSING ARRANGEMENTS

All transferred workers were asked by Local Offices of the Ministry of Labour and National Service to register with a panel doctor as soon as they arrived in their new area of employment; lists of such doctors were kept available for this purpose at Local Offices. Workers were also advised, if they were members of hospital or friendly societies, to arrange for their contributions to be continued during their absence from their home area or for their membership to be transferred to a branch in the area in which they were to work. Information about the medical and nursing facilities which were available to transferred workers falling sick was sent to managements of factories, who were asked to keep a record of the home addresses and of the next of kin of all their employees living away from home. In addition, managements were asked to devise a system by which follow-up visits could be paid to any workers living in lodgings or billets who had been absent for three days, in order to ensure that any necessary medical or nursing assistance had been obtained.

By arrangement between the Ministry of Health and the District Nursing Associations, District Nurses visited transferred workers who had fallen sick. The managements of factories were asked to notify District Nursing Associations of cases in which their help was needed. The Ministry of Health contributed towards the expenses incurred by the District Nursing Association in carrying out this work and workers receiving treatment were encouraged to make a donation. Similar arrangements were made for Scotland.

The arrangements above described did not, of course, meet the difficulty which arose when a transferred worker, suffering from an illness which required in normal circumstances home nursing but not hospital treatment, was unable to obtain the necessary care and attention in his lodgings or billet because, for example, the householder was absent during the day. The Ministry of Health and the Department of Health for Scotland arranged that accommodation would be provided for such cases in hospitals within the Emergency Medical Scheme; where necessary, additional beds were made available to meet the needs of transferred workers; and to the extent to which workers were unable

to pay for this service, the cost was borne by those Departments. The assessment of the patient's ability to pay was made by the hospital authorities in the usual way, account being taken of the payment which the patient had to make to retain lodgings.

Provision of Baths. The movement of workers from their home areas to lodgings and billets created in some places a need for special arrangements about baths. Action was taken by the Department's Welfare Officers, in conjunction with the regional officers of the Ministry of Health and Department of Health for Scotland, in the following ways:

(i) by approaching the War Office and Ministry of Home Security to release public baths requisitioned by them;
(ii) by arranging with local undertakings and authorities that facilities provided by them should be available at convenient times;
(iii) by making it a condition of grant-aid to residential clubs for transferred workers that baths were installed, if this was structurally possible;
(iv) by encouraging, with the assistance of the Supply Departments, the provision of baths in some factories;
(v) by paying 100 per cent. grant to local authorities for the provision of temporary baths where the need was proved to the satisfaction of the regional welfare officer and the billeting officer.

Recreational Facilities. The Central Council of Recreative Physical Training were given the task of stimulating the provision, outside the factory, of recreative physical training for adult workers, men and women, employed on work of national importance. The Council received financial assistance from the Department for this purpose.

Voluntary organisations concerned with the provision of club facilities were assisted to set up clubs in areas where appreciable numbers of workers were living away from their homes. Grants from Exchequer funds were made in respect of 148 schemes.

In view of the restrictions on travel, local authorities were encouraged by the Departments of Health and the Ministry of Labour to organise 'Holidays at Home' programmes and were given a number of special facilities for the purpose. These schemes met with considerable success.

The 'Rest Breaks Scheme', designed primarily to lessen the effects of fatigue among women working long hours under blackout conditions and enemy raids, was later extended to men. The scheme was officially defined as 'a preventive measure to avoid illness and breakdown for the industrial worker suffering from the effects of accumulated fatigue'. Nine 'Rest Breaks Houses' were set up and equipped by gifts from the British War Relief Society of the U.S.A. and were administered by the War-time Rest Breaks for Industrial workers National Advisory Committee. The Department assisted the committee to obtain premises and gave grants towards administrative expenses.

REFERENCES

[1] The Factories Act July 1937 (1 Edw. 8, and 1 Geo. 6, Ch. 67).
[2] The Civil Defence Act July 1939 (2 and 3 Geo. 6, Ch. 31).
[3] Order in Council June 7, 1940 (under Factories Act, 1937).
[4] Fifth Report of the Departmental Committee on Lighting in Factories H.M.S.O. 1940, 14.
[5] The Factories (Standards of Lighting) Regulations, 1941 S.R. & O. 1941 No. 94.
[6] Control of Fuel Order No. 2 S.R. & O. 1942 No. 1929.
[7] Factories (Medical and Welfare) Order S.R. & O. 1942 No. 1925, 1940.
[8] Memorandum on Medical Supervision (Form 327, November 1940).
[9] S.R. & O. 1917, No. 1067.
[10] Report of Sub-Committee on Co-ordination of Factory Medical and First-Aid Services with P.A.D.
[11] Youth Registration in 1942. White Paper (Cmd. 6446).
[12] 1915 No. 1170; 1919 No. 1775; 1924 No. 1505; 1936 No. 686; 1939 No. 1386 and 1942 No. 196.
[13] The Origin, Symptoms, Pathology and Prophylaxis of Toxic Jaundice observed in Munition workers. Royal Society of Medicine, January, 1917, 2.
[14] Tetryl Dermatitis, Technical Report No. 2 Industrial Welfare Div., Department of Labour and National Service, Melbourne 1944.
[15] Factories (Luminising) (Health and Safety Provisions) Order 1942. S.R. & O. 1942, No. 703.
[16] Factories (Luminising) Health and Safety Provisions) (Amendment) Order 1943. S.R. & O. 1943, No. 1053.
[17] Report on the Incidence of Silicosis in the Pottery Industry. H.M.S.O. 1926.
[18] Report on a Clinical and Radiological examination of workers exposed to Aluminia Dust. *Lancet*, December 19, 1939, 1478.
[19] Chronic Carbon Tetrychloride Intoxication (Alice Stewart and L. J. Witts) *Brit. J. Indust. Med., I* 1, 11–9.
[20] PHILIP ROSS. *Brit. Med. J.*, (1944) 1, 252.

B. CIVILIAN MEDICAL RECRUITING BOARDS

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DURING the first three years of the War of 1914–18 Recruiting Boards were under the control of the military authorities. They were required to determine not only the physical condition of recruits, but also the military work for which they were suitable, and were expected to have knowledge of the physical condition required for the different types of military work. Under the pressure of recruiting this arrangement proved ineffective, and in 1917 a Medical Department of the Ministry of National Service was organised, with Sir James Galloway at its head, to arrange for the examination of all men of military age called up for medical examination under the Military Service Act.(1)

The main features of the scheme for these medical examinations which the Ministry of National Service then introduced were as follows:

(1) The examinations were conducted by Boards composed of civilian practitioners devoting part-time to this work. At the head of each Board was a chairman who convened the sessions. Each chairman

had a panel of suitable medical practitioners from whom he nominated members for each session of the Board.

(2) The Boards were required to classify recruits, not according to the military work for which they were suited (a point on which the civilian practitioner had not the necessary knowledge to form an adequate opinion), but according to 'grades' of physical condition. The Boards were not concerned with the later stage of determining to which type of military work a recruit of any given standard should be allotted.

(3) The Boards were guided by a code of instructions in determining the appropriate grading of men found to be suffering from certain diseases or disabilities.

These three features of the scheme were retained in the arrangements for the examination of men for the Services during the War of 1939–1945.

THE CODE OF INSTRUCTIONS

The original code was drawn up in 1917, with the assistance of an Advisory Medical Committee composed of leading members of the medical profession. In 1942, in accordance with the ruling of the Man-Power Sub-committee of the Committee of Imperial Defence, a code of instructions based on the original code was drawn up by a Medical Code Sub-committee on which the Medical Departments of the Navy, the Army and the Air Force, the Ministry of Health, the Department of Health for Scotland and the Ministry of Pensions were represented.[2] This code was revised in 1933 and again in 1938.[3]

Military Training Act, 1939. In May 1939 the Military Training Act was passed. A regulation made by the Ministry of Labour under this Act provided for the appointment of Medical Boards for the purpose of the Act, consisting of not more than five and not less than three qualified medical practitioners. Under this regulation, Boards were required to place every person examined in one or other of the following categories:

Grade I Men who, subject only to such minor disabilities as can be remedied or adequately compensated by artificial means, attain the full normal standard of health and strength, and are capable of enduring physical exertion suitable to their age.

Grade II Those who, while suffering from disabilities disqualifying them for Grade I, do not suffer from progressive organic disease, have fair hearing and vision, are of moderate muscular development, and are able to undergo a considerable amount of physical exertion not involving severe strain. Where a man has been placed in this grade solely on account of either defects of visual acuity or of deformities of the lower extremities, or both, the letter (*a*) shall be inserted after the grade.

Grade III Those who present such marked physical disabilities or evidence of past disease that they are not fit for the amount of exertion required for Grade II.

Grade IV Those who suffer from progressive organic disease or are for other reasons permanently incapable of the kind or degree of exertion required for Grade III. These men are unfit for any form of service.

The definition of the grades was taken from the code of instructions to which reference has been made in the preceding paragraph.

Armed Forces Act, 1939. A regulation made by the Ministry of Labour and National Service under this Act made a similar provision about the appointment of Medical Boards for the purposes of the Act and the requirement to place every man examined into one or other of four grades.

From September 1939 the Boards were also responsible for the examination of all men volunteering for enlistment in the Armed Forces.

ORGANISATION OF MEDICAL BOARDS

In the code it had been proposed that the Ministry responsible for the organisation of Medical Boards should be assisted by a medical staff consisting of a Chief Medical Officer (assisted by a Deputy) and Divisional Medical Officers appointed by the Ministry of Health and the Department of Health for Scotland.

After the Military Training Act came into force in May 1939, medical officers of the Ministry of Health were responsible for the supervision of Civilian Medical Recruiting Boards and for advising the Ministry of of Labour and National Service on all medical matters connected with the examination of men and women by these Boards; and from June 1940, to April 1945, one senior medical officer, three divisional medical officers and seven regional medical officers were seconded to the Ministry of Labour and National Service for these purposes. These officers also advised the Ministry on all medical questions which arose out of compulsory service in industry, e.g. under the Essential Work Orders.

Method of Selection of the Personnel of Boards. In 1938 the Central Medical Emergency Committee, to whom had been entrusted the duty of allocating the medical personnel of the country in the event of an emergency, were asked by the Ministry of Health and the Department of Health for Scotland to furnish the names of all practitioners over 50 years of age who had expressed their willingness to serve on Medical Recruiting Boards. The names of about 4,500 practitioners were supplied and of these, all under 70 years of age were interviewed by the Regional Medical Officers of the Ministry of Health and Department of Health for Scotland, except those who were well known to these officers. A list was then prepared by them for each of the Boards which it was proposed to set up in the event of an emergency, comprising the names of fifteen to twenty practitioners in the area who were considered to be suitable for membership of Boards and indicating two practitioners who, in their opinion, were particularly well qualified for the post of chairman.

These lists were used as the basis of the Boards set up by the Ministry of Labour in May 1939, under the Military Training Act. Any vacancies that subsequently occurred in the panel of the Boards were filled from names supplied by the Local Medical War Committees, to whom this duty had been delegated by the Central Medical War Committee.

The original decision to confine the membership of Boards to practitioners over 50 years of age was made, because it was thought that in the event of war the majority of younger medical men would be required for some more active form of service. It was, however, decided in October 1939 that some relaxation of this rule was desirable, and practitioners between 40 and 50 years of age were appointed to fill vacancies, provided that at least two-thirds of the members of a Board were over 50. In 1940 this proviso was waived and the majority of the practitioners appointed thereafter were between 40 and 50 years old, and in areas where there was a shortage of practitioners available for this form of work men under 40 were appointed.

In determining the number of practitioners on the panel of a Board the primary consideration was the efficiency of the Board. Complete familiarity with the instructions and the routine of the work at a Medical Board and a sense of responsibility for the work of the Board are essential for efficiency, and it was considered that these could not be attained unless each member served at not less than two or three sessions a week. Up to June 1940, there was only a small number of Boards where it was necessary to hold more than eleven sessions a week on average, so it was decided that it was usually undesirable that the number of members on the panel of a Board should exceed sixteen. If a larger number had been appointed, the number of sessions that could be allotted to each member would have been too small.

In June 1940 registration was speeded up following the evacuation from Dunkirk, and the number of men to be examined greatly increased; in consequence it was necessary greatly to increase the number of sessions of each Board and to form a considerable number of new Boards. In January 1940 there were 159 Boards at which 2,692 practitioners were employed. At the end of July of that year there were 224 Boards, at which 3,659 practitioners were employed. It will be seen from these figures that the number of practitioners employed was considerably increased, but, as it appeared likely that the pressure of work would be very temporary, it was considered undesirable to increase the number of practitioners serving on each Board *pari passu* with the number of sessions. If this had been done, the result in the autumn, when there was a sharp fall in the number of sessions of each Board, would have been that there was too little work.

Appointment of Chairmen and Members. Every chairman and member on appointment received from the Ministry a copy of the code of instructions[4] and a letter about his duties and rate of remuneration.

Appointments were only for a period ending on the next May 31 after the appointment. The purpose of this arrangement was that it provided a convenient opportunity for getting rid of any chairmen or members who were considered inefficient. Every chairman also received a memorandum for his guidance which set out the procedure for obtaining consultant advice. The procedure was that every chairman had to prepare a scheme for his Board in which he was required to state the names of the various consultants or hospitals whose services he proposed to use. This scheme had to be submitted to the Regional Medical Officer of the Ministry for approval.

The number of practitioners appointed in June 1939 was about 2,000. Many more were appointed during the next fifteen months and the number serving on Boards in September 1940 was 3,755. Subsequently the number gradually decreased and at the end of 1943 it had fallen to 2,764.

Accommodation and Equipment. Immediately after the passing of the Military Training Act, H.M. Office of Works was asked to find suitable premises for the Boards and to provide the necessary equipment. In order to obtain uniformity the Code Sub-committee had issued detailed recommendations about the lay-out of the Board premises. In their view it was essential that the Board room should be a large room divided as necessary by screens. They had recommended alternative arrangements and one or other of these arrangements was adopted wherever practicable. Details of the arrangement and furnishing of a board room and dressing room and the equipment of a Board were given in the code.

THE EXAMINATION

Number of Examiners at each Session. The Code prescribed that the sectional method of examination would be followed, i.e. all recruits would be seen at some stage of the examination by each member of the Board, but if one of the examiners had any doubts he should consult with one or more of his colleagues. The Code also laid down the duties of each of the four examiners in a Board composed of a chairman and four members which it was thought would be the normal composition.

Experience showed that the division of the examination into four sections had certain disadvantages. Many chairmen complained that with this arrangement there was a tendency for some of the examiners to take very little interest in the examinee as a whole and to throw all responsibility for grading on the chairman. Also certain parts of the examination which should not properly be separated were allotted to different examiners, e.g. it was the duty of examiner No. 2 to examine the lungs and of No. 3 to examine the heart; of examiner No. 1 to test the acuity of vision and of No. 2 to examine the eyes; of examiner No. 2 to examine the nose and throat and of No. 4 to examine the ears.

This arrangement was also uneconomical in the use of medical manpower because many of the duties assigned to examiners No. 2 and No. 4, e.g. taking the height and the weight, and the duty of testing the urine could be satisfactorily carried out by a medical orderly. It was, therefore, decided in May 1941 to reduce the number of examiners at a session from four to three, and it was found that with the help of a medical orderly, three examiners could examine the same number of men at a session as four examiners under the former arrangement. It was also the general opinion of chairmen that the change led to increased efficiency.

Medical Questionnaire. From October 1940, every man summoned for examination was asked to complete a medical questionnaire designed to ascertain the history of his previous health and in particular whether he had ever suffered from tuberculosis or mental disorder and whether he had at any time received compensation under the Workmen's Compensation Acts.

Number of Men Examined at a Session. The duration of each session was reckoned to be about two and a half hours. Boards were originally required to examine thirty men at a session and during the first year most Boards were able to examine this number of men in two and a half hours, but, as the average age of the men examined increased, this was found to be impossible and the number was reduced from thirty to twenty-five. In May 1942 this number was further reduced to twenty-two to allow Boards more time to investigate the nervous stability of each man.

Medical Examination Record. The code of instructions placed on Boards the obligation to complete a medical examination record for each man and laid great stress on the importance of this document. The original form of this record was found to be unsatisfactory, and in July 1940 with a view to obtaining a more detailed record of the findings of the Boards a revised form was brought into use. (Appendix I.)

RESULTS OF GRADING

Analysis of Grading according to Age Groups. The effect of age on the percentage of men placed in the higher grades is shown in the analysis given in Appendix II and graphically in Appendix III. From these it will be seen that in the youngest age group (under 18) of men examined under the National Service Acts 89·8 per cent. were placed in Grades I or II and that this percentage gradually fell with the increase of age till in the oldest group (men aged 43) only 46·7 were placed in these grades. In the case of volunteers the percentage of men under 20 placed in these grades was 96·7 and of men aged 36 or over 94·1.

The Diseases and Disabilities on account of which Men were placed in Grades III or IV. At the end of 1941 an investigation was made to

find out the percentage incidence of diseases and disabilities on account of which men were placed in Grades III or IV in relation to the total number of men examined. The results of this investigation are given in Appendix IV.

Complaints against Grading. There was no provision in the National Service Acts for appeal against the grading of a medical board, but when a man complained about the grade into which he had been placed his case was referred to one of the medical officers of the Ministry of Labour and National Service for consideration. If the medical officer considered, either on fresh medical evidence supplied or for some other reason, that the Board's decision might have been wrong, arrangements were made for re-examination, either by the Board who made the original examination, or by a different Board. This procedure proved satisfactory and it was found unnecessary to set up any special Medical Appeal Boards to deal with these complaints.

The proportion of the men examined who were re-examined on account of a complaint about grading was 1 per cent. Half of the men re-examined were downgraded.

MEDICAL ADVISORY COMMITTEE

Constitution and Terms of Reference. As the Code of Instructions had been drawn up by a committee on which all the interested parties, viz. the Admiralty, War Office, Air Ministry, Ministry of Pensions, Ministry of Health and Department of Health for Scotland, were represented it was evident that no alteration in the Code could properly be made without the approval of a committee on which these parties were represented and in May 1940, the Minister of Labour appointed a committee under the chairmanship of Lord Horder on which the Admiralty, War Office, Air Ministry, Ministry of Pensions, Ministry of Labour and National Service, Ministry of Health, Department of Health for Scotland and the Royal College of Physicians were represented.

Its terms of reference were to advise the Minister on medical questions connected with the examination of men by civilian medical boards appointed under the National Service (Armed Forces) Act, 1939 and to make recommendations on these questions and other matters referred to it. The committee was given power to determine its own procedure and to consult any person or authority it might deem desirable. The terms of reference were subsequently amplified to cover the examination of women for the Women's Auxiliary Services and a medical woman was appointed to the committee.

Detection of Pulmonary Tuberculosis. One of the first matters to which the committee were asked to give their attention was the detection of pulmonary tuberculosis by medical boards. They were particularly asked to consider a memorandum which had been received from the

standing Advisory Committee on Tuberculosis and a memorandum signed by Lord Dawson and seven experts on tuberculosis, both of which urged the use of mass radiography as a normal part of the medical examination of men before entry into the armed forces. After hearing the evidence of radiologists and other experts on this subject the committee concluded that this method of examination represented an ideal to be aimed at in the medical examination of recruits but that serious practical difficulties were involved. The necessary apparatus and a sufficient number of expert examiners could not be made available for some months and the introduction of this form of examination would seriously delay the medical examination of recruits. The committee were satisfied that in the circumstances its adoption was impracticable.

The committee recommended, however, that the following steps should be taken to supplement the arrangements then in force:

> Every recruit at his examination by the Medical Board should be required to sign a declaration indicating whether or not he has suffered from tuberculosis.
>
> The Ministry should, if it is found practicable, adopt a scheme by which district medical officers of health should be required:
>
> > to furnish a notification to every man of military age whose name appears on the Tuberculosis Registers kept under the Public Health (Tuberculosis) Regulations, 1930, in order that this notification may be presented to the Medical Board by the man when he attends for examination, and
> > to furnish a similar notification direct to the Ministry for the information of Medical Boards.
>
> The attention of Medical Boards should be directed to the value of the X-ray examination of the chest in the detection of early cases of pulmonary tuberculosis, and urged to make use of this diagnostic method in the case of those recruits whose medical history or chest condition indicates even a remote possibility of this disease.
>
> Medical Boards should also be advised to consider this special examination of the chest in cases of general ill-health without definite clinical signs and also in those cases of 'effort syndrome' where there is no definite indication of cardiac or psychological cause.

The question of the use of mass radiography for the detection of pulmonary tuberculosis in recruits was again considered by the committee early in 1942 and in April of that year their report was issued as a White Paper.[5] In this report the committee again recommended that this method was impracticable as part of the examination of recruits by Medical Boards. But they suggested that the most satisfactory alternative would be to undertake radiological examination to the greatest practicable extent after recruits had entered the Services and that mass

miniature radiography was the most suitable means of applying radiological examination to large numbers of persons.

Revision of the Code. During 1940 the committee revised the Code. In the revision of the instructions on disease of the heart and arteries, effort syndrome and the Exercise Tolerance Test, the committee were greatly assisted by a memorandum on this subject which at their request had been prepared by the Cardiac Society, and by consultations with Sir Thomas Lewis, Dr. (afterwards Sir) John Parkinson, Dr. William Evans and Dr. Paul Wood.

The instruction on defects of vision was completely changed. Experience had shown that in the direction of men to suitable units in the Services more information was required about the acuity of a man's vision than could be furnished by placing him into one of the statutory grades, so, in accordance with the advice of Sir Stewart Duke-Elder, the consultant ophthalmologist to the Army, the committee recommended that Boards in addition to placing men in grades should also classify them for visual acuity according to seven visual standards. The committee recommended a similar alteration about men found to have defective hearing, viz. that Boards should be instructed to classify men into four hearing standards as well as to place them in grades. The committee also revised the notes for the guidance of Boards in grading men suffering from various other diseases and disabilities.

Detection of Psychoneurosis. In January 1942 the attention of the committee was drawn to the very large number of men whom the Services were finding it necessary to discharge within a few months after enlistment on account of psychoneurosis. In the opinion of the military psychiatrists the disability of a large proportion of these men was present before enlistment and could have been discovered if the Boards had more carefully investigated their medical history and their school and work record and had asked them questions with a view to eliciting any nervous tendencies. In view of these representations the committee carefully considered whether any further guidance to that already contained in the code of instructions should be given to Boards to assist them in the detection of psychoneurosis. After hearing the views of Brigadier J. R. Rees, the consultant psychiatrist to the Army, Dr. Bernard Hart, and three chairmen of Medical Boards, the committee made the following recommendations:

(*a*) The following question should be added to those at present asked of recruits about their past history in the questionnaire:

"Have you ever received medical treatment and been off work on account of a nervous illness ? If so, give particulars ?"

(*b*) Paragraph 13 of the Instructions for the Guidance of Medical Boards (M.R.B.I.), which relates to nervous and mental instability, should be amended by the insertion of the following sub-paragraph:

'Examiner No. 1 should ask every man a few simple questions designed to bring to light any past or present symptoms of nervous instability, e.g., how did you get on at school? What games do you play? What is your hobby? Are you often under medical treatment?' Although investigation of a man's nervous and mental stability is primarily the duty of examiner No. 1, any indication of instability observed by the other examiners should be reported to the chairman, who should personally satisfy himself about a man's mental stability before a decision is reached about his grading. In all cases of doubt the man should be referred for the opinion of a psychiatrist. If, in the opinion of the Board, the report of the psychiatrist fails to resolve the doubt, the man should be placed in Grade II.

(*c*) In order to enable No. 1 examiner to carry out the investigation suggested in (*b*) above, the duties allotted to examiners should be re-arranged so as to allow him more time for his part of the examination. This will entail some reduction in the number of men who can be examined at each session.

The adoption of these recommendations was followed by a considerable reduction in the number of psychopaths placed in Grade I or II but this matter was again brought to the attention of the committee in June 1943 when it was decided to issue to chairmen a further memorandum on the subject which had been prepared by the psychiatrists of the three Services.[6]

Detection of Mental Defectives. The number of men discharged from the Services as dull and backward during the first three years of the war was very considerable. In 1942 the Navy and Army arranged for the intelligence of recruits to be tested at the recruiting centres immediately before they were examined by the Medical Boards. The Advisory Committee recommended that it should be part of the routine procedure that the results of these intelligence tests should be passed to the Medical Boards to assist them in detecting mental defectives, which experience had shown was by no means always easy. Early in 1944, the Army decided to alter this arrangement by applying these tests after enlistment. The tests for R.A.F. recruits have always been made after enlistment.

Examination of Women for the Women's Auxiliary Services. During the first year and a half of the war, arrangements for the examination of volunteers for the Women's Auxiliary Services were made by the Medical Departments of the three Services. Examinations for the W.R.N.S. and W.A.A.F. were made by medical officers of the Navy and R.A.F. respectively, and examinations for the A.T.S. by civilian medical practitioners. In May 1941, at the request of the Services, arrangements were made for the examination of these volunteers by the National Service Medical Boards; subsequently all the women who opted for service in the Women's Auxiliary Services under the National Service Act (Number 2) 1941 were examined by these Boards.

The main difference between the arrangements for the examination of women and those for men is that for the former the Board consisted of a chairman and only two other members, of whom one wherever practicable, was a woman. The code of instructions that was issued to Boards for their guidance in the examination of women[7] indicated that all that part of the examination which entailed removal of the women's clothes should be allotted to the woman member of the Board, viz. examiner No. 2.

The number of women which the Board was expected to examine at a session was about 15.

Every recruit when summoned for examination was told the composition of the Board and advised that if she had any objection to examination by a Board of such composition other arrangements would be made. The number of requests made for other arrangements was extremely small and those few were all received during the first few weeks after the Boards began to examine women.

There were only two complaints of any impropriety on the part of a male examiner, both of which proved on enquiry to be without foundation.

Results of Grading of Women. An analysis according to age groups of the grading of women examined under the National Service Acts, and of volunteers, is given in Appendices V and VI. A comparison of Appendix V with Appendix II shows that, of women examined under the National Service Acts, the proportion placed in each of the statutory grades was very similar to that of men in the same age group. There is, however, one striking difference viz., the proportion of these women placed in Grade II solely on account of defects of vision was 0·9 per cent., while the proportion in the case of men in the same age group was 4·5 per cent. The most likely explanation of the difference is that women with defective vision are very prone to become clerks or typists; and, owing to the great demand for clerks or typists, women in these occupations were not permitted to show preference for the Women's Auxiliary Services.

Diseases and Defects on account of which Women were placed in Grades III or IV. An investigation was made in 1942 and again in 1943 to find out the percentage incidence of diseases and defects on account of which women were placed in Grades III or IV. The results of these investigations are given in Appendix VII.

Examination of Men for Service in the Home Guard. No medical examination was ordinarily required for service in the Home Guard, but when service in this Force became compulsory under the Defence (Home Guard) Regulations, 1940, it became necessary to arrange to examine men claiming exemption on medical grounds if the evidence produced in support of the claim was considered unconvincing. At the request of the War Office, arrangements were made for the examination

of such claimants by the N.S. Medical Boards. A code of instructions was drawn up on consultation with the War Office for the guidance of Medical Boards about the physical requirements for service in the Home Guard and the effect of certain diseases and disabilities on fitness for service in this Force.[8]

Up to the end of August 1943, men who had been medically examined under the National Service Acts and placed in Grades III or IV were excluded from compulsory enrolment in the Home Guard or part-time Civil Defence Services, but it was impossible in many parts of the country to meet the minimum requirements of these Services from the existing field of recruitment, and it was then decided to review the position. Accordingly, chairmen were instructed in future to note on the examination record of every man placed in one of these grades their opinion about the man's fitness for Home Guard or Civil Defence duties. Also, the chairmen of Boards in those parts of the country where there was a shortage of men for these duties were instructed to scrutinise the medical examination records of all the men who had hitherto been placed in Grade III or IV and to consider, in view of the information on those records, whether it was likely that the man would reach the medical standard required for these duties, and to indicate their opinion on the forms. Enquiries were then made about the eligibility for Home Guard and Civil Defence duties of the men so indicated, and those found to be eligible and available were then required to attend for medical examination to determine whether they were in fact up to the required standards. In consequence of the decision to stop compulsory recruitment for the Home Guard, the examination of men for this service was discontinued in September 1944.

Examination of Men for Fitness for Coalmining. In September 1942 there was a shortage of coalminers and men under 25 at the time of registration were invited to transfer to underground work in the mines as an alternative to being posted to the Forces, and in July 1943 this invitation was extended to all men registered under the National Service Acts who had been placed in Grade I or IIa (Feet) by a Medical Board. In September 1943 a special appeal was made for volunteers for coalmining; any man between the ages of 16 and 50 was acceptable if on examination by a Medical Board he was found to reach the required medical standard. A code of instructions for the guidance of Medical Boards about the physical requirements for underground work in coalmining and the effect of certain diseases and disabilities on suitability for this work was prepared in consultation with the Ministry of Fuel and Power.[9] In December 1943, because these measures failed to provide a sufficient number of men for coalmining, it was decided to direct a proportion of the men under the age of 25 placed in Grade I or IIa (Feet) to coalmining and to select by ballot the men to be so directed. Any man selected by the ballot who claimed that he was

medically unfit for coalmining was re-examined by a Medical Board with a view to deciding not only whether he had been correctly graded, but also whether he had any particular disability which rendered him unfit for coalmining. As a result of these re-examinations, about five per cent. of the men selected by the ballot were released from the direction to coalmining.

SUMMARY

Up to May 31, 1945, the Medical Boards in the United Kingdom had examined 5,088,849 men and 147,193 women under the Military Training and National Service Acts, and 1,432,350 men and 307,443 women who had volunteered for service; they had also examined 124,974 men in respect of fitness for Home Guard duties; a total of 7,100,409 examinations. The time usually occupied by each of these examinations at a Medical Board was just under half an hour, so the total amount of time spent by the chairmen and members of Medical Boards on these examinations was about 3½ million hours. This figure does not take into account the amount of time spent in the examination of men and women by consultants and ophthalmologists to whom, under the National Service Acts alone, 290,028 and 268,686 persons respectively were referred by Medical Boards for examination.

REFERENCES

[1] Min. of National Service, 1917–1919. Report upon the Medical Department of the Ministry of National Service. London: H.M.S.O., 1920.
[2] C.I.D. Paper 511–B, August 10, 1924, Appendix. (Papers Nos. N.S. (Med.) 7 and N.S. (Med.) 5).
[3] C.I.D. Papers Nos. N.S. 34 (1933) and N.S. (M.C.) 10 (1938).
[4] Min. of Labour and National Service. Instructions for the Guidance of Medical Boards under the National Service Acts. M.R.B.1.
[5] Report of Medical Advisory Committee on the use of Mass Miniature Radiography in the Detection of Pulmonary Tuberculosis among Recruits for H.M. Forces. Cmd. 6353. London: H.M.S.O., 1942.
[6] Min. of Labour and National Service. Memorandum for Civilian Medical Boards on the Detection of Psychopaths. M.A.C. 41A.
[7] Min. of Labour and National Service. Instructions for the Guidance of Medical Boards in the examination of recruits for the Women's Auxiliary Services. M.R.B.1. (Supplement—Women). January 1942.
[8] Min. of Labour and National Service. Instructions for the Guidance of Medical Boards in the examination of men for service in the Home Guard. M.R.B.1. (Supplement—Home Guard). February 1942.
[9] Min. of Labour and National Service. Instructions for the Guidance of Medical Boards in the examination of men for underground work in Coal Mines. M.R.B.1. (Supplement—Coalmining).

APPENDIX I

Note.—Form N.S. 158 and other accompanying documents must remain permanently attached to this record.

MEDICAL EXAMINATION RECORD AND MEDICAL HISTORY SHEET

Army Form B178A (Revised)
Naval Form B215
R.A.F. Form 30A
N.S. (M.C.) 14

Surname ______ N.S. Registration No. ______ Army No. ______ Enlisted at ______

Christian Names ______

Born at—Parish ______ County ______ Posted to ______ Date ______

Examined at ______ Date ______ Transferred to ______ Date ______

Declared date of birth ______

Trade or Occupation ______

Other Information

Medical Orderly

Part 1.—Physical Condition on Examination.

Weight ______ lbs. Height ______ ft. ______ inches

Colour of Hair ______ Colour of Eyes ______

Complexion ______

External Marks ______

Vaccination: Age ______ No. of Marks ______

Inoculation: Typhoid ______ Diphtheria ______

Tetanus ______ Other ______

Urine: Appearance ______ Albumen ______

Sp. Gr. ______ Sugar ______

Pulse Rate ______

Condition of Heart ______

E.T.T. (if taken) ______

Chest Measurement { Maximum ______ inches; Range of Expansion ______ inches

Lungs ______

Abdomen ______

Additional Examinations and confirmation of abnormalities ______

B.P. (if taken) S. ______ D ______

Medical Examiner No. 3 — Grade — Suggested Final Grade — Initials

Medical Examiner No. 1 — Grade — Initials

Past history:

Tubercle ______

Rheumatic Fever ______

Fits ______

Other salient facts ______

(e.g., Breakdowns, Gastric Symptoms) ______

Mental and Nervous Condition ______

Reflexes: Pupils ______ Knee Jerks ______ Ankle Jerks ______

Plantar Reflexes ______ Romberg's Test ______

Natural ______ With glasses in use.

Vision R ______ L ______ R ______ L ______

Eyes ______

Medical Examiners' Remarks and Additional Clinical Notes

(see M.R.B.I. para. 80)

Medical Examiner No. 2 — Grade — Initials

Ears R ______ L ______

Hearing R ______ L ______

Nose, Throat ______ Teeth ______

Physical Development ______

History of Injuries or Operations ______

Flat Foot ______

Knock Knee ______

Hammer Toe ______

Other Deformities of Legs ______

Deformities of other Joints ______

Movement of Joints ______

Varicose Veins ______

Venereal and Skin Diseases ______

Ext. Genitals, Perineum, Piles ______

Hernia ______

Chairman's Remarks

(i) Visual Standard ______ (ii) Hearing Standard ______

(iii) Other remarks.

(iv) Details of Medical Certificates.

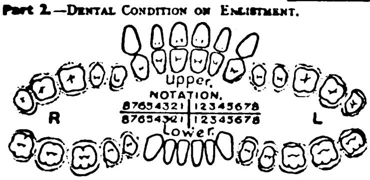
Examined and placed in:—*

Signature ______
Chairman of N.S. Medical Board

*Insert Grade—see M.R.B.I. part. 6.

FOR USE OF SERVICE AUTHORITIES ONLY.

Part 2.—Dental Condition on Enlistment.



Oral Hygiene ______

Remarks ______

Signature, Dental Officer ______

Part 3.—Prescription for Spectacles

	Vision without glasses	Sph.	Cyl.	Axis standard notation	Vision with glasses	Ophth. Centre	Date of Exam.
R.						Frame No. for measurements)	Date of Issue
L.							

Signature of M.O. ______

R.						Frame No. for measurements)	Date of Issue
L							

Signature of M.O. ______

Part 4.—Pulheems.

M.O.'s Sig. & Date ______									M.O.'s Sig. & Date ______									M.O.'s Sig. & Date ______								
Y.O.B.	P	U	L	H	E	E	M	S	Y.O.B.	P	U	L	H	E	E	M	S	Y.O.B.	P	U	L	H	E	E	M	S
Ht. ______	P								Ht. ______	P								Ht. ______	P							
C.P. ______	U								C.P. ______	U								C.P. ______	U							
Wt. ______	L								Wt. ______	L								Wt. ______	L							
	S									S									S							

Part 5.—Boards; Courts of Inquiry; Examinations for Field of Foreign Service Extension, Re-engagement or Continuance of Service, Anti-rabic Treatment, Issue of Surgical Appliances other than Dentures and Spectacles, etc.

Date	Brief details, and signature.

Part 7.—Protective Inoculation and Vaccination

Nature of Vaccine—"T.A.B.," Smallpox, Influenza, Cholera, etc.	Date of 1st Dose	Date of 2nd Dose	Signature of Medical Officer

Part 6.—Particulars of Treatment in Hospital, or in Quarters in the case of Warrant Officers not admitted to Hospital.

Name of Hospital and Station	Date of Admission Day	Admission Month	Admission Year	Discharge Day	Discharge Month	Discharge Year	Disease	Number of days in hospital	*Cause of disability* Remarks bearing on the nature, severity, treatment, and result of the case, likely to be of interest or of future use	Signature of Medical Officer (name and rank)

Part 8.—Became non-effective by .....

Date .....

Signature .....

APPENDIX II

Ministry of Labour and National Service
National Service Acts

Results of Medical Examinations during the period June 8, 1939 to October 26, 1944
Analysis of Grading according to Age Groups

Grade	Age groups												
	Under 18		18–19		20–25		26–30		31–35		36		37
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.
I . . .	177,506	78·4	639,135	76·7	1,023,709	71·8	576,446	64·1	452,390	55·1	61,406	46·9	50,678
II (a) (vision)	2,615	1·1	12,042	1·4	62,359	4·4	37,810	4·2	22,300	2·7	2,394	1·8	1,881
II (a) (feet) .	5,646	2·5	21,852	2·6	33,696	2·4	31,965	3·6	38,351	4·7	6,602	5·0	6,086
II . .	17,150	7·6	58,843	7·1	93,562	6·6	78,460	8·7	95,782	11·6	18,194	13·9	16,413
Total of II (a) and II .	25,411	11·2	92,737	11·1	189,617	13·4	148,235	16·5	156,433	19·0	27,190	20·7	24,380
Total of I and II . .	202,917	89·6	731,872	87·8	1,213,326	85·2	724,681	80·6	608,823	74·1	88,596	67·6	75,058
III . .	8,768	3·9	34,860	4·2	117,718	8·2	90,254	10·0	94,513	11·5	16,869	12·9	15,797
IV	14,654	6·5	66,744	8·0	94,154	6·6	84,050	9·4	118,151	14·4	25,581	19·5	23,264
Totals . .	226,339		833,476		1,425,198		898,985		821,487		131,046		114,119

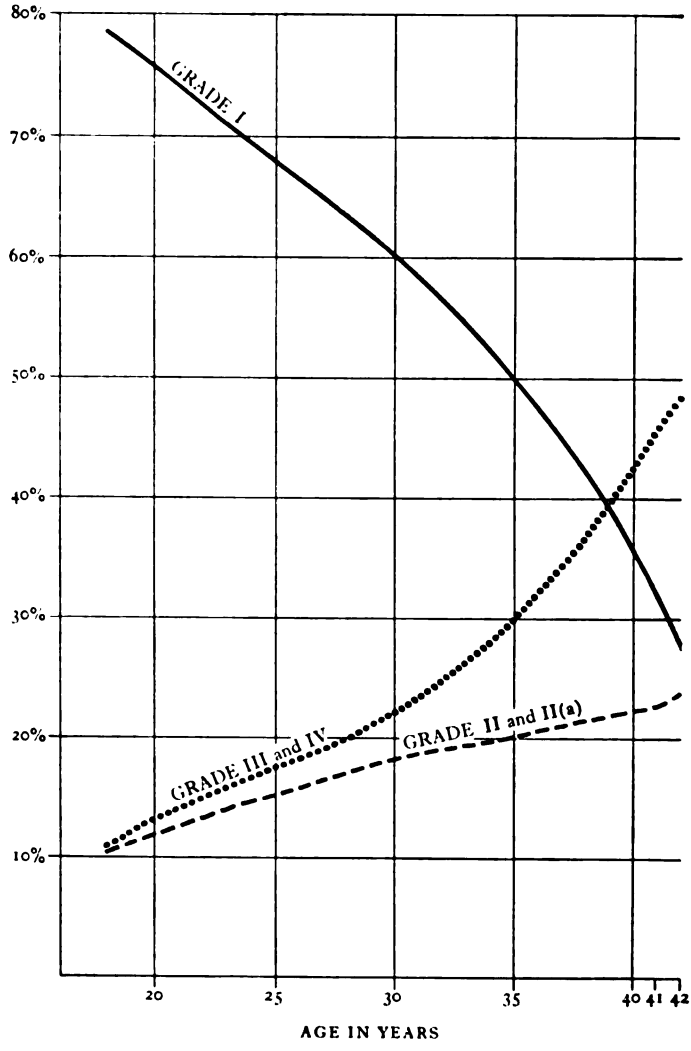
Age groups													Totals	
38		39		40		41		42		43				
Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
44·4	46,839	41·5	45,174	38·9	39,143	35·2	15,260	30·9	10,447	29·9	2,865	28·3	3,140,998	64·3
1·7	1,948	1·8	1,753	1·5	1,663	1·5	683	1·4	461	1·3	165	1·6	148,074	3·0
5·3	5,981	5·3	6,034	5·2	5,406	4·9	2,444	4·9	1,725	4·9	575	5·7	166,363	3·4
14·4	16,845	14·9	17,749	15·3	17,454	15·7	8,753	17·7	6,842	19·6	2,181	21·6	448,228	9·2
21·4	24,774	22·0	25,536	22·0	24,523	22·1	11,880	24·0	9,028	25·8	2,921	28·9	762,665	15·6
65·8	71,613	63·5	70,710	60·9	63,666	57·3	27,140	54·9	19,475	55·7	5,786	57·2	3,903,663	79·9
13·8	16,843	14·9	18,178	15·6	19,548	17·5	9,832	19·9	7,270	20·8	2,196	21·7	452,646	9·3
20·4	24,407	21·6	27,242	23·5	28,130	25·2	12,446	25·2	8,197	23·5	2,132	21·1	529,152	10·8
	112,863		116,130		111,344		49,418		34,942		10,114		4,855,461	

Note I.—Grade II (a) (vision) relates to men placed in this grade solely on account of defects of visual acuity.

Grade II (a) (feet) relates to men placed in this grade solely on account of deformities of the lower extremities.

APPENDIX III

PROPORTION OF THE MEN AT EACH AGE WHO ARE PLACED IN EACH GRADE



APPENDIX IV

Ministry of Labour and National Service

Comparison of the causes for rejection in the case of men examined under National Service Acts in the period 1939 to November 1941, and in the case of men examined in October 1942. The samples taken for each period represented all regions and related to 30,000 men of all medical grades.

The table shows the percentage of all men in each sample who were placed in Grade III or IV for the various disease conditions.

Disease condition found which determined the grade	1939 to November 1941			Short period in October 1942		
	Grade III	Grade IV	Total Grade III and IV	Grade III	Grade IV	Total Grade III and IV
	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
Diseases of eyes and defects of vision	0·36	0·72	1·08	0·07	1·06	1·13
Diseases of ears	1·02	1·05	2·07	0·51	2·02	2·53
Diseases of organic nervous system	0·07	0·40	0·47	0·09	0·26	0·35
Nervous instability and mental disease	0·45	0·47	0·92	1·17	1·05	2·22
Epilepsy	—	0·39	0·39	—	0·37	0·37
Dull and backward	0·27	0·42	0·69	0·42	0·64	1·06
Diseases of heart and arteries	1·10	1·56	2·66	0·42	1·76	2·18
Diseases of veins (varicose, etc.)	0·38	0·15	0·53	0·51	0·17	0·68
Diseases of lungs, etc. (not tubercle)	0·84	0·38	1·22	1·10	0·60	1·70
Tuberculosis—Lungs, etc.	0·24	0·81	1·05	0·26	0·78	1·04
Other parts	0·10	0·26	0·36	0·05	0·22	0·27
Defects of legs (locomotion)	1·55	0·73	2·28	1·63	0·76	2·39
Defects of hands	0·17	0·15	0·32	0·22	0·08	0·30
Defects of arm	0·30	0·24	0·54	0·26	0·18	0·44
Deformities, etc., of spine	0·17	0·20	0·37	0·20	0·20	0·40
Deformities of other parts	0·08	0·03	0·11	0·07	0·04	0·11
Rheumatism and bone diseases	0·07	0·17	0·24	0·15	0·10	0·25
Peptic ulcer	0·10	0·69	0·79	0·03	1·33	1·36
Other digestive diseases	0·12	0·09	0·21	0·37	0·12	0·49
Hernia	0·36	0·10	0·46	0·27	0·11	0·38
Diseases of urinary tract	0·21	0·29	0·50	0·13	0·26	0·39
Enuresis	—	0·02	0·02	0·01	0·07	0·08
Diseases of thyroid gland	—	0·08	0·08	0·05	0·11	0·16
Diseases of other ductless glands	—	0·05	0·05	0·11	0·05	0·16
Diseases of blood	—	0·02	0·02	0·02	0·08	0·10
Diseases of skin	0·28	0·10	0·38	0·24	0·11	0·35
Several diseases (debility, etc.)	0·36	0·11	0·47	0·84	0·17	1·01
Diabetes	—	0·19	0·19	0·01	0·20	0·21
Other conditions	0·90	0·13	1·03	0·17	0·24	0·41
All diseases	9·5	10·0	19·5	9·38	13·14	22·52

APPENDIX V

Ministry of Labour and National Service
National Service Acts
Medical Examination of Women for the Auxiliary Services

Results of Medical Examinations during period February 19, 1942 to July 27, 1944
Analysis of Gradings according to Age Groups

Grade	Age groups														Totals	
	19		20		21		22		23		24		25			
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
I . . .	7,867	76·1	36,294	73·8	30,044	72·3	17,015	70·1	8,551	66·5	5,153	64·4	632	69·2	105,556	71·7
II (a) (vision) .	78	0·7	408	0·8	363	0·9	200	0·8	120	0·9	83	1·0	13	1·4	1,265	0·9
II (a) (feet) .	319	3·1	1,773	3·6	1,607	3·9	1,006	4·1	586	4·6	343	4·3	31	3·4	5,665	3·8
II . . .	777	7·5	3,943	8·0	3,522	8·4	2,272	9·4	1,226	9·5	826	10·3	65	7·1	12,631	8·6
Total of II (a) and II .	1,174	11·3	6,124	12·4	5,492	13·2	3,478	14·3	1,932	15·0	1,252	15·6	109	11·9	19,561	13·3
Total of I and II	9,041	87·4	42,418	86·2	35,536	85·5	20,493	84·4	10,483	81·5	6,405	80·0	741	81·1	125,117	85·0
III . . .	550	5·3	2,876	5·8	2,703	6·5	1,679	6·9	1,017	7·9	660	8·2	76	8·3	9,561	6·5
IV . . .	753	7·3	3,932	8·0	3,324	8·0	2,102	8·7	1,366	10·6	942	11·8	96	10·6	12,515	8·5
Totals . .	10,344		49,226		41,563		24,274		12,866		8,007		913		147,193	

Note 1. Grade II (a) (vision) relates to women placed in this grade solely on account of defects of visual acuity.
Grade II (a) (feet) relates to women placed in this grade solely on account of deformities of the lower extremities.

Note 2. The Table for February 19, 1942 to June 29, 1944 showed: Grade I . . . . 71·7 per cent.
Grade II and II (a) . . . 13·3 per cent.
Total Grades I, II and II (a) . 85·0 per cent.

APPENDIX VI

Ministry of Labour and National Service Volunteers Medical Examination of Women for the Auxiliary Services

Results of Medical Examinations during the period June 9, 1941 to September 28, 1944
Analysis of Gradings according to Age Groups

Grade	Age groups											
	Under 18		18		19		20		21		22	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
I . . .	43,622	88·2	66,576	87·4	47,284	84·4	29,182	83·2	18,839	82·2	12,705	81·9
II (a) (vision) .	339	0·7	510	0·7	420	0·8	276	0·8	262	1·1	162	1·0
II (a) (feet) .	1,167	2·4	1,859	2·4	1,658	3·0	1,086	3·1	739	3·2	572	3·7
II . . .	2,144	4·3	3,511	4·6	3,105	5·5	2,027	5·8	1,307	5·7	964	6·2
Total of II (a) and II . .	3,650	7·4	5,880	7·7	5,183	9·3	3,389	9·7	2,308	10·0	1,698	10·9
Total of I and II . . .	47,272	95·6	72,456	95·1	52,467	93·7	32,571	92·9	21,147	92·2	14,403	92·8
III . . .	958	1·9	1,601	2·1	1,474	2·6	1,005	2·9	685	3·0	534	3·4
IV . . .	1,262	2·5	2,177	2·8	2,095	3·7	1,475	4·2	1,107	4·8	774	4·9
Totals . .	49,492		76,234		56,036		35,051		22,939		15,711	

Age groups									Totals	
23		24		25		26 to 30		31 and over		
Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
80·9	9,712	80·0	8,168	78·2	8,569	76·0	26,040	72·2	12,886	62·0	283,583	81·9
1·0	125	1·0	100	1·0	110	1·0	408	1·1	202	1·0	2,914	0·8
3·6	425	3·5	347	3·3	488	4·3	1,759	4·9	1,254	6·0	11,354	3·3
6·1	800	6·6	763	7·3	919	8·2	3,411	9·5	2,824	13·6	21,775	6·3
10·7	1,350	11·1	1,210	11·6	1,517	13·5	5,578	15·5	4,280	20·6	36,043	10·4
91·6	11,062	91·1	9,378	89·8	10,086	89·5	31,618	87·7	17,166	82·6	319,626	92·3
3·4	436	3·6	394	3·8	502	4·4	1,866	5·2	1,578	7·6	11,033	3·2
5·0	640	5·3	664	6·4	686	6·1	2,546	7·1	2,031	9·8	15,457	4·5
	12,138		10,436		11,274		36,030		20,775		346,116	

Note 1.—The figures given in this return relate only to examinations by medical boards conducted by the Ministry of Labour and National Service. Examinations were also made by the appropriate Service Department.

Note 2.—Grade II (a) (vision) relates to women placed in this grade solely on account of defects of visual acuity.

Grade II (a) (feet) relates to women placed in this grade solely on account of deformities of the lower extremities.

APPENDIX VII

Ministry of Labour and National Service
Examination of Women by Ministry of Labour and National Service Medical Boards
Comparison of the Causes for Rejection in the case of Women examined under National Service Acts in February–April 1942 and in December–January 1943

(*The sample taken for each period related to 18,000 women and represented all regions*)

The results of a limited scrutiny of 9,500 volunteers' records for December–January 1943 are also given for comparison. The table shows the percentage incidence of diseases requiring Grade III or IV in each of the three samples.

Disease condition found which determined the grade	National Service				Volunteers December to January 1943
	February to April 1942	December to January 1943			
	Grade III and IV	Grade III	Grade IV	Grade III and IV	Grade III and IV
Disease of eyes (and defective vision)	1·1	0·06	1·34	1·40	0·98
Disease of ears (and defective hearing)	1·6	0·62	1·10	1·72	1·41
Organic nervous disease	0·2	0·06	0·05	0·11	0·02
Nervous instability and mental disability	1·0	1·00	0·86	1·86	0·63
Epilepsy	0·3	0·02	0·21	0·23	0·05
Mental deficiency	0·4	0·32	0·38	0·70	0·44
Disease of heart and arteries	2·6	0·27	1·90	2·17	1·92
Disease of veins (varicose, etc.)	0·1	0·07	0·03	0·10	0·15
Disease of respiration (not T.B.)	0·8	0·44	0·41	0·85	0·35
Tuberculosis—lungs	0·7	0·21	0·49	0·70	0·27
other parts	0·3	0·06	0·18	0·24	0·12
Defects of lower limb	0·9	0·73	0·18	0·91	0·48
Defects of upper limb (hand, etc.)	0·1	0·03	0·01	0·04	0·03
Defects of upper limb (other)	0·1	0·06	0·02	0·08	0·04
Deformities of spine	0·2	0·08	0·04	0·12	0·07
Deformities, etc., of other parts	—	0·02	0·01	0·03	0·03
Rheumatism and bone disease	0·3	0·09	0·09	0·18	0·07
Peptic ulcer	0·1	—	0·14	0·14	0·06
Other digestive diseases	0·2	0·17	0·08	0·25	0·08
Hernia	—	—	0·02	0·02	0·03
Diseases of urinary tract	0·3	0·05	0·15	0·20	0·26
Enuresis	0·1	0·02	0·03	0·05	0·02
Diseases of thyroid gland	0·6	0·08	0·30	0·38	0·27
Other endocrine defects (obesity, etc.)	0·1	0·06	0·02	0·08	0·04
Blood diseases	0·1	0·02	0·04	0·06	0·04
Skin diseases	0·2	0·19	0·10	0·29	0·08
Several diseases (debility, etc.)	0·4	0·96	0·30	1·26	0·73
Disease of breast	—	0·04	0·02	0·06	0·03
Pregnancy	0·2	—	0·28	0·28	0·09
Disorders of menstruation	0·8	0·57	0·16	0·73	0·35
Other genital diseases	0·1	0·07	0·08	0·15	0·14
Other conditions	0·4	0·15	0·12	0·27	0·12
Total (all diseases)	14·3	6·52	9·14	15·66	9·40

CHAPTER 3

MEDICAL SERVICES OF THE MINISTRY OF SUPPLY

By N. LANGDON LLOYD
M.B., B.S., M.R.C.P.
Chief Medical Officer, Ministry of Supply

INTRODUCTION

THE functions of the Ministries of Supply and of Aircraft Production were, in the War of 1914–18, performed by one supplying Ministry, the Ministry of Munitions. Medical supervision in factories under the control of this Ministry was exercised through the Welfare and Health Section of the Ministry of Munitions, and the work done by medical and nursing personnel in the prevention of poisoning by explosives, where they applied the results of research made by the Medical Research Committee (later the Medical Research Council), and laid the foundations of preventive medicine in the filling and explosive factories in the War of 1939–45.

When the Ministry of Supply was formed in 1939, it assumed direct control of the State munition factories known as the Royal Ordnance Factories, and acted as adviser to a number of agency factories supplying munitions, the administration of which continued under private ownership. The Ministry had no responsibility for the health and welfare arrangements in these agency factories, but their advice was frequently sought and given.

Royal Ordnance Factories are of three kinds:

1. Those in which explosives are made (explosives factories).
2. Those in which explosives of various kinds and compositions, mixed in their required proportions, are used for filling cartridges, shells, torpedoes, bombs, mines, etc. (filling factories).
3. Those in which are made the implements of war—guns and mountings of all types, small arms, and ammunition of all sizes from revolver cartridges to 16 inch shells, which are later filled with the appropriate explosive.

The occupational risks of each type of factory present considerable differences.

During the period between the wars the number of Royal Ordnance Factories had dwindled to three—at Woolwich, Enfield and Waltham —and the total strength in these factories was but 9,000. Three others were on a 'care and maintenance' basis.

In 1936, however, plans were put in hand for rearmament. By 1943 there were forty-four Royal Ordnance Factories in operation, and the 9,000 employed before the war had grown to some 350,000.

The story of this expansion has been told elsewhere. It gave rise to many problems of recruitment, accommodation, travelling, training and welfare, and of these the provision of medical and nursing staff gave rise to its own difficulties.

The medical and nursing needs for this big expansion had not been fully appreciated, and accommodation allotted to medical work was often cramped. The enormous number of entrants to be medically examined had not been foreseen, waiting-room accommodation was meagre, and the need for satellite surgeries as well as a main surgery, particularly in filling factories, had been, perhaps not surprisingly, overlooked.

For the factories in existence before the war there were already medical and nursing facilities. At the Royal Arsenal there were a few medical officers of the Royal Army Medical Corps and in others local medical practitioners held part-time appointments. Additional medical officers, civilians, were now engaged by the Establishments Directorate of the Ministry of Supply, and nursing staff were engaged locally by factory managements, by advertisement, or through the Ministry of Labour. Salaries were inadequate, duties undefined, and there was little idea of the numbers required in the various factories.

In October 1940 a Chief Medical Officer was appointed under the following terms:

> His primary function is to supervise and co-ordinate medical matters arising at the Royal Ordnance Factories and other outstation establishments of the Ministry, acting in collaboration with the Factory and Welfare Department of the Ministry of Labour and National Service and the Industrial Health Research Board of the Medical Research Council.

This was the beginning of the Ministry of Supply's Medical and Nursing Service.

DEVELOPMENT 1939–42

HEADQUARTERS STAFF

In October 1940 the Department started with a Chief Medical Officer and one temporary Civil Service clerk.

By July 1943 it consisted of:

Chief Medical Officer: Air Vice Marshal Sir David Munro,
Deputy Chief Medical Officer: Dr. A. J. Amor,
Assistant Chief Medical Officer: Dr. Catherine Swanston,
Medical Officer for Hostels: Dr. E. B. Gunson,
Chief Nursing Officer: Miss Clare Sykes,
Senior Temporary Assistant: Miss M. Webdale,
Statistical Assistant: Miss K. Turner,
Officer in charge of Medical Stores: Captain Abbot and nine clerks.

Early in 1942, a panel of Honorary Consultants was formed, and with later additions consisted of:

Professor T. B. Davie: Professor of Pathology, University of Liverpool,
Dr. (later Sir) D. T. Davies: Physician, Royal Free Hospital,
Professor E. C. Dodds: Courtauld Professor of Biochemistry, University of London,
Professor A. W. M. Ellis: Regius Professor of Medicine, University of Oxford,
Dr. (later Sir) A. M. H. Gray: Physician for Diseases of the Skin, University College Hospital,
Mr. (later Sir) H. E. Griffiths: Surgeon, Albert Dock Hospital,
Professor R. E. Lane: Nuffield Professor of Occupational Health, University of Manchester,
Dame Louise McIlroy: Obstetric and Gynaecological Surgeon, Royal Free Hospital and
H.M. Senior Medical Inspector of Factories.

A Chief Nursing Officer was not appointed until late in 1942, but in the previous year much help had been given voluntarily (by courtesy of the hospital authorities) by Miss E. Cockayne, Matron of the Royal Free Hospital, in advising on the problems of a rapidly expanding nursing service.

FACTORY MEDICAL STAFF

With the exception of the Royal Arsenal, Woolwich, which had a R.A.M.C. Establishment, with some additional full-time civilian medical practitioners for industrial medical work, the factories were medically cared for by civilian medical practitioners appointed by the War Office on a part-time basis.

In October 1939, on the urgent representation of the Home Office, whose functions at that time included those under the Factories Act, 1937, the Treasury were asked to sanction employment of full-time doctors for factories over 5,000 strong, and a little later, on account of special risks, at explosives factories of lower strength. In addition, authority was obtained to engage part-time medical officers for the medical examination of the new labour intake, at that time very heavy.

These medical officers were normally selected and appointed by a Selection Board. Recruitment was difficult from the start. Advertisement brought few suitable candidates, and of these some could not be employed on account of the medical man-power position elsewhere, for it had been agreed with the Central Medical War Committee not to make appointments without reference to them, and several Local Medical War Committees of the Central Medical War Committee were reluctant to release from their area doctors who wished to work in the Royal Ordnance Factories. Further public advertisement was therefore abandoned, and the Central Medical War Committee was relied on as

the main source of recruitment. Unfortunately, the Central Medical War Committee, whose main duty was to supply the Fighting Services, had few suitable candidates to spare for industry, and those who were appointed had little or none of that previous knowledge and experience so desirable for the application of preventive medicine in the large factories, where highly toxic substances were being handled.

The first dozen or so selected candidates were posted for a week's instruction to the Royal Arsenal, Woolwich, and there attended lectures given by investigators of the Industrial Health Research Board of the Medical Research Council, on such subjects as heating and ventilation, lighting, industrial psychology and statistics. This was followed by three weeks' attachment to a central Royal Ordnance Factory, the first in service of the large filling factories, before posting to their allotted Royal Ordnance Factory. The need for medical officers was so urgent, however, that often they could not complete the initial training, and it was eventually dropped. Instead, medical officers were encouraged and given leave to attend the various short courses on industrial medicine, usually at week-ends, which came into vogue at various university centres, e.g. the London School of Hygiene, and Manchester, which recognised the need for specialised training in this branch of medicine.

In 1943, the first of a series of post-graduate courses organised by the Ministry of Supply Medical Department for its own medical staff was held in London at the London School of Hygiene, by courtesy of the Dean, who, with other members of the staff, gave every help and encouragement on this and many other occasions.

FACTORY NURSING STAFF

In making the original estimate of the nursing staff required, it had been expected that the nurses' work in the factories would be confined to the main surgeries. Thus, in smaller factories running on two shifts, three State Registered Nurses (two for day and one for night) had been thought sufficient; about double this number was estimated for the big filling factories. On these figures, the estimate given to the Treasury in 1940 allowed for a total of only 84 nurses. In July 1943 there were in fact over 420 State Registered Nurses and some 200 not fully trained assistant nurses on the establishment of the Industrial Nursing Service of the Ministry.

Up to the end of 1940, the subordinate medical establishments of the factories consisted of nurses, male dispensers, surgerymen, and surgery orderlies (male and female)—a continuation of the medical organisation at the Royal Arsenal. The men were mostly ex-Servicemen, retired R.A.M.C. and naval sick berth ratings, or St. John Ambulance certificated personnel. The men predominated. It was considered wise, for a number of reasons, to replace these grades by hospital trained nursing personnel.

Recruitment was at first haphazard, nurses being obtained locally as required by the factory labour management. It was not systematised until the appointment of a Chief Nursing Officer in 1942, though the Royal College of Nursing helped considerably in 1940 and 1941 by recommending for interview at the Ministry a number of women who had completed short courses of training at the College with a view to taking up industrial nursing as a career.

OTHER AUXILIARY PERSONNEL (DENTAL SURGEONS, OPTICIANS, CHIROPODISTS)

Considerable resistance had to be overcome before these services could be inaugurated in the factories. The argument, all-convincing in the end, that many thousands of hours of valuable production-time could be saved if workers could avoid taking days off to visit the dentist, or the optician for correction of refractive errors, or the chiropodist for painful affections of the feet, eventually won the day. In one factory, for instance, it was found that out of a shift of some 1,000 operatives, 60 odd were absent for one day during one week to visit dentists. The objections against providing these facilities—that the provision of such services free or cheaply was a disguised addition to wages; that insured workers were entitled in some cases to dental and ophthalmic benefit; and that it would be difficult to distinguish between the entitled and the non-entitled—were eventually overcome.

As far as dental treatment was concerned, there could be no question of providing full treatment including dentures; the personnel was not available. An offer of help from America could not be followed up because shortly after it was made the United States came into the war. A preliminary survey of three big filling factories, made by the Ministry of Health in 1942, showed what a high percentage of operatives urgently needed dental treatment (up to 87 per cent. in one factory). Obviously, conservative and emergency treatment, sufficient to keep the operatives at work, was all that could be aimed at. A dental service on these lines was sanctioned in 1942; a small fee was recoverable from those treated. Difficulties of providing accommodation, supplying equipment and selecting personnel were not overcome until 1943, when the first eight dental surgeons were appointed. A general shortage of dental surgeons prevented the full development of this service before the peak production period was passed and the need lessened.

As regards opticians, it appeared early in the war that the high rate of rejection of applicants due to defective eyesight, especially for skilled jobs, and the risk that faulty and wasteful work would result if they were not rejected, necessitated the provision of glasses to these workers as a matter of urgency in the interest of production. It was impracticable to obtain enough ophthalmic surgeons, and as the Joint Council of Qualified Opticians had a ready-made scheme already operating successfully

in certain private factories, the Treasury agreed that the assistance of this council should be sought and by the end of 1941 a team of opticians was installed and working in the factories. The scheme proved its worth and was undoubtedly one of the most valuable aids to production afforded by the Medical Services, under whose supervision the opticians worked.

The case for chiropodists was made in 1941 and sanctioned for trial purposes in six selected factories. The Chiropody Group Council rendered invaluable service in the selection of personnel and in advising on the equipment and accommodation needed, and continued to be available in an advisory capacity when the scheme was widened to include all Royal Ordnance Factories. Originally, the services of the chiropodist were free to the individual, but when they were applied generally in the factories a small charge was made. The chiropody service made a valuable contribution to the happiness and comfort of factory operatives, many of whom had previously had little or no experience of many hours of standing, which finally revealed foot defects that could be crippling unless relieved.

MEDICAL STORES AND EQUIPMENT

At the beginning of the war, medical stores and equipment were obtained through the Royal Arsenal, and items required were drawn from Army Medical Stores. With the expansion of the Royal Ordnance Factories, it was obvious that this arrangement could not continue, and at the end of 1940 a section was set up at the Headquarters of the Medical Department to deal with this matter. Through a series of running contracts, in most cases, arrangements were made for direct supply to individual factories. Indent vouchers were completed by individual factories, checked and approved in the Medical Branch at Headquarters, and orders sent to suppliers.

This system satisfactorily speeded up supply, but the position was complicated by the fact that medical and surgical equipment required for air raid precautions, centred in the Passive Air Defence (P.A.D.) Branch of the Ministry of Supply, was being obtained separately through the Ministry of Home Security and from other sources, and this led inevitably to overlapping. Further complications arose because there were no schedules for medical purposes among those authorised for P.A.D. The needs of the different factories, varying as they did in size and function, militated against standardisation; it was not as though they were military units of comparable size and function, for which standard equipment and consumable supplies could be laid down on a scale of so much per 1,000 personnel. By mid-1943, however, agreement was reached with the P.A.D. that all medical supplies should be made the charge of the medical departments of the factories, and since the needs of the various factories were by now more clearly recognised,

combined schedules became sufficiently known to warrant standardisation, at any rate up to a point.

PHYSICAL STANDARDS OF NEW LABOUR INTAKE

Medical examination of the labour force entering the Royal Ordnance Factories was insisted on from the start of the war. The standards, which followed those practised at the Royal Arsenal, were allied to the standards of selection for the Army, and were unsuitable for a civilian population about to be engaged in total war. In a time when every worker was needed, the percentage of rejection on medical grounds was so high as to prejudice seriously the required intake.

Lower standards were promulgated in 1940, the chief criterion urged on the examining doctors being the use of common sense; and it was impressed on them that the chief purpose of medical examination was not to reject all but the fittest, but to help labour management in allocating workers to the tasks for which they were most fitted, and to advise on the physical limitations of those who had suffered from the effects of working environment, for example T.N.T. poisoning.

The medical staff of the factories were, however, too centrally placed and, without reinforcement, too inadequate to deal with the labour intake at its heaviest. Further, they were often so overwhelmed that they had little opportunity to study the work and the environment for which they were examining the new labour. Time and money was being wasted, too, in sending labour from Labour Exchanges often situated many miles from the factory where the labour was required, only to be rejected by the factory medical officers on arrival or found unsuitable later. An arrangement was therefore entered into with the Ministry of Labour and National Service whereby would-be entrants could have a preliminary medical examination at or near their home towns. This was certainly an improvement, and the obviously handicapped were in this way saved unnecessary journeys, though the scheme suffered from the lack of knowledge of examining medical officers of the nature of the work and hazards for which this labour was intended.

A complication in the early stages of the war was the prevalence of louse infestation and scabies, which caused temporary rejection until arrangements could be made for disinfestation at the factory or hostel.

PREVENTIVE MEASURES

During the period between the two wars there had been little opportunity for gaining further knowledge about the toxic effects of the various substances used in the explosive and filling factories. Preventive measures in this war started at the point reached in the last war; thus fire-proof protective clothing, goggles and respirators for special work had not to be devised again, and danger area precautions were already in existence

and known. As the war progressed, however, it became obvious that the last word had not been said. Deaths from T.N.T. poisoning still occurred, and existing precautions did not prevent outbreaks of disabling dermatitis (fulminate of mercury, tetryl (C.E.), T.N.T., neat oils and white spirit being, in that descending order, the chief agents) while new substances, or old substances in new rôles, came into use.

The basis of preventive medicine in industry is, of course, accurate information on occupational diseases and accidents. Until mid-1941 the only medical statistics available centrally were:

(i) a return of sickness absence based on the percentage of possible man-hours lost, and not differentiated into causes; and
(ii) a weekly return from the explosive and filling factories of the number of operatives removed from 'contact' with toxic substances for reasons of ill-health, with reports of fatalities, if any.

The initial list of toxic substances—T.N.T. and its compound mixtures, tetryl, shellite, fulminate of mercury, lead azide—and their effects under the headings of toxic jaundice, anaemia, anilinism, gastritis and dermatitis, was subsequently extended.

A consolidated return made out from individual factories' returns was sent weekly to H.M. Senior Medical Inspector of Factories, to supplement individual returns made officially by factories to the Factory Department of the Ministry of Labour and National Service under Statutory Rules and Orders. In 1942 a weekly medical report was instituted (R.O.F. Form 49) from which information was obtained centrally in order to further new preventive measures as up-to-date knowledge became available. But preventive measures are not solely the task of the medical services; indeed, the responsibility for their application rests in the last resort with the executive. Thus, until complete co-ordination was attained between the branches of Production Management, Labour Management, and Health Services, preventive measures were apt to be frustrated. Early in the war for instance, it became apparent that, though skin-protective barrier creams had their value in preventing dermatitis, the chief preventive measure was to be found in scrupulous cleanliness. But medical recommendations were of little value where there was a shortage of soap and towels and insufficient supervision of ablutions.

The appreciation of such matters led to a build-up at Headquarters of a close liaison between Production, Labour Management, and Health Services, a liaison the wisdom of which seemed obvious later, but which at that time had to wait until the need was appreciated by all those concerned. A most important result of this liaison was its spread to the factories, initiated by a Joint Memorandum by the Chief Medical Officer and the Chief Labour Management Officer which concerned itself largely with collaboration between Medical and Labour

Departments at the factories, particularly in the consideration of sickness absence, transfers on medical grounds within the factory, accidents and industrial disease, and discharges and releases on medical grounds. The value of weekly meetings to discuss these matters, and the lighting, heating, ventilation and sanitary arrangements, was stressed. The hope then expressed, that this regular collaboration 'should prove fruitful in promoting smooth working and should enable both Departments to take a wider view of the human problems which affect them', was indeed borne out in the event.

HOSTELS

Strategical considerations dictated that, in this war, munitions factories should be dispersed and as far as possible located in areas remote from air attack. Great factories, therefore, sprang up in places where a year before there had been country villages, fields and hedgerows. Their remoteness in some cases from centres of population raised acute problems of transport and housing, and these led to the erection of hostels for workers, administered with the help of voluntary bodies acting as the Ministry's agents.

Hostels created a number of medical problems. The health of the residents out of factory hours was covered by the normal arrangements for the civilian population, and they were allocated, according to choice, to some local general practitioners' panel. In the more remote districts, in particular, this threw a great burden on the general practitioners. In the initial stages of development of hostels the Medical Department of the Ministry advised inclusion of a small sick bay to care for minor ailments, which should have accommodation for from 1 per cent. to 2 per cent. of the residents, with a small nursing staff; medical attention being provided by each local practitioner for his or her own panel patients. A medical superintendent, usually one of the local general practitioners, was appointed by the Ministry of Supply to each hostel, and it was his function to ensure that the medical and nursing arrangements in the hostel sick bays were satisfactory. A medical officer for hostels was appointed at Headquarters, his duties being to make smooth the path of the medical superintendents, where, for example, they were finding difficulty in transferring sick bay cases to general or special hospitals or sanatoria; or where new residents were found unsuitable for factory work and their re-direction or return home was necessary. In the rapid development of the hostel arrangements there were many such problems difficult to deal with locally.

CO-ORDINATION AND INTEGRATION 1942–3

The year 1940–1 was a time of extraordinary expansion in munition factories and increase in rate of production. Many new factories were opened and two (or three) shift systems became the rule.

By the end of this period there were some forty-four Royal Ordnance Factories, and a number of Research and Experimental establishments. The number of workers had grown from 9,000 to 350,000. The Medical Services had matched this growth, so that full-time medical officers had increased from 23 to 59, and nursing staff from 84 to 620. Further there were some 26 part-time medical officers, chiefly at engineering Factories and Research establishments.

The first phase—growth and development—has already been dealt with. There now followed, in 1942 and 1943, a phase of co-ordination and integration.

There developed a growing liasion with other departments in the factory, foreshadowed by the Joint Memorandum of the Chief Medical Officer and Chief Labour Management Officer, which has already been mentioned, and closer integration of the Medical Services of the Ministry of Supply with arrangements made by other Government Departments and local authorities.

Within the factory, the co-operation with the Labour Management Department was followed by similar liaison with the Training Department, and with committees such as the Works Safety Committee and Whitley Councils, and the responsibilities, scope and functions of the Medical Services were clarified. The medical officers attended the main Whitley Council when any matters concerning the health of the workers were to be discussed.

The co-ordination included keeping medical statistics in more detail than was required for Headquarters purposes, and called for further organisation and methods of recording sickness absenteeism, accident records, and the incidence of occupational diseases of all kinds, though within a general framework and broadly defined system details varied from one type of factory to another.

At the same time, further and closer co-operation developed with other Government Departments and with the Emergency Medical Services of the Ministry of Health. There had already been close liaison with the Headquarters of these bodies, in particular, perhaps, with the Medical Inspectorate of the Ministry of Labour and National Service. Such co-operation now developed at factory level, so that there was increased opportunity for continuity of treatment of cases attending E.M.S. hospitals on their return to the factory, a return which was often speeded up when the scope of the factory medical services became known in the hospitals. There developed, too, a close link with the Ministry of Pensions in connexion with limb-fitting for amputations, of which not a few occurred in factory accidents.

About this time Headquarters of the Medical Department accepted further responsibilities, since the Ministry of Supply now took over flax factories from the Board of Trade. Part-time medical officers were appointed to these factories. This growth was reflected at Headquarters,

where it became necessary to appoint a Deputy Chief Medical Officer, Dr. A. J. Amor, (who later became Chief Medical Officer on the retirement of Air Vice-Marshal Sir David Munro), an Assistant Chief Medical Officer (Dr. Catherine Swanston), and an Assistant Chief Nursing Officer (Mrs. Reve).

The somewhat high proportion of doctors and nurses engaged in the Royal Ordnance Factories as compared with other factories in the country arose, of course, from the concentration of workers, largely women, on toxic processes. The rapid expansion of the explosives and filling factories exposed large numbers of raw workers to new hazards, the character of which was changing from time to time. The record of cases seriously affected by such dangerous processes, and of minor departures from health from these causes, gave a good indication of the efficiency of the Medical Department and the nature of the liaison between it and others in the factory concerned with safety and welfare. Particularly does this refer to T.N.T. poisoning and dermatitis, which, in view of the numbers at risk, might well, if not brought under control, have seriously hampered production. Happily, in the event, the preventive measures met the challenge well, and, as will be shown later, grew in efficiency with development and experience.

FURTHER DEVELOPMENTS 1943–5

By 1943 the rate of intake of new labour dropped considerably. The era of expansion of the Royal Ordnance Factories was largely over. Replacements of factory workers were still required on account of labour turnover, and increasingly these came from persons released from the Forces on medical grounds, and from other sub-standard groups. But this was a small problem compared with that of the previous years.

There was now opportunity to devote more time to environmental studies in the factories, and to improve in detail the medical service which had been built up.

STUDIES UNDERTAKEN BY THE MEDICAL DEPARTMENT

These fall into two main classes, those entirely within the Department and those undertaken in co-operation with outside authorities.

Of those within the Department none reached publication, for a number of reasons, though this may to some extent be rectified some day. They were concerned with such matters as amounts of airborne T.N.T. in relation to occurrence of T.N.T. sickness, and variations in concentration at differing sites of work and with improvements in plant design, with trials of barrier creams in the prevention of dermatitis, with blood changes in workers employed in contact with nitro-derivatives, with employment of those in the higher age groups, and with visual requirements for various jobs. Most of these studies formed the

basis of reports made to Headquarters from individual factories. Such reports, quite apart from periodic statistical data, were encouraged; they were stimulating to the medical officers concerned, and often extremely valuable to Headquarters, resulting sometimes in general directives to all factories.

In co-operation with other authorities there were undertaken, among others, surveys of height and body weight (in collaboration with the Ministry of Food), mass radiography (with the Ministry of Health), and clinical trials of protective measures against the common cold (with the Medical Research Council).

Absences from work due to sickness and injury were primarily, but not solely, the responsibility of the Medical Department. In addition the worker's own doctor, his or her workmates, the factory Safety Officer, and the Labour Department were all concerned; but it was the function of the Medical Departments at Headquarters and in the factories to analyse and investigate the causes of ill-health and to develop, in most cases with necessary co-operation from the workers, the general practitioners, and other branches of factory administration, such measures as would prevent an increase or reduce the incidence of sickness. Industrial medicine is essentially preventive medicine.

Success in such matters demands an intimate knowledge of the worker and the job, including the environment. It depends largely on personal contact with the individual and personal knowledge of the physical, chemical, psychological and biological conditions of work. Much responsibility therefore fell on the industrial medical officer in the factory, and it is well, therefore, to look on some of these problems as they appeared to him or her, rather than as they appeared from Headquarters.

In the Royal Ordnance Factories, industrial medical officers' activities fell broadly into three divisions. First, the medical examination of all new entrants ensured, as far as possible, that no workers whose health would immediately deteriorate under factory conditions were allowed to start work, and that others of sub-standard health were placed with regard for their disabilities. Secondly, both general and special examinations of the particular health hazards connected with the handling of explosives were made and remedial practices introduced. Thirdly, the causes of common industrial sickness and injury were investigated and preventive action taken.

The relative importance of these three courses varied with the factory and in time. During the first two and a half years of the war the emphasis on recruitment tended to direct almost all the activities of the Medical Department to the entrance examination. Attention was, of course, paid to the particular hazards of filling and explosives factories, the practice being based on the experiences of the War of 1914–18; but the absence of statistical information as to the incidence of these risks, the

comparative lack of knowledge of the medical staff as to their nature, and the pressure of work connected with new entrants, limited the development of this side of the work. From mid-1942 onwards the marked reduction in the rate of recruitment, coupled with the collection of reliable statistics and the growing experience of the medical staffs, reversed the picture. The entrance examination became of less importance and large strides were taken in the investigation and prevention of both the particular and the common sickness and injury risks. The variations between factories were chiefly a reflection of the different processes and materials used and products made.

MEDICAL STANDARDS OF NEW LABOUR INTAKE

The problems which arose in connexion with the entrance medical examination in the first years of the war were largely those of the general recruitment policy rather than those of medical standards. This examination, which had been a feature of all Government establishments in peace-time, was carried over almost automatically to war-time conditions and to the new establishments. But in 1940 some doubts were expressed as to the advantages of this examination.

The Director-General of Ordnance Factories suggested in June of that year that 'we are being hampered in our efforts to increase our number of employees through the operation of our normal practice of requiring all candidates to undergo a thorough medical examination'. Such an examination was not common practice in the private engineering industry, and the considerable increase in the numbers recruited and, particularly in the special or depressed areas, the lower physical standards of the candidates, led to an increase in both the proportion and the total numbers rejected. The issue was also raised by the Ministry of Labour and National Service, quoting the example of one R.O.F. where some 35 per cent. of the men and 14 per cent. of the women submitted for employment had been rejected. In August 1940 the medical standards required were lowered and there was closer co-operation with the Ministry of Labour and National Service officials in examining recruits, but the issue was not closed.

In May of the following year, the Welfare and Advisory Board of the Ministry of Labour and National Service repeated the charge that the examination was a definite obstacle to the recruitment of labour, and suggested that 'the present arrangements should be very considerably modified'. It was not possible to clarify the issue by statistics of the numbers passed and the numbers rejected, partly because they were not kept in any comparable form by the different factories, but mainly because it was an important part of the charge by the advocates for the abolition of the examination that many workers refused to take the examination altogether, for fear of being rejected or that some serious illness might be disclosed.

A careful examination of the position was undertaken by the Director-General of Ordnance Factories, and reports from all the factories tended to show that in practice 'applicants do not seriously object to the medical examination and that very few people are lost to us through their refusing to undergo the examination'. This fact, coupled with the value of the examination to the Ministry (partly in placing workers in jobs which they were physically able to perform without risk and partly as a safeguard against liability to pay compensation, as the State could not insure against risk as private employers could) led to the rejection of the suggestion that the examination should be waived.

The fall in the rate of recruitment to the Royal Ordnance Factories from mid-1942 onwards lessened the importance of the medical examination in the overall work done by the Medical Department, but did not end the discussion on standards. The total numbers examined were fewer, but the percentage rejected as unfit increased; and in 1943 protests were again made by the Ministry of Labour and by Members of Parliament, noticeably from South Wales, against the standards fixed by the Ministry. These protests had some substance. For example, during the first nine months of the year 2,394 men were examined at one Royal Ordnance Factory and 1,106 (or 45 per cent.) were rejected. The percentage rejected among women was 22. At another Royal Ordnance Factory during the same period 39 per cent. of the 4,977 men examined were rejected, and 9 per cent. of the 2,025 women. Although the proportion of candidates rejected at these factories was particularly high, the reason for the increase in the proportion of candidates rejected was clear enough. The standard had been fixed in relation to the general physical requirements for work in a factory on the one hand, and to a medically normal population on the other. By 1943, the shortage of labour was such that a large proportion of the workers not in employment were in the older age groups, between 55 and 70 years, and their physical condition could only be described in many instances as 'pathological'. This was particularly true in those areas where the men had been employed in their youth in the heavy industries, iron and steel, coalmining, tin-plate works, and heavy engineering.

The number of 'light' jobs in the factories upon which these men could be employed with little risk was very few, and indeed, in many cases, they were already filled by disabled persons; and any general lowering of standards to enable them to pass the examinations for other jobs was tantamount to inviting an increased sickness rate, for the older men suffering from respiratory diseases or gastric trouble would be more susceptible to toxic hazards. At the same time, however, it was recognised that very considerable improvements had been made in the methods of filling and handling toxic materials since the standard was last modified in 1940, and the improvements in environment and

working conditions had materially lessened the risk to health that was associated with certain processes.

The Ministry, therefore, while not lowering the standards, called the attention of all medical officers in the factories to the fact that in many cases 'the improvement of factory hygiene more than counterbalances the low medical standard of those who may be engaged on certain processes', and urged that discretion should be exercised in the enforcement of the fixed standards.

OCCUPATIONAL DISEASE

The efforts of the Medical Department, Safety Officers and Production Departments of the Royal Ordnance Factories to reduce the risk of accidents and the incidence of the particular industrial diseases which are associated with the manufacture of explosives, fill some of the most exciting pages in the history of industrial medicine. The story, moreover, is one of success; the accident and sickness rates due to these particular hazards in the National Factories in the War of 1914–18 were never approached, and the loss of production and absence from work due directly to these causes were negligible. The story, however, is too long and too technical to be told here in detail, and the main themes of the struggle will be outlined.

Dermatitis. Of the problems of industrial medicine which arose from the particular materials handled in the manufacture of explosives, industrial dermatitis was the greatest. Though it was not a serious disease when compared with the other risks such as toxic jaundice and aplastic anaemia, its incidence was far higher in filling and explosive factories than that of any other industrial disease, and it presented a problem not only of prevention but also of the organisation of transfers of affected workpeople away from the sources of irritation.

The preventive measures chiefly centred around the use of barrier creams and protective clothing, and insistence on the cleanliness of both personnel and workshops. Tremendous efforts were made by the Medical and Labour Departments in the factories to educate all grades in the factory, from labourers to managers, in the importance of these measures, to provide the necessary facilities, and to ensure that they were used. The problems were approached from many sides. Special 'make-up' rooms were set aside where the women workers could put on the face powders and barrier creams in front of mirrors and adjust their clothing and turbans to their personal satisfaction. Wages were paid for the periods at the beginning and end of the shifts when the workers were 'making-up' or washing, and for some time there was close supervision of the ablutions. Where the risks were high, as for example with the use of mercury fulminate, approaches were made to the Ordnance Board suggesting that the use of alternative substances should be investigated, owing to the high incidence of dermatitis. And the

engineers and chemists played their part by introducing improved mechanical processes whenever possible, thereby reducing the individual handling of, and contact with the agents.

These measures, particularly the insistence on cleanliness, reduced the incidence of dermatitis but never eliminated it completely, and it remained a cause of anxiety, sickness, and loss of production. The second problem, therefore, how to cure dermatitis and to limit its effects on the individual and thereby on production, persisted throughout the war.

The medical cure of dermatitis was relatively simple. Regular medical examinations of all workers in contact with irritants and therefore liable to dermatitis were undertaken by medical officers and the nursing staffs, and this ensured early diagnosis of the disease. All cases diagnosed had then to be removed from contact and given treatment. To the production departments, however, the problem was by no means simple; for while only a minority of the cases were placed on the injury list and thereby lost to production, other work had to be found for the majority 'out of contact' during the period they were receiving treatment, and their places 'in contact' had to be filled by other workers. After treatment, with the exception of the few whose skin was unusually susceptible to the disease even after minimal contact, the rest could return to work in contact. There was a continual flow of workers from contact jobs to non-contact jobs and vice-versa, and this flow was uneven and could not be calculated with any accuracy. The smooth operation of these inter-group transfers, in a manner which avoided both a shortage of workers and workers without jobs, was a constant problem in the filling and explosives factories.

An important step towards ensuring this smoothness was taken in October 1942, by the Joint Memorandum of the Chief Medical Officer and the Chief Labour Management Officer (already mentioned) which set forth a well-defined procedure for the notification to the Labour Departments by the Medical Departments of all workers who had to be transferred, leaving the details of transfer to the Labour and Production Departments, and also for the regular examination of all workers transferred out of contact so that their return to work in contact, through the same channels, could take place as soon as medically permissible. Full co-operation of the departments concerned, and particularly of the workers, was essential, and a measure of the success achieved was that practically all workers who had contracted dermatitis returned to contact work.

T.N.T. Poisoning. The second group of special hazards, which were of particular concern to the medical officers in filling and explosives factories and to Headquarters, comprised the risks of diseases, other than dermatitis, which were associated with the processes and chemicals (in particular T.N.T.), used in the manufacture of explosives. Of these, the two most serious diseases were toxic jaundice and toxic anaemia. The

number of cases reported was only a fraction of the number of cases of dermatitis, but the high fatality rate which accompanied these diseases (in 1914–18 for toxic jaundice alone 25 per cent. of the cases were fatal) placed a heavy responsibility on the Medical Departments. The risk of these diseases is almost exclusively a war-time risk. Toxic jaundice was 'discovered' in the War of 1914–18; that is, it became reportable for the first time as an industrial disease in 1916, and toxic anaemia became reportable for the first time in January 1942. The number of cases of toxic jaundice reported to H.M. Inspector of Factories in the years between the wars was negligible.

The experience drawn upon by the Medical Departments at the outbreak of the Second World War to combat these diseases rested, therefore, on the lessons learnt in 1914–18, though perhaps not all of these were remembered. The processes and the final compositions of the explosives had changed, but the emphasis was placed, once again, on cleanliness in the shops, avoidance of T.N.T. fumes and dust by whatever means possible, and regular medical examination of the operatives. These measures, alongside of the better layout of the shops using T.N.T. and the improved methods of production, lowered the incidence of the diseases as compared with the previous war. In the last thirty-six months of the War of 1914–18 (i.e. from January 1916, when toxic jaundice became notifiable to the end of 1918), 403 cases of T.N.T. poisoning were reported, of which 105 proved fatal. Between 1940 and the middle of 1945, only 105 cases were reported from Royal Ordnance Factories, of which 21 proved fatal.

No one was satisfied with this rate of incidence, however, even though it was lower with a greater volume of production than that of the last war, and continuous efforts were made during these and subsequent years to reduce the incidence. The main developments were a pathological service in connexion with the factories, extensive studies of the chemical environment in the factories and haematological tests of the workers, and constant efforts to improve the processes and environment by mechanising the processes and improving the ventilation.

The need for a pathological service to the Ministry was discussed throughout 1943 and earlier. The toxic nature of much of the work of the Medical Departments, the need for maintaining close watch on the health and nutrition of the workers and for routine observation of the effects of new chemicals were emphasised. Finally, early in 1944, a pathologist was appointed to the Ministry of Supply (Dr. C. V. Harrison) to be responsible for additional training of medical officers in pathology and the supervision of clinical pathology in nine of the filling and explosives factories. This appointment, and the indication which it gave of the responsibility accepted by the Ministry in relation to these hazards, marked an important stage in the development of industrial medicine in the Royal Ordnance Factories.

The studies of chemical environment and the haematological tests of the workers were also systematised in 1944. Before that year, a few factories had undertaken investigations, and the valuable results achieved led to their adoption in all factories where the toxic risks were high. The aim of the tests of chemical environment were to assess the exposure to which workers handling T.N.T. were subjected by means of a survey of the amount of T.N.T. in the atmosphere. Samples of the atmosphere were taken at frequent intervals, often five or ten minutes, throughout the shift and on each shift and in all parts of the shop, and the amount of airborne T.N.T. measured. In one factory, for example, the atmosphere in twenty-seven buildings was investigated and over 2,500 tests made. From the graphs and charts constructed from these tests it was possible to analyse which operations gave rise to the greatest concentration of T.N.T. in the air, where the pockets of T.N.T. existed, and how the density of these pockets changed with time. The operation of breaking the solid 'biscuit' T.N.T., not fully mechanised, gave rise, for example, to a high concentration, which, contrary to some expectations, was higher than that produced by the fumes from molten T.N.T. Another high concentration was found at the end of the shifts when the floors were being swept.

The studies were of considerable assistance to the Production and Engineering Departments in their efforts to improve working conditions and mechanise processes, and so to reduce the hazards. These efforts had been made continuously since the outbreak of the war, and the obstacles had been slowly surmounted. There were two main obstacles. First, those difficulties arising from working to a programme and planning; and secondly, the technical and mechanical difficulties. The continuous changes in programmes, and modifications and alterations in the chemical composition of the explosives, made the long-term development of mechanised processes impossible. On many occasions a process was improved, new methods and machines introduced, and the workers carefully trained and made adept at the different operations, when a modification became necessary. Modified products always had the highest priority; and, with no time to adapt existing machinery or develop new, the process had to revert again to the simple and elementary methods. The realisation that processes and products were subject to continual change and modification deterred the introduction of mechanisation; nevertheless, important progress was made from the rudimentary methods used, say, at the time of Dunkirk, to the fully mechanised 'biscuit' breaking, bag cleaning, and other processes which were in operation in 1944.

The technical problems arose chiefly from the dangerous character of the materials used in the manufacture of explosives, and from the need for simple rather than elaborate methods, because of the changes in programme mentioned above. One particular problem which proved

difficult was to install efficient systems of ventilation in the shops ; these were essential if the concentration of airborne T.N.T. was to be kept low. As the dust in the air was explosive, it could not be passed directly through a fan, and an alternative method had to be found. After many experiments, the most successful method was found to be induced suction by a forced draught driven by a fan through a venturi tube. This method gave approximately thirty changes of air in an hour, and during 1944 was installed in most of those factories in which ventilation was a problem.

The studies of the chemical environment threw into sharp relief some of the particular problems which the engineers had to solve, and also afforded a reliable test of the effectiveness of the measures taken. The installation of local suction near the 'biscuit' breaking operations and the use, in a few instances, of vacuum cleaners instead of sweeping up the shops, are instances of this.

The success of the Production Departments, the planners, engineers and chemists, the Medical Departments and the doctors and nurses in helping workers in the factories to combat T.N.T. poisoning can be illustrated to some extent by statistics. In the last thirty months of the war, from January 1943 to June 1945 only 26 cases (three fatal) of toxic jaundice among R.O.F. operatives were reported. This represents a reduction of two-thirds in the number of cases (and more than three-quarters in the number of deaths) compared with the first three years of the war when there were 79 cases and 18 deaths.

A striking fall is seen, too, in the numbers of cases of other forms of T.N.T. sickness. These figures are shown in Table I below. It may be noted that in the years 1916–18 there were 403 cases of T.N.T. jaundice, with 105 deaths. The figures of other cases of T.N.T. sickness during those years do not appear to be available :

TABLE I

Notified Cases of T.N.T. Sickness

	Toxic jaundice	Toxic anaemia	Aniline poisoning
1940	13 (1)	—	50
1941	41 (12)	—	218
1942	25 (5)	6 (2)	155
1943	9 (1)	4 (2)	41
1944	11 (1)	4 (3)	21
1945	6 (1)	1 (0)	18
Totals	105 (21)	15 (7)	503

Note: Figures in brackets refer to deaths.

As striking a picture is shown in the comparative figures for dermatitis. This is not a notifiable disease, though voluntary notifications were made

in some cases to the Ministry of Labour and National Service. The incidence, during four years, of dermatitis from contact with explosive substances is shown in Table II below:

TABLE II

Dermatitis due to Contact with Explosives

Average number of cases per month

	Tetryl	T.N.T.	Mercury fulminate
1942	474	60	295
1943	295	38	168
1944	215	30	27
1945	167	30	5

ACCIDENT SERVICES

The expansion of nursing services in the factories, where State Registered and hospital trained nurses replaced first-aid men and women, brought to the accident services the up-to-date knowledge and technique used in hospital casualty departments, and gave the opportunity to apply modern methods in dealing with the injured.

To those who are unfamiliar with the day-to-day work in factory Medical Departments, the figures for accidents may be astonishing. The numbers vary with the nature of the work, and in the Ministry of Supply were, as may be expected, higher in the engineering than in the explosives and filling groups, though those accidents occurring in the latter were more serious.

During the last two and a half years of war, there were 45,972 accidents in Royal Ordnance Factories which caused some loss of time from work; and there were eighty fatal accidents.

For every accident which caused loss of time there were a number of accidents not so serious but which, nevertheless, called for some first-aid attention in the factory surgeries. The proportion varied in the different groups, and although there is no accurate figure of the total number of accidents which did not cause loss of time, that figure for the same period is probably in the region of 2,000,000.

To this first-aid work the nursing staff brought knowledge and experience. Further, they brought receptive minds, an eagerness to be taught, an enthusiasm for the application of new techniques.

The most important advance was the use of sterile dressings and their proper handling, together with a 'no touch' technique in the dressing of open wounds—a great improvement on the simple 'lint and bandage' method of the ordinary first-aid man; and under the direction of medical staff they learnt the value of plaster-of-paris splinting for

certain injuries, particularly of fingers and toes. It was found that with such light and unbulky dressings many could remain at work who would otherwise have lost time.

The occurrence of very serious injuries, the result of explosions, made it imperative that the entire personnel of the factory medical departments should be continually on the alert to deal with such accidents. The main surgery was always ready for the reception of such cases, and arrangements were complete in minute detail for emergency transport from every section of the factories. Remoteness, in some cases, from general hospital facilities called for more than 'first aid'.

As an example of the day-to-day work, and the technical efficiency of the staff, there may be quoted the experience of one factory during a period of eighteen months from 1943 to 1945. During this time, the new accidents attending the surgery numbered 11,208. Of these, 190 lost time on account of the accident; the remaining 11,018 lost no time from work, and in none of these cases was sepsis noted. They received full treatment and rehabilitation at the factory while remaining at work, and they included 320 cases of traumatic amputation or fracture, the latter involving the bones of the forearms, hands, fingers, feet, toes, scapula and ribs.

The Ministry was under a heavy obligation to Mr. H. E. Griffiths, Honorary Consulting Surgeon, for the time and trouble he took in teaching and demonstrating this minor casualty technique, in connexion with which he visited Royal Ordnance Factories and gave much help and encouragement to medical and nursing staff.

GENERAL SICKNESS ABSENCE

In addition to the illness and loss of production due to accidents and to industrial diseases such as dermatitis and T.N.T. poisoning, the Medical Departments in the Royal Ordnance Factories were also concerned with the ill-health and loss of time caused by what can be termed common ailments, such as colds, influenza, nervous debility, dental trouble, gastritis and fatigue.

This field was a wide and complicated one, and as a whole accounted for far more absences due to sickness than was caused by notifiable diseases. These ailments arose both from within and without the factory. Domestic circumstances and the previous medical history of the worker, as well as factory working conditions, influenced the liability to sickness; and the responsibility for preventive measures and remedial actions lay partly with the worker's own doctor and partly with the factory Medical Department. But the complications did not stop here. For the preventive measures that could be taken within the factory in relation to certain of the ailments, such as nervous debility, were very varied, ranging from the issue of vitamins to a recommendation that the hours of work in Royal Ordnance Factories should be reduced; and in many cases the

operation of these measures involved major questions of the policy of the Ministry. Finally, because of the complex interaction of factors which gave rise to these common ailments, the Medical Department was never in a position either to guarantee results from the adoption of a particular remedy or to measure with any pretence of accuracy the results of a particular practice or policy that was adopted.

Against this background the story of the efforts to reduce the incidence of the common ailments becomes somewhat confused. Action on many different planes and on many different problems was taking place at the same time, but the main themes of the story can be grouped under three headings. First, the collaboration between the factory Medical Department and the general practitioner on the health of the individual worker; secondly, the provision by the Ministry of auxiliary health services; and thirdly, the efforts of the Medical Departments to secure the adoption of a general labour policy which, in their view, would lead to an improvement in the health of the workers as a whole.

Collaboration between the factory Medical Departments and the general practitioners presented no major problems. In theory the former were, as suggested above, concerned mainly with preventive medicine in the factories, and the general practitioners with the treatment and cure of their patients. In practice when workers reported sick to the surgery and the illness needed more than first-aid treatment, they were told to go and see their own doctor. The medical officers in the factory were continually warned against becoming tied to their surgeries and against doing the practitioner's work for him, and were urged to spend all possible time in the shops, getting to know the processes and the workers and studying and improving the environmental conditions.

The general practitioners were encouraged to visit the factories and acquaint themselves with the conditions under which their patients worked and with the health services provided by the factory. Although the general practitioners sometimes criticised the decisions taken by medical officers in the factories, particularly in connexion with the entrance examination, and the medical officers similarly criticised the general practitioners on occasion for granting medical certificates too readily or allowing workers to return to work before they were fit, the new and extensive medical service in the Royal Ordnance Factories functioned as a whole quite smoothly alongside the old-established general practitioner service. The co-operation increased the 'turn-round' of sick workers.

ANCILLARY SERVICES

The ancillary health services developed by the Medical Department for workers in the Royal Ordnance Factories were, for the most part, on the rather ill-defined borderline between personal health service

and industrial medical service, and in their operation the co-operation between the factories and the general practitioners mentioned above was of considerable value. For example, the Ministry in 1943 made arrangements for priority hospital treatment for key workers, independently of efforts of the workers' own doctors, and further provided after-treatment in the factory surgery. The rehabilitation centres and after-care for workers who had been ill or injured approached the personal health service field. The recommendation and provision of special diets for certain workers by the factory Medical Departments similarly had a bearing on the supervision of the worker by his own panel doctor. But as the Medical Departments in the Royal Ordnance Factories were in a position to provide these services and the majority of general practitioners were not so placed, and as every worker kept at work or returned speedily back to work was of paramount importance, particularly in the last three years of war, this partial invasion of the personal health service field was not held to be unethical or wrong in principle; and, indeed, was welcomed and appreciated by the overworked practitioner, particularly when he was familiar with the nature of the facilities available.

These services concerned, however, only a very small number of the workers. Of more general application were those developed in the Royal Ordnance Factories in relation to optical, dental and chiropody treatment, and the rest-break scheme for workers suffering from fatigue. These services already mentioned, as with the more limited ones mentioned above, were not developed on a wide scale until 1943 and 1944. Discussion and experiment had, however, preceded their general adoption.

By the end of 1944 more than 50,000 workers had received eye refraction tests in the factories, and this service was a valuable addition to the entrance medical examination. In some instances the opticians also assisted in testing workers who were already engaged on work, for example detonator filling, which demanded a high standard of vision, and in designing special safety measures for the eyesight of the workers.

Difficulties in obtaining trained staff and equipment delayed the introduction of the dental and chiropody services, but by the end of 1943 the reports on their operation in a limited number of factories showed an all-round appreciation of the services. In February and March 1944, authority was given to extend these services to all Royal Ordnance Factories 'in order to reduce lost time arising' from visits to dentists and foot clinics, and absences due to toothache, untreated foot ailments, etc. A flat charge was made in each case; for example, 2s. 6d. a visit to the dentist and 1s. 6d. to the chiropodist.

The rest-break centre scheme was essentially an experiment in preventive medicine; the guiding principle was to avoid the breakdown or collapse of the workers who were becoming overwrought, and the centres

were never regarded as convalescent homes for people recovering from illness. Although the conditions giving rise to the fatigue and debility of the workers, which made a rest-break necessary, were not necessarily due solely to the environmental and psychological conditions of their particular factory ; the Ministry, as the employer, secured the provision of the facilities ; and the factory medical staff selected the workers to be sent to the centres rather than the workers' own doctors.

By 1942 some six centres were in operation. The organisers of the scheme had the full support of the Ministry of Labour and National Service, and the principle behind the scheme was strongly supported by the Medical Department of the Ministry. In the words of the Chief Medical Officer, 'Measures have been or are being taken to reduce the number of medical rejections on entry, to improve medical supervision at work, and to accelerate the return to work after sickness and accident, but no attempt has so far been made to put in the "stitch in time that saves nine", to give the workers a rest and overhaul before the parts break down'. That a scheme on these lines was necessary was accepted by the Ministry, and as a proposal to establish a Ministry of Supply rest centre proved too difficult in practice, full support was given to the existing scheme.

Before, however, workers could be sent in large numbers, some arrangements were necessary on the financial side to ensure that the loss of wages and the cost of a week or a fortnight's holiday did not act as a deterrent. In October 1943, the Treasury made a grant of £5,000 to be distributed to well-run benevolent funds, to be used primarily to help rest centre cases. This was increased by £2,500 in March 1944, to enable grants to be made to workers in Ministry establishments other than Royal Ordnance Factories.

So far as Royal Ordnance Factories were concerned, the response was disappointing. In 1944, only 1,256 workers from Ministry of Supply establishments, of whom 363 were granted financial assistance amounting to £2,648, attended the rest centres. The majority of these workers were women, and they usually stayed a fortnight in the centres.

More publicity was given to the scheme in the early months of 1945, and the rate of attendance increased. In the first six months of that year the numbers attending the centres were 106 men and 740 women, of whom 482 received financial assistance. The chief reason for the relatively small use made of the scheme was that the women who most needed the rest—that is, those attempting to keep going in the factory and the home at the same time—were unable to escape their domestic responsibilities and leave their husbands, children and lodgers for a fortnight. However, limited as the use of the scheme was, there can be little doubt, from the reports of the workers who attended the rest centres and from the Medical Departments, that many cases of certified sickness for long periods were avoided by the 'stitch in time' at the rest centre.

THE MEDICAL DEPARTMENT AND GENERAL LABOUR POLICY

The influence of the Medical Department on the general labour policy of the Ministry was indirect: the recommendations and opinions of the Department carried considerable weight in regard to specific problems of the health and sickness of the workers (for example, the preventive measures necessary to lower toxic risks or the use of ancillary health services to improve the general health of the workers), but the wider issues of labour policy (such as hours of work, length of the working week, shift systems, and incentive bonus schemes) were determined by many other factors. Among the most important of these were the demands of the Production Departments, the views of the Trade Unions, the practice in the industry and considerations of political expediency. Nevertheless, the Medical Departments, like the Labour Departments, had the responsibility both at the factory and headquarters level to make recommendations and give advice based on their particular knowledge and approach.

At the factory level the extent to which this responsibility was discharged depended more on the personality of the Senior Medical Officer and of the Superintendent than on the establishment of formal machinery for the exchange of views. The general picture in the majority of factories is one showing that after a slow start, when the Medical, Labour, and Production Departments were all too absorbed in their own problems to notice those of others, close day-to-day working developed and in countless ways the Medical Department found opportunities to forward its views on aspects of general policy.

The Ministry also invited the Industrial Health Research Board to investigate particular problems in the R.O.Fs. when it was thought that such investigations would yield results of immediate value.

The suggestions and recommendations made by the Medical Departments and the Industrial Health Research Board were not always acceptable to the Ministry. The slowness with which the Ministry accepted the Industrial Health Research Board's recommendations as to hours of work has been referred to elsewhere. Another example was the outcome of a review undertaken by the Medical Department in July 1943, of the problems of ill-health, sickness absenteeism, and labour wastage among workers in Royal Ordnance Factories. The factory medical officers were asked to review these problems and make recommendations, and on the basis of these reports, in the compilation of which some sixty-nine doctors took part, the Deputy Chief Medical Officer made a number of specific proposals.

Among these were the abolition of all night work for women, except in very special circumstances; the abolition of Saturday shift working, to be replaced by Sunday working; and an increase in the number of

days' holiday per year. None of these suggestions was adopted immediately. The embryonic stage of industrial health research and medicine, particularly in its psychological aspects, and the inexperience in this work in industry of a great number of the medical officers, might account in part for the failure of the Medical Departments to convince others of the correctness of their diagnosis and remedies. The reluctance of the Production Departments to lower their demands and to accept new methods of labour organisation until convinced by facts of the failure of the old methods, also played a part in the rejection on many occasions of the proposals by the Medical Departments.

But in spite of these apparent failures in relation to particular reports, there can be little doubt that the continual emphasis placed by the Medical Department in the last three years of the war on the existence of fatigue and weariness among workers in the Royal Ordnance Factories led not only directly to efforts to improve environment, and to the provision of rest centres, but also led, in time, to changes of policy in other directions, such as the reduction of hours of work.

CO-ORDINATION AND INTEGRATION

THE FINAL POSITION

It has already been noted that in the early years of the war, periodic returns from out-stations to Headquarters were of the simplest kind and gave little information other than a general sickness rate, and a brief summary of those put on the 'injury list'—that is, those who lost time from work by reason of accidents at work. It should be noted that this latter record differs from a record of 'reportable accidents', which are accidents causing loss of time of three days or more.

These early figures are of little interest, since they were in many cases incomplete or inaccurate.

As a result of reorganisation by Medical Headquarters, including regular and more detailed returns, and with support from Headquarters Directorate of Factories and of Labour Management, a sufficiently accurate picture of sickness and occupational illness and accidents was painted to make a statistical representation of some value. These returns cover a period of thirty-four months, from 1942 to the middle of 1945, and data extracted from them are represented in Tables I and II.

The fall in the number of cases of occupational ill-health during the last three years shown in these tables is a measure of the intense activity of members of the medical staff, on whose clinical acumen in the interpretation of slight trends in ill-health, improving with experience and supported by statistical information, was based such recommendations concerning modifications of processes, plant, workshop design, shift systems and rotation of personnel, as seemed most likely to diminish the dangers to which the individual was exposed. The acceptance of

these recommendations was a measure of the growing confidence of management in the Medical Department.

It became recognised during this period that the Medical Department had a contribution to make which would be of value at an earlier stage in the development of a project, that the medical aspects of prevention should be considered long before the operative starts a dangerous process, and that opportunity for this should be given at the stage where the handling or making of a toxic substance has not yet reached production; for much time and trouble, anxiety and ill-health may be avoided if these matters are foreseen in the 'blue-print' stage. Such a conception calls for co-operation between the Medical Department and the planners and designers, the research chemist and physicist. Teamwork must begin at the beginning.

The following example gives a picture of an approach to a problem as a pattern of co-operation:

> In 1943, the Deputy Director of Small Arms Ammunition informed the Medical Department that a particular compound (hitherto unused in filling factories) was the only substance suitable for a particular purpose. As the material was toxic, advice was asked on the possible poisonous effects, and approval of the method of handling it requested; the substance was to be used in large-scale production.
>
> The experimental department of one of the factories had made some progress with filling in the laboratory, and at a medical meeting held to consider the matter it was decided to:
>
> (i) initiate research through the Medical Research Council on the acute and chronic toxicity of the substance;
>
> (ii) arrange clinical and bio-chemical observations on the experimental work at the factory;
>
> (iii) lay down preliminary safeguards relating to the work.
>
> Two weeks after the original request, the Inter-Services Technical Committee was informed of the result of the medical investigations. Further observations were carried out at the factory experimental section, the report of which, on eight girls, proved to be satisfactory.
>
> The plant was inspected two days later and a report submitted to the Director-General of Small Arms Ammunition, some modifications relating to the nature of the labour to be employed and the precautions to be taken being made.
>
> A few weeks later, the medical position at the factory was further investigated by Professor E. C. Dodds (who was responsible for the medical research), Dr. Daniel T. Davies (Honorary Consulting Physician) and Dr. A. J. Amor (Chief Medical Officer), and modifications in the methods of processing were suggested. Reports on acute toxicity were received from Professor Dodds, and it was agreed that the greater danger to the individual was from inhalation rather than from skin absorption.
>
> The matter was further discussed at another meeting of the Inter-Services Technical Committee and, subject to the acceptance of further slight modifications to the plant, sanction was given to a large-scale trial.

In the meantime, the researches of the Engineers and of the Chemical and Scientific Research Department were proceeding, and clinical biochemical tests were carried out on one or two operatives at a large general hospital.

The matter was further considered with the Production and Engineering Departments, when the main subject of discussion was further modifications in the design of the plant to reduce the danger to the health of the operatives, and plans for the final layout for a large-scale production plant were discussed with the medical consultants, the Engineers and Production Department. Subject to slight modifications, the final agreement for the production plant was given five months after the original communication.

In the meantime, the Engineering Department had begun the erection of the final plant at another factory, and in a short time this full-scale production plant was completed, inspected, and approved. It was agreed that the plant was excellently designed and that, subject to good housekeeping being maintained, no medical trouble need be expected, although the most careful clinical observation would be kept on all operatives working on this plant.

In the event, this very dangerous material was handled over a period of 18 months by a number of operatives increasing from 75 to over 350, and it is recorded that, apart from two minor cases of dermatitis, no other ill-health causing lost time or serious illness was noted.

This description of the degree of co-operation which is possible between various branches of factory management, the Medical Branch, and outside authorities, has been given *in extenso* because it serves as an excellent example of good industrial medicine. It concerned highly dangerous material which it was essential to handle in bulk; and the conservation of health of the operatives concerned was a matter for the closest team-work between those concerned with design, layout, engineering, labour management, safety and medical supervision. Its extreme toxicity called for the extreme in such team-work.

After the War of 1914–18 a number of valuable lessons learnt by bitter experience were forgotten, either because their details were never preserved or because they were buried in files the existence of which was not remembered. Much, therefore, had to be learnt or re-learnt in this war, and it is to be hoped that the records of medical experience, of organisation and methods, and above all of the place taken by the medical services in relation to those concerned with labour management, production and research, which are of great value, will be preserved and will be available if needed.

Of these lessons, perhaps the most important is the value of incorporating the medical branch as an effective member of the team which concerns itself with the human factor in all its facets, and the maintenance of this position during the years of peace.

AIR RAID PRECAUTIONS

Responsibility for organisation and control of air raid precautions in the factories lay with the Passive Air Defence (P.A.D.) Branch. The Medical Departments were not concerned with this, except in so far as reception, treatment and despatch of casualties were concerned.

As in industry, in general, a proportion of employees was trained under the direction of P.A.D. in the basic principles of first aid, a great deal of work being put into this and into maintaining efficiency after training.

The duty of the medical and nursing staff was to remain in the Medical Department or first-aid posts and await the arrival of casualties. In the recently built factories the main Medical Department was in a number of cases designed as a strong-point, reinforced and protected, and in addition there were first-aid posts, similarly fortified, dispersed about the working areas. These first-aid posts were generally used during other times as additional surgeries with a small staff.

A warning of hostile approach was the signal for closing down of normal activities and preparing with all speed for the reception of casualties. Outlying first aid posts were manned or if normally in use their personnel strengthened; furniture and equipment were re-arranged where necessary, ample boiled water prepared, beds filled with hot water bottles, trestles placed for stretchers, and the staff took up their air raid stations.

In some cases large notices were displayed inside and outside the medical units for the better direction of casualties and to guide ambulance vehicles.

Full records of casualties were kept, with notes as to their degree of injury, and their disposal.

There were, fortunately, only a few factories seriously affected by air raids. A few others were attacked on isolated occasions, receiving damage and sustaining casualties.

In all 144 persons were killed and some 952 injured. There is no record of any casualty occurring among medical and nursing staff.

Details concerning the instructions issued to commercial firms regarding the provision of first-aid arrangements in works and factories are to be found in Volume I, Part II, Chapter 7 on the work of the Emergency Medical Services.

CHAPTER 4

MINISTRY OF WAR TRANSPORT

THE MEDICAL SERVICES OF THE MERCHANT NAVY

Based on material supplied by the Ministry of War Transport

SURVEY OF THE MEDICAL SERVICES IN PEACE-TIME

LIFE in the Merchant Navy has always had an attraction for young men and, although life at sea is not in peace-time the hazardous occupation it once was, it still demands a high degree of physical fitness.

Unlike the Fighting Services, merchant seamen were not under strict Government control in the days of peace which preceded the war. On the other hand, the Merchant Service differed from other industries in that many of the conditions of service were governed by Acts of Parliament. Among the many provisions and requirements contained in these Acts were the following: (*a*) ships must carry medicine chests containing medicines and medical stores in accordance with specified scales; (*b*) seamen must receive provisions in accordance with an approved scale; and (*c*) shipowners were liable for seamen who were left behind abroad sick. The Merchant Shipping Acts did not, however, provide for the compulsory medical examination of new entrants or for the periodic examination of those already serving. Exceptions to this were made in the case of young people (Section 3 of the Merchant Shipping (International Conventions) Act, 1925) and the crews of emigrant ships (Section 306, M.S.A. 1894). Apart from these exceptions, the shipping industry was in a similar position to any other industry, and it rested with the shipping companies to decide what medical examination, if any, was to be made of the crews of their ships. In the absence of reliable records, it is not possible to give more than an approximate figure of the proportion of seamen who were medically examined prior to engagement. The number of medical examinations made under the Shipping Federation's arrangements varied from about 20 per cent. to about 30 per cent. of the total number engaged. In addition, many of the larger liner companies had their own arrangements for medical examinations. The total number medically examined before engagement was estimated to be somewhere in the neighbourhood of 50 per cent.

TREATMENT IN THE UNITED KINGDOM

When a British seaman is discharged in this country, the shipowner's liability under the Merchant Shipping Acts ceases. Before the war the seaman was in a similar position to a man in a shore industry. If he was discharged because of sickness, or if he became sick while unemployed, he was able to get treatment from his panel doctor, if he came within the scope of the National Health Insurance scheme.

TREATMENT ON BOARD SHIP

When the seaman is in the service of a ship, the owner is liable, under Section 34 of the Merchant Shipping Act 1906, to bear the expense of all medicines, surgical and medical advice and attendance. Section 209 of the Merchant Shipping Act 1894 provides that every foreign-going ship having 100 persons or upwards on board, shall carry as part of her complement a duly qualified medical practitioner. On ships carrying less than 100 persons, the treatment of any sick members of the crew is a responsibility which devolves on the Master. All Masters and deck officers hold first-aid certificates issued by one of the recognised associations. To assist Masters of ships carrying less than 100 persons, i.e. Class II ships, a medical handbook entitled *The Ship Captain's Medical Guide* must be carried on board (Section 200 of the Merchant Shipping Act, 1894). This handbook gives detailed advice on the diagnosis and treatment of all diseases commonly met with at sea. Amendments to the advice given in the handbook are promulgated by means of official notices.

If the Master has a case of illness or injury which he feels is beyond his medical resources, he can obtain medical advice by wireless either from a ship carrying a doctor or from a shore station.

TREATMENT ABROAD

When a Master or seaman is discharged abroad, as the result of injury in the service of the ship or an illness (not being an illness due to his own wilful act or default, or to his own misbehaviour), the owners of the ship on which he was serving at the time of his discharge are liable for the expense of providing all necessary medical advice and treatment and for the seaman's maintenance until he is cured, or dies, or is returned to a proper return port, which is usually a port in the country to which he belongs or the port at which he has shipped.

The Merchant Shipping Acts provide, however, that a seaman may not be left behind abroad, unless the Master previously obtains the sanction of the proper authority. At a foreign port, the 'proper authority' is the British Consul and at a Dominion or Colonial port, the Shipping Master or the Superintendent of the Mercantile Marine. When a Master wishes to discharge abroad a seaman on the ground of unfitness or inability to proceed on the voyage, the Consul (or Shipping Master) does not give his sanction, unless he is satisfied that the man is in reality unable to do his duty on board, and will not recover in time to resume his duty before the ship sails.

When a seaman who is sick has been discharged with the sanction of the proper authority, arrangements for the necessary medical attendance, and for his subsequent maintenance and repatriation, may be undertaken by the agents of the owners of the ship. If the agents do not make the

necessary arrangements, the seaman is taken in charge by the proper authority who will arrange for the seaman to be sent to hospital or otherwise receive the necessary medical attention. After discharge from the hospital, the proper authority will also arrange for the seaman's maintenance pending repatriation or, if fit pending further employment. It is the duty of the proper authority to see that the seamen in his charge are well cared for and receive the best possible treatment. For this purpose, arrangements are made at each port with the hospital authorities to receive sick seamen and to provide all necessary surgical and medical treatment. The proper authority in general makes himself responsible for the well-being of the seamen.

The position is substantially the same in regard to sick seamen, who are temporarily removed from their ships to prevent infection or otherwise for the convenience of the ships.

Seamen who are discharged from their ships abroad are not liable, save in those cases where the illness is due to their own wilful act or default or to their own misbehaviour, for any part of the cost of their treatment and maintenance at ports abroad or for their subsequent repatriation. As stated above, this liability falls on the shipowner under the provisions of the Merchant Shipping Acts. The hospital and maintenance charges are usually paid by the proper authority and subsequently recovered by the Ministry of Transport from the shipowner. There is no limit of time to the shipowner's liability for the expenses and seamen are entitled to and actually receive free of cost to themselves all necessary treatment, whatever the cost, during the whole of the time they are sick abroad. They are, therefore, relieved of any anxiety as to the cost of treatment. In cases where seamen fall sick abroad, but where it is not necessary for them to be removed from the ship, it is the duty of the Master to make arrangements for any medical treatment that may be necessary.

Service at sea during the war was, of course, much more hazardous than service at sea in time of peace. The risks of injury and illness were increased not only by enemy action in the air, on the sea and under the sea, but also by such things as sailing in convoy, carriage of dangerous cargo and blackout on board. Those conditions naturally resulted in a substantial increase in the number of seamen who required medical treatment abroad. It was found, however, that in general the peace-time arrangements for the care and treatment of sick and injured seamen were adequate, and that special facilities were not required. Consuls and Shipping Masters oversea dealt with all such cases with sympathy and despatch. They gave particular attention to cases which came into their charge and did all in their power to ensure that the best treatment available was given.

While the liability for treatment of sick and injured seamen abroad remained on the shipowners concerned, H.M. Government in the

United Kingdom re-imbursed them in respect of expenses incurred for the treatment of seamen, who sustained an injury or illness arising from hostilities or warlike operations.

STATISTICS

There are no statistics in respect of illness in the Merchant Navy before the war. Statistics relating to deaths of seamen were compiled by the Registrar-General of Shipping and Seamen, but these included no record of the causes of death of those who had left the sea for shore occupations, possibly because of ill-health or because of disease contracted at sea.

In 1931–2, the Board of Trade made arrangements with the London School of Hygiene and Tropical Medicine to carry out a statistical investigation of the mortality of merchant seamen. The results of this investigation were published in 1932 and the conclusion then reached was that, apart from drowning and injury, service in the Merchant Navy was not more inimical to life and health than many occupations ashore which were generally regarded as healthy.

WAR-TIME MEDICAL WORK

TREATMENT ON BOARD SHIP

The edition of the Ship Captain's Medical Guide which was carried on merchant ships during the war was issued in 1929. In 1938 it was decided that the Guide should be completely revised, but war conditions made it impossible to proceed with the project. During the war, changes in the recommended treatment of specific diseases and alterations in the medical scales were promulgated by means of notices issued by the Ministry of War Transport.

The main changes made during the war years are shown below:

Malaria. The incidence of malaria in ships calling at ports on the West Coast of Africa has always been heavy. During the war the number of ships calling at such ports increased and it became clear that special steps would have to be taken to persuade seamen to take the measures recommended for the suppression of the disease. Arrangements were therefore made for the immediate issue of a copy of a Notice on the Suppression and Treatment of Malaria to the Master of every foreign-going ship. Posters drawing attention to the dangers of malaria-carrying mosquitoes were also distributed through Mercantile Marine offices to ships proceeding to malarious areas, and Masters were asked to display the posters on the ships just before suppressive dosage was started. From time to time references to the recommendations for suppression and treatment of malaria were made in the B.B.C. 'Shipmates Ashore' programme. It was the practice of some shipowners to arrange for a clause to be inserted in the ship's agreement, when the crew

signed on, that 'the crew shall take all necessary precautions against malaria as the Master may direct'. Other shipowners went further than this and required the crew to take quinine as a preventive, but in spite of these undertakings, the crews of vessels proceeding to malarious areas more often than not neglected these preventive measures.

Following the report of a special commission sent by the Colonial Office to investigate malaria control arrangements at Freetown and other West African ports, (see Volume II, Part II, Chapter 1, The Colonies), the Ministry of War Transport appointed three Malaria Lay Assistants to the West Coast ports of Freetown, Lagos and Takoradi. The duties of these officers were to visit British ships, check the stocks of quinine (later mepacrine) and see that the screening of the crew's quarters was satisfactorily carried out or that each member of the crew was supplied with mosquito netting; to give talks to seamen on malaria and its dangers and persuade them to take the preventive measures recommended. In addition, they were requested to furnish fortnightly reports giving particulars of the ships visited and reports of any cases in which they found that preventive measures were not carried out by the Master or crew. These reports were received by the Ministry of War Transport through the Colonial Office and action was initiated, either with the owners or with the Masters to improve the conditions.

The Ministry of Health asked Port Medical Officers of Health in the U.K. to keep malaria constantly in mind when examining sick persons on ships arriving from West African ports, and in September 1940, the Ministry of Health asked them to furnish particulars of all vessels in which malaria had occurred during the voyage. Copies of the returns were sent to the Colonial office and to the Ministry of War Transport. After the appointment of the Malaria Lay Assistants, the Ministry of War Transport investigated every report by Port Medical Officers of Health which was received by them, and where the circumstances warranted it, they followed the matter up with the owners or Masters of the vessel.

The number of cases of malaria among merchant seamen during the war years gives no indication of the true incidence of malaria, because the number was closely related to the number of ships visiting the West Coast of Africa, and to the length of time the ships stayed in malarious areas. Although complete statistics are not available from which the incidence of malaria in the various areas can be calculated, such statistics as are available indicate that the various measures taken by the Ministry of War Transport were, to a large extent, successful in keeping malaria among merchant seamen under control.

When the war began, quinine was used both for the suppression and treatment of malaria. The supply of quinine became difficult when Japan entered the war, and it was necessary for stocks of the drug to be earmarked for the Merchant Navy. With the continued shortage of

the drug, mepacrine became increasingly the drug of choice, especially for suppression. After consultations with leading malariologists, the Ministry of War Transport decided, early in 1943, that mepacrine should replace quinine for the suppression of malaria in merchant ships. The necessary amendments were made to the Merchant Shipping Medical Scales and a 'Notice to Masters' on the subject was promulgated.

Typhoid. Typhoid has not in recent years been prevalent in the Merchant Navy, and the war years were no exception. Cases were infrequent during the early part of the war, but later the Ministry of War Transport received information of several deaths from typhoid.

Towards the end of 1943 the question of inoculation of merchant seamen was carefully considered. There was an obvious difficulty in that if a merchant seaman were inoculated after assignment to a ship, he might be unfit to join or, if he joined within 48 hours, he might be unfit to work. On the other hand, men were not likely to be willing to be inoculated when they came ashore or during leave with the probability that they might be sick for two or three days. In the circumstances, it was felt that the risk of typhoid was not sufficient to justify the very difficult organisation which would be necessary to secure anything like compulsory inoculation, even if seamen were likely to submit to it. It was, however, decided as an experiment, to offer inoculation to groups of seamen who were to be conveyed to North America to join ships proceeding to eastern waters. The ship's surgeon of the conveying vessel gave the first injection to the seamen who accepted the offer, and the Ministry of War Transport Representative in North America arranged for the second injection on arrival. The experiment proved successful, and arrangements were made to cover all ships with surgeons on board conveying seamen to oversea ports.

Venereal Diseases. With the advent of the sulphonamides and the good results obtained in the treatment of gonorrhoea by such drugs, the question whether or not they should be put into the hands of laymen for the specific purpose of treating this disease, occupied the minds of the authorities in 1943. In March of that year arrangements were made for sulphathiazole or sulphadiazine to be carried compulsorily in all ships, including ships which did not carry doctors. A notice was prepared explaining in detail the treatment of gonorrhoea by sulphathiazole or sulphadiazine. Copies of this notice were made available to Masters of all ships and, in addition, arrangements were made with manufacturing chemists to supply the drug in tins containing sixty tablets of 0·5 g., this being the dosage for five days' treatment, and to include a copy of the pamphlet in each tin.

There are, unfortunately, no statistics to show to what extent or with what success gonorrhoea among seamen on ships not carrying doctors was treated.

Posters were displayed during the war at all Mercantile Marine offices and information was available at every office giving the addresses of treatment centres for venereal disease in British ports. Pamphlets on the subject were also made available to seamen.

At the suggestion of the Ministry of Shipping, the Shipping Federation issued a strong recommendation to their members that prophylactic packets containing ointment or sheaths should be provided for free and unobtrusive issue on ships. The view was held, however, that at the time not more than 50 per cent. of owners adopted the recommendation.

Early in 1943, there was much concern about the loss of merchant shipping man-power, due to the diversity of practice among the medical authorities of the various Allied Nations in the treatment and disposal of their merchant seamen in this country who contracted venereal disease. This diversity of practice aggravated the difficult administrative problem of keeping the maximum number of seamen employed on deep sea service (as distinct from employment on coastal vessels, the availability of which was limited). Consultations took place between medical and other representatives of the Allied Nations with a view to agreeing upon a uniform practice for dealing with venereal disease among seamen. As a result of the consultations, recommendations were made which were followed at treatment centres at which seamen attended.

It was recognised that the recommendations were not ideal from the standpoint of the highest medical standards, but it was considered by the medical representatives of the Allied Nations that, having regard to all the circumstances, they would not prejudice the welfare of seamen.

Tuberculosis. Unfortunately, it is not possible to say very much on the incidence of this disease in the Merchant Service. In its early stages, pulmonary tuberculosis is commonly symptomless and without obvious physical signs it would possibly not be detected. It was, therefore, not possible to be quite certain that a seaman who was allowed to sign on was not in fact suffering from tuberculosis in its early stages, although he had been medically examined, and it was probable that during the war a number of men suffering from tuberculosis did join the Merchant Service.

In the investigations made by the London School of Hygiene and Tropical Medicine in 1931–2, the conclusion was reached that as regards respiratory diseases, 'although it has been observed that these diseases in the aggregate constitute one of the principal causes of death among seamen . . . , the mortality among British seamen from all respiratory diseases is actually below the average in all ages when compared to the mortality due to the same cause in the selected shore industries.'

During the war, conditions in the Merchant Service changed—merchant seamen were probably a little more crowded than in peace-time, though they had the space prescribed by the Regulations of the Ministry of War Transport; the ventilation was not so good under blackout conditions, especially on the older ships, as it was in peace-time, and these two factors increased the risk of men on board suffering from re-activisation of latent pulmonary tuberculosis contracted from some other infected person on board. On these grounds, the Government agreed in 1942 that so long as measures continued to be taken which increased the risk of a man's getting tuberculosis, they would provide compensation for tuberculosis. The applicant would, however, have to show that he had been exposed to the risk while in the service of a ship for a length of time which made it reasonable to assume that the tuberculosis from which he was suffering originated from, or was aggravated by, his exposure to this increased risk.

Supply of Blood Products for Transfusion. By arrangements with the Ministry of Health, the Medical Research Council and (through the Department of Health for Scotland) the Scottish National Blood Transfusion Association, supplies of blood products for transfusions were made available, at specified centres, to ships' surgeons. Instructions for the use of such products were issued by the Ministry of War Transport in March, 1943.

Heat Exhaustion, Heat Stroke and Heat Cramp. During the war many officers and men served for the first time in tropical waters. It was, therefore, considered necessary to issue advice on steps which should be taken to avoid heat exhaustion and heat cramp, and also on the treatment which should be given to seamen suffering from these affections. A notice dealing with these matters was issued and distributed as widely as possible.

Immersion Foot and Frost Bite. These conditions were often met with among survivors from shipwreck; and it was felt that the need for prompt recognition of their symptoms could not be over-emphasised. Recommendations on the prevention and treatment of immersion foot and frost bite were issued in the form of a Notice and every effort was made to get officers and men in the Merchant Navy acquainted with the advice given.

Scabies. There was a general increase in the number of cases of scabies among merchant seamen during the war. Treatment involving the use of sulphur ointment was recommended in a Notice giving advice on the prevention and treatment of the affection issued to merchant seamen. At a later stage the Advisory Committee on scabies to the Ministry of Health recommended the use of an emulsion of benzyl benzoate as the treatment of choice, and this advice was passed on to merchant seamen in a Ministry Notice.

ACTIVITIES OF THE JOINT ADVISORY COMMITTEE

On the outbreak of war, there was a Joint Advisory Committee on the Health of the Mercantile Marine, composed of representatives of the Board of Trade and Ministry of Health. It had been appointed in 1928, 'To consider and advise upon any questions affecting the health of the Mercantile Marine which the Board of Trade or the Ministry of Health may from time to time refer to them'.

As originally constituted, the committee was composed of four members representing the Ministry of Health and three members representing the Board of Trade. The Medical Secretary was appointed by the Ministry of Health and the Clerical Secretary by the Board of Trade.

No meetings of the committee were held during the war until May 1941, when the committee was enlarged by the inclusion of two representatives of the Ministry of Labour and National Service.

Questions relating to the health of merchant seamen were referred to the committee and its recommendations were implemented by the Ministry of War Transport.

THE EMERGENCY MEDICAL SERVICES' PROVISION FOR THE TREATMENT OF SEAMEN

Officers and seamen of all nationalities who were injured in the course of duty or who were suffering as a result of exposure on duty were entitled to hospital treatment free of charge under the Emergency Hospital Scheme. Any officer or seaman who was not covered by this arrangement and who fell sick and was away from home and who sustained a fracture ashore (even if he was not away from home) was entitled to treatment under the Scheme, subject to assessment, i.e. the patient was expected to contribute through any contributory association to which he might belong or, if he was not a member of such an association, to pay what he could reasonably afford towards the cost of his treatment.

One defect in the arrangements which soon came to light was that seamen, instead of being treated at hospitals in ports, were often transferred to inland hospitals. Hospital authorities in ports were conversant with the peculiar position of seamen and were normally able to put them into touch with officials who could help them to clear up their affairs. It was considered desirable that while seamen were in hospital, every effort should be made by those concerned to make sure than any claims for outstanding wages, compensation, etc. were attended to so far as possible before the man left hospital. With this end in view, a system of notification was instituted in 1943 under which hospitals were asked to advise either the Seamen's Welfare Officer or the Mercantile Marine Office Superintendent, as the case might be,

of the admission and discharge of every merchant seaman. By this means a sick or injured seaman's needs were attended to speedily, and his recovery was assisted.

Under the E.M.S. Scheme, arrangements were made to provide dental treatment, dentures and surgical appliances free of charge to merchant seamen in certain circumstances. The operation of the Registration for Employment (Merchant Navy) Order, 1942, brought to light the fact that there were a number of men in shore occupations who would be able to return to sea if they could receive dental treatment including, where necessary, the provision of dentures or surgical appliances for certain minor disabilities. In addition, there were members of the Merchant Navy Reserve Pool, who would have had to be discharged on medical grounds unless they received the necessary treatment or appliances. To meet this difficulty the Ministry of Health made arrangements under the E.M.S. Scheme for free treatment, including free provision of dentures, and for the provision of free surgical appliances where necessary in such cases. By these arrangements, many men who would otherwise have been lost to the Merchant Navy were able to help in the maintenance of vital supplies.

HYGIENE, FOOD AND CLOTHING

Hygiene. A great deal of thought was given to the planning of crew space accommodation during the war. The standards applicable were those embodied in the Instructions on the survey of crew spaces, 1937. These were minimum standards and were exceeded in many respects before the war on the better class of ship. As building was under Government control during the war, it was possible to secure an advance on the 'Instructions on ships in general, 1937,' though shortage of labour and materials imposed certain restrictions. The improvements secured included ultimately the most important one of mechanical ventilation on deep sea ships.

Another matter which occupied the close attention of the Ministry of War Transport was the rat-proof construction of ships. A circular on the subject was drawn up by the Ministry in agreement with the Admiralty Shipbuilding Department, and copies were distributed for the guidance of shipbuilders.

Chlorination of Drinking Water. It was considered that there was a risk of accidental or malicious contamination of drinking water obtained at oversea ports. To meet this possibility, Masters of ships were told that all supplies of drinking water taken on board should be chlorinated in order to ensure the purity, unless it was known that the supply had already been chlorinated.

Food. It was very fortunate that just prior to the outbreak of hostilities, careful consideration had been given to the Food Scales prescribed for merchant seamen under the Merchant Shipping Act, 1906. No

alteration had been made in these Scales for thirty-five years. In practice, shipowners usually supplied other articles of food than those laid down as a minimum under the scales and it was considered that the time had come for a complete revision. One of the main complaints under the old scale was the lack of fresh vegetables and fresh meat, too much reliance being placed on salt or preserved meat and dried or tinned vegetables. The specified quantities of milk, tea, sugar and butter were insufficient for present day needs and fresh fish, cheese and eggs were absent. The old scale did not provide enough scope for changes required by different climatic conditions; for instance, salt beef or salt pork were considered sufficient for both the tropics and for cold climates.

The revised scale, which received the approval of dieticians as providing a healthy diet for seamen, came into force early in 1940.

No reduction was made in the scales during the war period. In addition the provisions supplied were of high quality. These were important factors in the maintenance of the health of merchant seamen during the war.

Clothing. The yearly allowance of clothing coupons which was given to seamen was much greater than that allowed to the rest of the civilian population. Arrangements were also made for a special allowance of clothing coupons for shipwrecked seamen. In addition, the Shipwrecked Mariners' Society issued clothing free of charge to such seamen, and other voluntary societies interested in seamen issued woollen garments free of charge to all seamen who applied for them. Seamen were thus able to provide themselves with ample clothing during the war, and this played an important rôle in the health of merchant seamen in their dangerous and difficult occupation.

STATISTICS OF MORTALITY AND SICKNESS

Deaths. As stated earlier, the only statistics of deaths among seamen are compiled by the Registrar-General of Shipping and Seamen. They include deaths of British seamen and fishermen occurring on British and foreign ships.

Sir William Elderton, K.B.E., Statistical Adviser to the Ministry of War Transport, dealt with this subject in a detailed report to the Minister in March 1946, and in a paper submitted to the Institute of Actuaries in November 1946 which was subsequently published. In these documents he pointed out that the statistics available could not be taken to be strictly accurate as, owing to the time lag, some deaths which occurred before the outbreak of hostilities were included in the earliest war period, while some occurring in the last period of the war might have been omitted, as would the records of deaths among prisoners-of-war in the hands of the Japanese, and of men reported missing in the Far East.

Since Sir William Elderton's report was published, however, the Registrar-General of Shipping and Seamen has revised the basis for his statistics, and they are now available on the basis of the actual dates of death.

Table I below is a statement of deaths in the Merchant Navy and Fishing Fleets which, in the case of deaths from enemy action and other war causes, occurred between September 3, 1939 and December 31, 1945, and in the case of deaths from other causes between January 1, 1939, and December 31, 1945. During the period between January 1, 1946 and December 31, 1949, 843 deaths from enemy action and war causes (including 32 deaths of fishermen and 56 deaths of lascars) have been reported.

TABLE I

Year of death	Deaths from enemy action and war causes		Deaths from other causes		Totals		Totals
	M.N.*	Fishing	M.N.*	Fishing	M.N.	Fishing	No. of deaths
1939	536† (62)	95†	918 (155)	42	1,454	137	1,591
1940	6,615 (1,186)	242	1,214 (245)	60	7,829	302	8,131
1941	7,950 (1,042)	306	1,169 (166)	40	9,119	346	9,465
1942	8,818 (1,304)	64	1,053 (149)	62	9,871	126	9,997
1943	4,840 (1,221)	18	1,084 (172)	35	5,924	53	5,977
1944	1,704 (443)	75	854 (135)	23	2,558	98	2,656
1945	810 (22)	74	969 (143)	23	1,779	97	1,876
	31,273	874	7,261	285	38,534	1,159	39,693

* The figures shown for M.N. in each year include lascars (in brackets).
† These figures relate to the period September 3, to December 31, 1939.

It will be observed that there is a distinct upward trend in the figures of 'Deaths from other causes' in the years when the number of 'Deaths from enemy action' were particularly high. It is thought that many of the 'deaths from other causes' registered during those peak years, while they could not be recorded as having been directly due to enemy action, nevertheless resulted from the country being in a state of war, e.g. collisions occurring when vessels were required to sail in convoy; accidents on board due to the the absence of normal lighting; illness arising from the lack of ventilation, etc.

Table II overleaf shows the proportion of deaths (from enemy action and from other causes) in relation to the total strength of the Merchant Navy (excluding fishermen). Unfortunately, reliable figures of the strength of the Merchant Navy in the years 1939–42 are not available, but it can safely be assumed that the numbers employed were definitely fewer than in the later years of the war. The percentage of deaths from all causes during the years 1940–42 must, therefore,

have been much higher than in the subsequent years referred to below:

TABLE II

Year	Strength (at June)	Percentage of deaths		Totals
		Enemy action	Other causes	
	(approx.)			
1943	135,000	3·6	0·8	4·4
1944	148,000	1·1	0·6	1·7
1945	149,500	0·5	0·7	1·2

Sickness. From October 1942 the Registrar-General of Shipping and Seamen maintained an accurate record of men, according to rank or rating, discharged from the Merchant Navy Reserve Pool on medical grounds. A monthly statement was issued which provided particulars of the diseases etc., from which the men were suffering. Unfortunately, similar information covering the period May 1941 (inception of Merchant Navy Reserve Pool) to October 1942 is not available.

Tables III and IV covering the years 1943–6 are based on this record. In making comparisons between the years it will be noted that a change in the classification of diseases was made after 1944. It will be observed, for example, that the highest rates of discharge during the years 1943 and 1944 were 19·4 per cent. and 22·2 per cent. respectively and related to 'nervous diseases', whereas for 1945 and 1946 the great rates of discharge of 20·9 per cent. and 17·7 per cent. arose in connexion with 'organic diseases of the nervous system and psychoneurosis'. Similarly in 1943 and 1944, 'stomach trouble', which resulted in discharge rates of 13·3 per cent. and 15·9 per cent. respectively should be compared with 'gastric and duodenal ulcers and other diseases of the digestive system' in the years 1945 and 1946 when the rates of discharge were 15·8 per cent. and 14·9 per cent.

Without additional and more elaborate data it is rather difficult to say what may be deduced from these figures, but it may safely be concluded that the reduced percentage rate of discharge for the year 1946 is attributable to the removal of the cause—the cessation of hostilities in 1945—and the relief from the anxiety and tension of the war years.

It is interesting to note that the number of discharges for physical reasons rose to the peak in 1945, yet the period 1940–3, during which shipping losses were at their highest, was doubtless one of great—if not the greatest—mental and physical strain on the Merchant Navy personnel. It seems reasonable to assume, however, that the accumulated effects of those years did not become apparent until towards the end of the war.

TABLE III

Numbers of Men Discharged on Physical Grounds from the Merchant Navy Reserve Pool, 1943–44

Old classification	1943		1944	
	Numbers	Per cent.	Numbers	Per cent.
Chest diseases (not tuberculosis)	417	8·0	535	6·8
Tuberculosis	310	6·0	426	5·4
Ulcerated legs	47	·9	31	·4
Varicose veins	101	1·9	142	1·8
Varicocele and genital organs	70	1·4	85	1·1
Piles	11	·2	24	·3
Hernia	119	2·3	146	1·8
Ear diseases, etc.	304	5·9	537	6·8
Eye diseases, etc.	353	6·8	573	7·3
Heart disease	338	6·5	387	4·9
Gastric diseases	688	13·3	1,264	15·9
Nervous diseases	1,003	19·4	1,756	22·2
Skin diseases	99	1·9	165	2·1
Rheumatism	212	4·1	331	4·2
Fractures and deformities	413	8·0	677	8·5
Injuries through enemy action	38	·7	18	·2
Bladder diseases	14	·3	51	·6
Spinal diseases	44	·9	7	·1
Poor physique and general debility	204	3·9	122	1·5
Infectious diseases	4	·1	—	—
Amputations	33	·6	47	·6
Chronic appendicitis	3	·1	7	·1
Kidney diseases	71	1·4	81	1·0
Frostbite	16	·3	11	·1
Burns	1	·02	7	·1
Blood pressure	68	1·3	77	1·0
Paralysis	37	·7	39	·5
Pernicious anaemia	10	·2	5	·05
Glandular diseases	25	·5	35	·5
Chronic alcoholism	5	·1	3	·03
Cancer	17	·3	9	·1
Diabetes	16	·3	28	·3
Post concussion	6	·1	26	·3
Jaundice	1	·02	—	—
Wasting muscles	2	·03	—	—
Tonsils	5	·1	18	·2
Fistula	9	·2	7	·1
Meningitis	2	·03	2	·02
Others and unspecified	61	1·2	245	3·1
Totals	5,177	100	7,924	100
Total strength of Merchant Navy as at June (approximate)	135,000		148,000	
Percentage discharge of whole		3·8		5·4

To abstract information regarding sickness during the period September 3, 1939 to May 1941, that is, before the Merchant Navy Reserve Pool was created and the Central Registry of Seamen set up, would be laborious and lengthy, in fact almost an impossible task. It would involve a detailed examination of every entry made in Masters' log books for every voyage made during the period. It is doubtful if the results

would be of any value, for such an endorsement in the log is usually only the lay opinion of the Master as to the sickness from which the member of his crew is suffering, or perhaps a note to the effect that a seaman has been discharged to hospital.

TABLE IV

Numbers of Men Discharged on Physical Grounds from the Merchant Navy Reserve Pool, 1945–46

New classification	1945		1946	
	Numbers	Per cent.	Numbers	Per cent.
Respiratory tuberculosis	333	3·9	250	6·1
Other tuberculosis	37	·4	14	·3
Syphilis (and sequelae)	68	·8	38	·9
Gonorrhoea	13	·2	2	·05
Scabies	6	·06	1	·02
Malaria	49	·6	23	·6
Other tropical diseases	6	·06	—	—
Typhoid and paratyphoid fevers	1	·02	7	·2
Dysentery	19	·2	8	·2
Other infective and parasitic diseases	6	·06	14	·3
Organic diseases of nervous system	236	2·8	97	2·4
Psychoneurosis and mental diseases	1,553	18·1	628	15·3
Diseases of eye—visual defects	726	8·5	468	11·4
Diseases of ear and mastoid	659	7·7	269	6·6
Diseases of heart and arteries	476	5·6	219	5·3
Diseases of veins (varicose, ulcers, haemorrhoids)	267	3·1	112	2·7
Diseases of respiratory system	527	6·1	253	6·2
Diseases of mouth and teeth	76	·9	44	1·1
Gastric and duodenal ulcers	849	9·9	324	7·9
Hernia	131	1·5	35	·9
Other diseases of digestive system	506	5·9	286	7·0
Genito-urinary diseases (non-venereal)	174	2·0	90	2·2
Diseases of skin and cellular tissue (excluding scabies)	260	3·0	133	3·2
Rheumatism and diseases of bones, joints, muscles	511	6·0	232	5·7
Deformities	157	1·8	84	2·05
Other diseases and ill defined symptoms	418	4·9	275	6·7
Burns	19	·2	1	·02
Fractures	228	2·7	90	2·2
Dislocations and sprains	25	·3	17	·41
Other unspecified injuries	234	2·7	84	2·05
Totals	8,570	100	4,098	100
Total strength of Merchant Navy as at June (approximate)	149,500		125,000	
Percentage discharge of whole		5·7		3·3

REGISTRATION OF DEATHS

Sir William Elderton in his above-mentioned paper made the following comments on this subject:

> 'The Registrar-General of Shipping and Seamen is of the opinion that certain small war-time changes in the recording of deaths have not

materially affected the value of the figures, which relate throughout to all deaths reported to him, excepting deaths of fishermen, members of the crews of foreign charted or requisitioned ships, Services personnel and passengers. They include a number of deaths of seamen ashore abroad shortly after leaving their ships.

'The figures relate mainly to deaths of the seamen of United Kingdom registered ships sailing at one time or another from the United Kingdom, but include a small number of deaths in ships registered in the Dominions and Colonies and in India. It is considered probable, however, that the number of deaths included in respect of ships registered outside the United Kingdom does not exceed the number of deaths on United Kingdom registered ships trading from India and from other ports abroad, for which returns were not due to be rendered to the office of the Registrar-General of Shipping and Seamen.

'The crews of Armed Merchant Cruisers and Naval Commissioned Merchant ships under certain agreements (T.124 etc.) are treated in all respects as part of the Royal Navy, and deaths among these crews are not included in Table I. A seaman is given a British Seaman's identity card, and this has to be exchanged for a civilian identity card when he ceases to be in the Merchant Service. So long as he holds the Seaman's identity card the Registrar-General of Shipping and Seamen would normally hear of his death, but it would not be included in the figures in Table I if the seaman died ashore in the United Kingdom, and his death would be included in the returns to the Registrar-Generals of Births and Deaths of England and Wales, Scotland and Northern Ireland. Thus, if a man has been discharged at a British port because his state of health is such that he cannot continue his occupation, his subsequent death would not be included in the table.'

WAR-TIME WELFARE WORK

Welfare work both at home and abroad was directed chiefly to meet three important needs, viz. the reception and care of survivors from sinking or shipwreck; the provision of hostels not only for survivors but for other seamen who had occasion to stay ashore; and the provision of adequate and sufficiently attractive recreation. The needs of Allied seamen and of neutral seamen serving the Allied cause had to be borne in mind. Indirectly, these had a bearing on health.

Survivors landed or arriving in this country were usually looked after by the Shipwrecked Mariners' Society. During the war the numbers to be dealt with rose out of all proportion to peace-time experience. Very many of these were injured men or serious cases of exposure or illness. In the complex situation resulting in war-time when advance knowledge of arrivals of ships with parties of survivors was highly secret, and accommodation and services ashore were frequently over-taxed, it became necessary to ensure that all the organisations and services having a part to play in the reception and care of survivors were properly co-ordinated, and the responsibility for general oversight of

the arrangements in each port or area was placed on Superintendents of Mercantile Marine Offices. Besides the primary need of clothing and accommodation, they took care that as far as possible medical attention and transport to and treatment in hospital were available immediately on landing for seamen who required them.

In oversea ports the similar responsibility lay on Consuls in foreign ports, and Shipping Masters in British ports.

The adequacy of the arrangements for survivors undoubtedly obviated much loss of life or temporary or permanent incapacity which might have followed avoidable exposure or neglect. Efficient attention aided also to restore confidence of outlook.

Apart from survivors, many of the visitors to the hostels which were established in war-time were officers and men who sought a night's sleep ashore by way of recuperation from the strain on board.

Again, it was necessary to provide not only hostels but safe, decent and attractive clubs for British and Allied seamen, especially in oversea ports, in order that as many men as possible would use them in preference to more doubtful resorts where drink and disease might bring temporary or permanent disability—with the added danger in many oversea ports that enemy agents were on the alert in such resorts to waylay and beguile British seamen.

Some good clubs and hostels already existed; some already existing were improved; some were newly created. Most were provided by voluntary organisations, but many of the new ones were set up with the aid of the United Kingdom Government or Colonial Authorities. They made a great difference to the incidence of venereal diseases which might otherwise have been a far more potent source of wastage of man-power. At any time, a seaman wandering aimlessly about a port is in danger of being inveigled into dangerous company, and the risk was, for many reasons, multiplied during the war.

This reference to the work of the general welfare organisation will indicate how in a broad way welfare and health were closely connected. The account is not exhaustive and other aspects could be quoted; for example, voluntary organisations provided special first-aid outfits for rescue ships in the same way as they provided rescue clothing kits, and special help was given in various ways to prisoners-of-war during and after their captivity.

It is proposed, however, to deal with two or three matters here, which link up more directly with medical well-being.

Hospital Visiting. The non-official organisations which were concerned in seamen's welfare played no direct part in the medical arrangements for sick and injured seamen, which were necessarily in the hands of the hospitals, the doctors, the health authorities and others responsible for the various aspects of the problem. One very important service which they rendered, however, was in hospital visiting. Before the war, the

voluntary organisations or individual members of the community attempted in an unsystematic way to visit seamen in hospital; during the war hospital visiting was placed on a systematic basis. In the first place, arrangements were made to ensure that all admissions of seamen to hospital were duly notified to those who undertook visiting or might be concerned with the individual seaman patient. On the admission of a seaman to hospital in this country details were forwarded immediately by the hospital authorities to the Seaman's Welfare Officer—in the ports where they had offices—or the Superintendent of the Mercantile Marine Office in other ports; and the names were passed on by them to the local representatives of the Shipping Federation, the seamen's or officers' unions and the organisations responsible for visiting. In this way it was made much easier for relatives and union officials to get into touch with seamen. Secondly, a co-ordinated scheme of hospital visiting was worked out to ensure that those who were prepared to undertake this duty were not cutting across each other's work, and were covering all hospitals where seamen were patients. The primary duty of helping the seaman normally fell on the hospital visitor, since it was frequently only in conversation with him that a seaman would disclose any personal or domestic difficulties which the visit of, for example, a Union representative could quite readily solve, or to meet which the seaman had to be put into touch with those who could best remedy his various difficulties.

It will be seen that not only was it proved important that all seamen in hospital should be visited, but that the function of the visitor was far more than to pay a friendly call and perhaps distribute some cigarettes and reading matter, which was all that was thought necessary in the earlier days. Seamen were found, naturally, to be acutely anxious about their insurance benefit, their claims to compensation or pension or the like, and how their families were faring while the bread-winner was not earning and supporting them. The relief of knowing that these problems were being tackled was real.

In Glasgow the organisation for these purposes was carried further. A Seamen's Liaison Committee was established in 1941, the chief functions of which were to co-ordinate hospital visiting, to direct into the right channel questions regarding pension, insurance and similar matters raised by seamen in hospital and their dependants, and to deal with all applications arising in the area for financial and other assistance. The committee included representatives of the Unions and the voluntary and benevolent organisations at work in the area, and was presided over by the Chief Superintendent of Mercantile Marine Offices in Scotland. Seamen and their dependants could obtain advice on any personal matters at the committee's bureau.

A special scheme was organised by King George's Fund for Sailors, for supplying seamen who were in hospital as a result of injuries due

to enemy action with a compendium containing toilet articles, writing paper and stamped envelopes. From other sources seamen patients were supplied with cigarettes, games and other comforts.

Where a seaman on admission was dangerously ill the relatives were not only informed immediately, but were provided with free travelling warrants, at Government expense, to enable them to visit him. In other cases relatives could obtain a reduced fare to visit seamen in hospital.

The effect of organised hospital visiting—relieving the patient of personal anxiety—would in any case be valuable because without a psychologically favourable atmosphere the physician is handicapped. Hospital visiting is particularly important for seamen since very often they are in hospital in a port remote from home, and visitors are of far greater significance to them than to those who have relatives in the vicinity.

It is certain that the hospital visiting scheme evolved during the war will in its general lines be maintained permanently, since its value has been demonstrated.

What has been said above applied during the war to ports oversea as much as to ports in this country, and it can be said with some confidence that in any port where there was a member of the British community, or a British Consulate, practically every British seaman who went into hospital was visited at regular intervals; and if he had any special needs, every effort was made to attend to them. Although in many ports abroad local circumstances may make it impossible to organise arrangements in the same way in the future, there is every hope that for the most part this matter will continue to be attended to in the comprehensive way that it was organised during the years of the war.

In dealing with this organisation we must not overlook the vastly greater debt that the Merchant Navy (and the nation) owed to the individual hospital visitors. Men and women of all kinds, ranging from officials to harassed housewives, mostly at personal inconvenience and in scanty leisure hours, undertook this duty with resource, sympathy and cheerfulness under the strain of war; and we should not forget in particular the women of other lands—the U.S.A., the Netherlands, Belgian and French Empires and elsewhere—who gave their help in this way.

REST AND REHABILITATION CENTRES

One other special line of development undertaken by the voluntary societies deserves mention, viz. a scheme to meet the needs of seamen requiring rest after the strain of war service, but not hospital or medical treatment. Three rest homes for merchant seamen were established; one, at Limpsfield in Surrey, was run by the National Union of Seamen; the second, at Allendale in Northumberland, by the Missions to

Seamen; and the third, at Summerlands in Westmorland, by the Liverpool Seamen's Welfare Centre, the organisation responsible for the large Ocean Club in Liverpool. In these rest homes those who were suffering from strain, but not requiring hospital treatment or medical treatment for some specific ailment, could have two or three weeks' complete rest amid peaceful surroundings.

Each applicant was only admitted on the certificate of one of the doctors of the Merchant Navy Reserve Pool that he was a suitable applicant and was in need of a rest. If accepted, his normal stay was for two weeks, but this could be extended to three, and it was impressed on those concerned that they should take this rest period before taking any normal leave due to them, rather than taking their ordinary leave first, as the benefit would be all the greater. Men were cared for at these homes free of charge. In addition, they were given free travel and a pocket money allowance of 5s. weekly, and, if they had families, a weekly allowance was made of 35s. for the wife plus 5s. for each dependent child; allowances to dependants of single men were also payable, though the maximum in any one case was £2 10s. exclusive of pocket money. These allowances were made possible by substantial grants from King George's Fund for Sailors.

The Allendale Rest Home closed on April 30, 1946, as the demand for this type of rest holiday had almost disappeared. The remaining two continued in existence but in a rather changed form.

The Rest Home at Limpsfield was, unlike the other two, installed in premises already available to the management. The Henry Radcliffe Home for infirm and convalescent seamen was established after the War of 1914–18 by the Merchant Seamen's War Memorial Society, which is closely associated with the National Union of Seamen, and which continued to manage the Home and the estate surrounding it, when it became a rest centre during the last war. The union and the society, with large funds given by the Merchant Navy Comforts Service, later developed the scheme by adding a cottage residential section for aged seamen and their wives, and making arrangements for training disabled seamen in agriculture and other crafts.

Associated with this was a similar scheme at Sachel Court, Alfold, Surrey, where homes for aged seamen and the training and rehabilitation of disabled men were being developed by the union after the war. This became known as Springbok Village, for which up to £150,000 was generously given by the South Africa Navy League and Navy War Fund.

At Summerlands, a regular rehabilitation centre was built up alongside the original rest home. In well equipped workshops, disabled seamen could take a six months' course in the use of machine carpentering tools of all kinds, which equipped them very well, if they showed aptitude, for almost any class of employment in this line in the outside

world and helped to restore their self-confidence. These workshops in the first year produced 20,000 bedsteads and 20,000 other items of furniture for the market. Alongside this centre, a number of cottages were built for disabled seamen, and the ultimate scheme was for 200 homes in all at a cost of not less that £290,000. The intention was that as far as possible the occupiers would work in the workshops as teachers or otherwise, or find other employment on the spot, according to their capacity.

In this way the adjuncts which these rest homes developed during the war largely altered their whole purpose. The continued operation of Limpsfield (with Sachel Court) and Summerlands was now based upon the aim of providing cottage homes and re-training, though different emphasis was laid in each scheme upon the nature of the re-training and the type of seaman specially catered for.

TRAINING AND RESETTLEMENT

The contribution of Limpsfield and Summerlands Rest Homes to rehabilitation was, though valuable, only a small part of the arrangements which were available for those seafarers who, in spite of all that medical science might be able to do, suffered disablement of such a nature that they could not return to sea.

From all points of view, it was desirable that they should not be left to find employment unaided or by some makeshift means. There is no need here to describe the full machinery which was available for the general training and resettlement of all those who had served in the Forces and Merchant Navy, and for any reason whatever had to be discharged. The following brief indications may be useful:

Under the Disabled Persons (Employment) Act, 1944, a register of disabled persons was set up. All those who suffered from some disability which substantially handicapped them in their work, or unfitted them for their old work (or, in the worst case, for all ordinary work) were able to register. Though registration was voluntary, it conveyed certain benefits; in particular they would thus qualify for the percentage of jobs which under the Act employers were required to fill with registered disabled persons, and for those kinds of jobs which were to be wholly reserved for registered disabled persons. Further, for those so severely disabled as to be unable to work in ordinary conditions, employment under sheltered conditions would, it was hoped, be provided. Every seafarer who suffered disablement of a kind which would prevent his return to the Merchant Navy had the opportunity while in hospital of an interview with the special representative known as the Disablement Rehabilitation Officer of the Ministry of Labour. After this, the local office of the Ministry did its best to assist in bringing suitable available employment to the disabled man's notice or, if none such were available, in making inquiries about prospects of alternative employment.

Various vocational training schemes were instituted, mostly involving a course of about two months, especially in manual types of vocation. These courses were provided free, and maintenance allowances were paid during the training.

The importance of these schemes from the medical point of view is not merely in completing the history of the care taken of the injured seafarer, but also that the seafarer while in hospital was given some confidence that his future livelihood had not been entirely forgotten, and thus a further possible source of discouragement, which might affect the speed of recovery, was removed as far as official action could do so.

CHAPTER 5

HOME OFFICE

THE CHANNEL ISLANDS.

PREFACE

JERSEY AND GUERNSEY

The medical history of the Channel Islands during the war, unlike that of the United Kingdom, is not primarily a matter of air raids and casualties, but mainly an account of how the medical services were continued during enemy occupation, and a description of the effects of the deprivations on the health of the people. Compared with the occupied areas in the Colonial Empire the Channel Islands suffered very little, but the experience of the inhabitants of Jersey compared very favourably with those of Guernsey, chiefly owing to an abundance of milk and home grown wheat, potatoes and vegetables. They were at times short of food, at times many felt hungry and many lost weight, but actual starvation was practically unknown.

ALDERNEY

The entire population, with the exception of one family, was evacuated before the German occupation.

As regards the smaller islands of Sark and Herm, no medical arrangements had been made.

Jersey

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THE MEDICAL SERVICES

The main hospital of the Island was the General Hospital. This was originally a Poor Law Infirmary which gradually developed the hospital side of its work until by 1939 it was, apart from the Poor Law portion, a well equipped modern hospital of about 150 beds, with an operating theatre, X-ray department and maternity and children's wards. In addition to a busy out-patient department, there were special clinics for diseases of the eye, ear, nose and throat, orthopaedic surgery, physiotherapy, dentistry, etc. The medical staff consisted of a surgeon, a physician, an eye and ear, nose and throat surgeon, a radiologist, two anaesthetists, a dentist and two resident medical officers. The General Hospital was the property of the States of Jersey. The medical staff other than the resident medical officers were part-time.

The Jersey Dispensary and Infirmary was a small hospital of 33 beds consisting of male and female wards, two private wards and a children's ward. It had a well-equipped theatre and X-ray department and maintained an out-patient department, an eye clinic and an ear, nose and throat clinic. Any doctors practising on the island could become members of the staff, and look after their own patients in the institution.

It was a voluntary institution, supported by public subscriptions, endowments and fees; it was popular with the public and its beds were usually full.

Overdale Isolation Hospital, recently built, had 62 beds, divided between infectious diseases and pulmonary tuberculosis; the latter side of the work gradually becoming predominant. It had a small operating theatre and the Medical Officer of Health acted as physician to the establishment. It was maintained by the States of Jersey.

The Mental Hospital, St. Saviour, had 250 beds for both sexes, but rarely had that number of patients. It also was the property of the States.

The States Bacteriological Laboratory, originally started to do public health work, had been rapidly developing a department of clinical pathology, mainly haematology and biochemistry and for clinical bacteriological investigations. The number of specimens dealt with annually before the war was about 2,500. As it stood in the grounds of the General Hospital, the laboratory was admirably situated for helping in the clinical work.

The Medical Officer of Health was medical officer to Overdale Hospital, Bacteriologist, School Medical officer and Port Sanitary Officer. There were 39 medical practitioners in the Island including the Medical Officer of Health and the staffs of the General and Mental Hospitals.

MEDICAL AND CIVIL DEFENCE PREPARATIONS FOR WAR

These were planned and developed by Lt. Colonel G. H. Stewart, who handed over to Major Crawford Morrison at the outbreak of war when he returned to the R.A.M.C. When war actually began, various changes were carried out at the General Hospital. The male and female Poor Law patients were removed to the Gloucester Hotel and to Sandybrook respectively, which were acquired by the Island Defence Committee for the duration of the war. The top floor was cleared of patients and the nurses were transferred to the Gloucester Hotel. The quarters for males were reconstituted as a decontamination centre and casualty clearing hospital for less serious cases, which gave a large increase in the number of beds available.

First-aid posts and points were developed all over the Island, and arrangements made for the services of doctors at all of them in case of

necessity. Various doctors were to stand by at the hospital to give assistance to its normal staff. Fifteen improvised ambulances were available at various points to help the three civilian ambulances normally available. A central control station was equipped and staffed at the Town Arsenal.

THE ENEMY OCCUPATION

On July 1, 1940, the Island was occupied by the German Forces, and the principal problem became not that of dealing with casualties, but of keeping the Island services going under the new conditions.

The estimated population of the Island in July 1939 was 51,080 and the population by census taken in July 1940 was 41,101, so about 10,000 people had left the Island either before the occupation to join H.M. Forces or at the evacuation which occurred on June 19 and subsequent dates. It was estimated that before the end of 1939, 2,017 had left to join H.M. Forces. The people who left were mainly young people and this had its effect on the death rate, as is described later.

The first step, when the occupation was seen to be inevitable, was to change the organisation in order to centralise controls. The Public Health Department, the General Hospital and the Mental Hospital, which had been administered by separate committees, were amalgamated under the Public Health Department.

The Jersey Dispensary, which had closed because of shortage of staff brought about by the evacuation, was re-opened as a maternity hospital. The object of doing this was (1) to provide accommodation for maternity cases away from the General Hospital and so free more of its beds and (2) to prevent the little hospital from being taken over by the Germans. The arrangement proved a great success. The hospital dealt with over 60 per cent. of the midwifery cases during the occupation, and it remained a maternity hospital after the war.

All drugs, medicaments, instruments etc., left behind by doctors and dentists, were requisitioned, listed, valued and re-sold to chemists, doctors or dentists. Lists of essential drugs were made out for purchase from Germany or France. Also, there was a stock-taking of essential supplies. Fortunately, fairly large stocks of dressings and important drugs had been laid in at the beginning of the war, as it was feared at the time that enemy action might interrupt communications for lengthy intervals and that stocks might be difficult to replenish. As a result, the occupation started well supplied with most of the necessities, but it was also important and desirable to get supplies from Germany and France. At first encouragement was given to buy drugs and other medicaments from Germany and German firms even sent advertisement circulars, but gradually it became more and more difficult to get such supplies; and shortly after the introduction of a quarterly ration from France in January 1942 all purchases from

Germany were prohibited. A small illegal trickle, however, continued. One German doctor who found his pay too small supplemented it by bringing back a suitcase full of valuable and expensive drugs each time he returned from leave. These he sold for the use of the hospital; the money came from the Finance Department unknown to the Germans.

Early in the occupation the pharmacists got together and formed the 'Chemists Pool'. They arranged for one of their number, a French woman, to go to France to arrange with French wholesale houses for the supply of drugs. These links were of great assistance throughout the occupation. All orders for drugs had to be approved by the Imports and Exports Advisory Board, of which the Medical Officer of Health was a member. There was some delay, but the goods arrived in not unreasonable quantities, considering the many difficulties.

These arrangements were in addition to the quarterly ration of basic necessities, which were bought by the Public Health Department and re-sold at cost to the 'Pool'.

It was difficult to estimate the needs of the Island as there were no reliable figures to work on. For instance, in 1940, large quantities of insulin were bought, sufficient, according to estimates supplied by the General Hospital and the retail chemists, to last three years. Yet by the spring of 1941 there was a serious shortage, which lasted until 1943.

There was always a sufficient supply of the sulphonamide drugs, of which a very generous gift was received from the French Red Cross just before D-day. Ten times during the occupation, supplies of various drugs were received from the Red Cross organisations. Sometimes the help was only a small packet of insulin; at others, as in October and November 1942, it consisted of a really large supply of useful drugs.

All supplies from France ceased soon after D-day and although six months' supplies of anaesthetics were always kept in hand, the shortage was acute just before the Swedish relief ship, s.s. '*Vega*', working under the auspices of the International Red Cross Society, arrived with supplies on December 31, 1944. On the day of her arrival there were only 20 lb. of ether left on the Island. After that date large and varied supplies of all sorts arrived, brought by the '*Vega*' on her various trips to the Island, and the drug supply improved steadily until V.E. day. When supplies arrived in excess of the needs of the hospitals, they were sold to the 'Chemists Pool' and the money received from the sale was paid into the Red Cross Fund.

During the whole period, communications were maintained with Guernsey and mutual aid given over drug and other difficulties. An amicable arrangement was made between the respective Medical Officers of Health by which each kept the other informed of the incidence of infectious diseases and exchanged other medical information which might be useful. Contact was also established with Dr. Le Saffre,

Directeur de la Santé Publique, Prefecture, St. Lo, who also exchanged information as to infectious diseases and gave valuable assistance in the severe crisis of the diphtheria epidemic in 1942–3, when he sent a supply of anti-toxin which lasted until the arrival of large supplies from the Pasteur Institute and the Red Cross.

Every winter vitamins were available free to children on medical prescription. These vitamins were brought from France often in a very concentrated form, and were made up into preparations suitable for prophylaxis in children. At first they were mixed with malt received from the Ann Street Brewery, but when these supplies ran out they were mixed with beet syrup.

The vitaminised beet syrup issued in the winters of 1943–4 and 1944–5 was made up to contain 3,600 units of vitamin A and 2,000 units of vitamin D to each teaspoonful and was therefore a very much richer preparation than ordinary cod liver oil. It was very popular with the children and during the winter of 1943–4 enough was prepared to give 5,000 a six weeks' course.

THE HOSPITALS DURING THE OCCUPATION

The General Hospital. As already stated, about 150 beds were available at the General Hospital. In addition a list was kept of all available beds in the nursing homes. At most periods, another 25 beds could have been made available by this means. At Overdale, 16 beds were kept ready for a similar purpose. In event of this not proving adequate, certain hotels in St. Helier had been surveyed and could at a pinch have made still another 100 beds available.

On June 28, 1940, there was an air raid, resulting in 11 killed and 9 injured. These were suitably attended to at the General Hospital. On July 1, a senior German medical officer asked Mr. A. C. Halliwell, F.R.C.S., the surgeon to the General Hospital, to meet him there. He assured Mr. Halliwell that the Germans would not interfere with the work of the hospital, but might need to send cases in. They also stationed a German medical officer at the hospital to deal with their own cases. This officer, who was very young and not fully qualified, was given a room in the R.M.O. quarters vacated by the evacuation of one of the residents before the occupation. During the next two weeks the Germans admitted several cases to the wards, but were so short of all medical supplies that they had to borrow scissors and dressing forceps. The German doctor explained that they had advanced so quickly that they had to leave their equipment behind; they had not even a field dressing, and it was several weeks before their equipment arrived.

On August 25, 1940, a gun emplacement at the airport was bombed by a British plane and several casualties were admitted. The Germans then took over an entire ward for their troops. They used the operating theatre by arrangement and, as they always asked if it was convenient,

everything went on smoothly. During this period their behaviour was proper and courteous; their orderlies always saluted Mr. Halliwell when he arrived at the hospital.

During 1940, the Germans operated on 26 cases and entered their names in the theatre book. The nurses, three of whom volunteered to staff the ward they had taken over, continued to look after their troops. Occasionally Mr. Halliwell or one of the other doctors on the staff was asked to give an opinion on one of their cases. The advice given was not always taken, but it was remarkable that it should even be sought.

At the end of February 1941, an order was received to evacuate the whole of the main wards on the first floor. A deputation saw the Commandant and the order was rescinded, but was re-issued in twenty-four hours and had to be obeyed.

The male patients were removed to the top floor which had been evacuated as an air raid precaution, and the women were sent to the old maternity block. There was a small theatre in the maternity block which was used until the end of the war. The three nurses who volunteered to work for the Germans continued in that position.

Supplies of most essentials for medicine and surgery were kept up from France. In addition, Mrs. Halliwell sent her husband 12 pairs of rubber gloves at Christmas, 1943, via the Red Cross. But supplies became difficult after the state of siege had been in force for six months and the shortage of anaesthetics was very serious at the end of 1944. Whenever possible, local anaesthetics had to be used for operations, of which only those necessary to save life were performed.

Although the arrival of the s.s. '*Vega*' eased the position as regards medical supplies, the fuel situation became very serious. Gas supplies finally ceased at 7.30 a.m. on September 4, 1944. Electricity was rationed to certain periods of the day, which gradually became shorter and shorter and finally petered out on January 25, 1945.

The boilers at the General Hospital and Overdale were adapted for burning liquid tar in June 1944. This kept the light going for the institutions and maintained a hot water supply, which included the laundry, at the General Hospital. The supply of liquid tar lasted until V.E. day and the ingenuity and skill of the engineering staff in this matter was above praise. Ultimately, the hospital was doing all the laundry for Overdale, and the dispensary in addition to its own. The Germans tapped some of the electricity made at the hospital for a nearby garage used as a gun repair depot.

Soap had almost disappeared, but the Public Health Department had at its disposal over two tons of fat from the Knackers Yard which had been closed down at Le Mourier. Large quantities of caustic soda had been obtained from France and a crude soap was produced which, together with the washing powder available, helped to keep the patients and the hospitals clean.

The Jersey Dispensary as already mentioned continued to function as a maternity hospital throughout the occupation and ultimately became very popular.

The Mental Hospital. During the latter months of 1941, Dr. Blackwenn, the German Sanitäts Officer, began to make enquiries about the asylum, which caused considerable perturbation. These culminated in a definite request in February 1942 for information as to the number of patients of both sexes, the number who could be transported as walking, sitting or stretcher patients, and the number of attendants considered necessary to accompany them should they be moved. Evidently some scheme was afoot to move all our mental patients to the Continent. Vigorous protests were made through the Superior Council and everything possible was done to point out the difficulties, dangers and suffering which would ensue. Fortunately, these protests were successful and the scheme was never put into action.

Towards the end of the occupation, in fact about one month before D-day, the Germans took over the isolation block of the mental hospital and billeted their soldiers in it, putting up machine guns and digging trenches. Protests were made against this and this time the Germans were quite unmoved, indeed they were very angry that we should consider it necessary to protest at all.

Overdale Hospital. This continued to function as an isolation hospital and tuberculosis sanatorium. An epidemic of diphtheria broke out in 1942 and reached its peak in 1943. This epidemic reduced the number of beds available for tuberculosis. To relieve the situation a large country house 'Les Vaux' was taken over as a relief sanatorium. This functioned for two years and proved very helpful.

THE STATES' BACTERIOLOGICAL LABORATORY

During the occupation the Germans made extensive use of the laboratory facilities, sending many pathological and bacteriological specimens. The number of specimens examined during the war years was as follows:

1940	3,235
1941	3,804
1942	5,758
1943	10,263
1944	6,048
1945	4,127

Fortunately, before the occupation the difficulty in getting laboratory stores had been anticipated and an adequate store of laboratory supplies had been obtained which enabled the work to be carried on without any serious difficulty. The great increase in 1943 was due to the diphtheria epidemic.

GENERAL MEDICAL PRACTICE

This continued much as usual except for the shortage of motor cars. The petrol ration fell to just under two gallons per week and the number of licences allowed for doctors' cars was reduced to about eight. This meant that doctors had to share cars. The reduction in petrol meant a good deal of cycling and one medical woman even rode a horse on her rounds. Several times the Germans tried to force the doctors to zone the island, each looking after his own district, but this idea was very unpopular and, when a final and determined effort to enforce it was made, all the doctors signed a letter that they would not agree to this arrangement. The result was a complete climb-down on the part of the Field Command.

No doctor was allowed drugs for dispensing, so all dispensing by doctors ceased. The control of medical certificates by the Medical Board was not always agreeable, but on the whole it can be said that the doctors were reasonable and admitted its necessity.

THE MEDICAL BOARD

Towards the end of 1940, it became evident that something must be done to deal with the increasing flow of medical certificates for extra food. As our food shortage was very real, either of two policies was open to us:

(1) To refuse all medical certificates. This seemed undesirable as in many cases the ordinary food available was not suitable for invalids, and because certain small quantities of rarer foods were available, but in too small quantities for general distribution.

(2) To control medical certificates.

The latter course was adopted and a medical board was formed consisting of Mr. A. C. Halliwell, F.R.C.S., a surgeon, Dr. H. J. Blampied, a general practitioner, and the Medical Officer of Health. All certificates for extra food were filed in dossiers. Each new certificate for any person was added to his or her dossier. By this means the Board had before it all previous certificates for the same person, and thus it was easy to detect the persons who went from doctor to doctor, and to find the doctors who were over-generous with their certificates. The scheme worked fairly well as a whole, and certainly acted as a brake on the issue of certificates for extra food. The extent to which the work grew can be seen from the fact that at the end of the occupation there was over 30,000 dossiers out of a population of under 39,000.

The Board also drew up dietaries for expectant mothers, tuberculosis patients, diabetics, etc.

Hospitals and institutions were not rationed as to their total quantity of milk and, in addition, received some of the meat offal, of which there was not sufficient for a general ration.

THE GENERAL FOOD SITUATION DURING THE OCCUPATION

From July 1940 to July 1941, with the rations and extras available, most people obtained a dietary of sufficient total energy value, between 2,800 and 3,000 calories daily. Strangely enough, there were more complaints during this first year than later.

From July 1941 to July 1942 dietaries up to a total value of 2,500 calories per day were obtainable by all adults, the lowest figure being reached during the first three months of 1942.

Between July 1942 and July 1944 conditions deteriorated to some extent, and dietaries of most adults lay between 2,000 and 2,250 calories. The lowest figures again occurred during the first three months of each year.

July 1944—*V.E. day*. This was the most difficult year. All supplies from France were cut off. The sugar ration stopped in November 1944, the butter ration on January 20, 1945, the bread ration fell to 2 lb. weekly on February 5, to 1 lb. on February 19 and stopped entirely on February 26, 1945. The potato ration ceased on April 19, 1945 after a final issue of 1½ lb. If it had not been for the timely arrival of Red Cross supplies on the s.s. '*Vega*' on December 12, 1944, actual starvation would have occurred. As it was, dietaries fell temporarily below 2,000 calories during January and February, but the tide of hope was rising and the time was short. On V.E. day our troubles ended.

THE EFFECTS OF THE OCCUPATION ON THE GENERAL HEALTH OF THE POPULATION

Various factors other than food must be taken into consideration when examining the effects of the occupation on the population.

A large influx of foreign workers and slave workers brought an increase in scabies and other skin infections. The shortage of fuel and soap made the washing of clothes difficult and led to a great increase of septic skin conditions. There was a definite increase in uncleanliness among the school children. Depression and boredom had their effect. But there was no real evidence of any increase in vitamin deficiency during the occupation.

BIRTH AND DEATH RATES

The Death rate. When the change in the age distribution of the population caused by the evacuation, and the departure of young people to join H.M. Forces before the evacuation is taken into consideration, there is no evidence of any increase in the death rate. The crude rate increased but this was entirely due to the departure of the young. The infantile mortality rate fluctuated to about the same extent as it did in the pre-war years.

The tuberculosis death rate behaved rather curiously. For ten years before, the tuberculosis death rate was 0·88 per thousand. It rose in the

first year of the occupation to 1·4 and averaged 1·3 during the occupation. Immediately after the liberation in 1945, it fell back to 0·9, approximately the pre-war rate. There is no plausible reason for this curious sudden rise and sudden fall.

The Birth rate. This was naturally much lower than in the pre-war years owing to the fewer numbers of adults.

The table below shows the birth and death rates for the years 1936–46.

Year	Crude death rate	Corrected death rate	Birth rate	Infantile Mortality rate
1936	15·8	10·9	18·7	40·4
1937	16·0	11·0	18·4	62·4
1938	15·6	10·7	18·5	66·4
1939	15·3	10·5	16·9	34·8
1940	17·0	11·0	17·6	62·3
1941	16·3	9·9	11·1	41·5
1942	19·1	11·6	9·9	59·3
1943	18·4	11·2	11·9	56·3
1944	17·0	10·4	13·6	55·0
1945	15·4	9·2	11·8	27·4
1946	12·5	8·7	17·2	34·2

MORBIDITY

Diarrhoea was very common and was mainly due to the great increase in roughage in the dietary.

Polyuria. This was common; the protein figure in the dietary was low, large quantities of not very nourishing soup were taken and the diet contained a far greater proportion of water than usual.

Loss of Weight. This was most marked among the middle-aged and elderly. There was only one case of serious emaciation, a mentally deficient man who sold his rations on the black market. There were, however, many cases of malnutrition.

Venereal Disease. This was not a serious problem and was well controlled, the Germans being as anxious as the civil authorities to prevent its spread. The medical officer of health had powers to incarcerate active cases of venereal disease until free from infection.

Septic Skin Conditions. These have already been mentioned and were mainly due to the difficulty of keeping really clean.

Diphtheria. A diphtheria epidemic started towards the end of 1941 and persisted until 1945. During this epidemic the death rate was higher than usual in Jersey. In the epidemic of 1931–3 the death rate was 3·1. In this epidemic it was 5·4 per cent. The adult death rate was 6·4 in the occupation epidemic; it was nil in the 1931–3 epidemic.

To summarise: the general death rate was higher; the adult death rate was exceptionally high, and the percentage of adult cases was three times that of the previous epidemic.

THE EFFECT OF THE OCCUPATION ON HEIGHT AND WEIGHT OF SCHOOL-CHILDREN

Comparative tables of the weights and heights of elementary school children from the age of 6 to 14 showed that among both sexes there was on the average a loss of weight, of from about 1½ lb. at the age of 6 to about 7 lb. among boys and about 5 lb. among girls at the age of 14 in the year 1943 as compared with the year 1940. By the year 1945 most of the loss of weight had been recovered.

As regards heights there was some slight diminution in these years amounting to an average of about half an inch at the various ages among boys and rather more among girls.

One curious effect of the occupation was the improvement in the teeth of the school children.

In the Ministry of Health *Monthly Bulletin* for August 1946 (Volume 5, p. 162), Miss E. M. Knowles, L.D.S., who made a survey in 1945, stated that 51 per cent. of the children from three to seven years of age who stayed on the Channel Islands had complete dentitions free from caries as compared with only 11 per cent. among the evacuated children who had returned to their homes. In Jersey, the position was rather better, the corresponding percentages being 59 per cent. and 12 per cent. at ages 3 to 5 and 50 per cent. and 10 per cent. at ages 6 to 7 years. Miss Knowles ventured no opinion as to the reason, but there were practically no sweets available after 1940 and all children got 1½ pints of full cream milk up to 2 years and 1 pint from 2 to 18 years; the bread was 100 per cent. extraction and the dietary involved more roughage than normally and more work for the teeth.

Guernsey

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THE MEDICAL SERVICES AT THE OUTBREAK OF WAR

The Medical and Public Health Organisation in being before the war included two general hospitals, a cottage hospital, a maternity hospital, a mental hospital and a hospital for infectious diseases, including tuberculosis; the usual services for tuberculosis, school children, and venereal diseases, also general sanitary services and the compiling of vital statistics.

Before the outbreak of war, the hospitals were re-organised, so that one of the former general hospitals was reserved for chronic cases and the other was extended and received acute cases and maternity cases, with 50 beds reserved for casualties; the maternity and cottage hospitals were closed.

The administration of the casualty hospital was under a committee of doctors.

An ambulance service was provided and administered by the St. John Ambulance Brigade.

A special Air Raid Precautions Committee was formed to create and administer a Civil Defence Service, which was modelled on such services in England, and included first-aid posts, ambulance services, decontamination squads, fire services, etc.

The hospital referred to above, which had fifty beds reserved for casualties, was previously a State General Hospital, known as the 'Country Hospital', receiving acute and chronic cases; the number of beds was increased by appropriating wards from the adjoining workhouse and converting them for hospital use. The name of the hospital was changed to the 'Emergency Hospital'. The medical services were provided by the general practitioners of the Island, several of whom were practising surgeons; X-rays and massage were available. Nineteen thousand persons were evacuated from the Island before the German occupation.

THE GERMAN OCCUPATION

Guernsey was declared an open area and evacuated by the Army and R.A.F. on June 21, 1940; there was no fighting during the occupation of the Island on June 30, 1940, but the German Air Force made a raid on June 28; this resulted in 33 deaths and over 40 seriously wounded, who were treated during the evening and night of the raid at the Emergency Hospital.

FOOD SUPPLY

The period of German occupation lasted from June 30, 1940, to May 9, 1945, and after the first year food became very short. The primary and by far the largest industry in the Island is the growing of tomatoes in glasshouses; these were used during the occupation for growing potatoes, beans, carrots, turnips, sweet corn and other vegetables. The rations up to June 1944 averaged about 1,500 calories a day, and these could be added to when crops of beans, peas, turnips and other similar vegetables were available. Supplies of meat, bread, sugar, cheese, milk and butter, were very limited and the greater part of these foods, with the exception of milk, was imported from France. Potatoes were scarce and were rationed.

After D-day, imports from France were cut off, and the rations were reduced more and more; by December 1944, the calorific value was only about 800. The situation was becoming very serious, but the escape was arranged of a Guernsey pilot, who had with him full information of the circumstances in the Island; he was picked up by an American warship and taken to Cherbourg. As a result, by an agreement made between the International Red Cross and the Germans, food parcels were sent

at intervals of from two to four weeks. The first parcels were distributed on January 1, 1945, and were very acceptable; the origins of parcels received in Guernsey were New Zealand, Australia, U.S.A. and Canada.

During the occupation the Germans commandeered very large quantities of vegetables and milk, and also the bulk of the fish caught by the Island fishermen; in consequence these foods were very restricted and fish supplies were further shortened by limitation of petrol and by German regulations in regard to fishing.

THE POPULATION DURING THE OCCUPATION

At the peak of the occupation there were about 24,000 German troops and 20,000 foreign labourers on the Island. With the civilian population, which after the evacuation numbered 23,981, (see Emergency Census table below) the total number of persons inhabiting the twenty-four square miles of Guernsey was about 68,000.

The civilian population after the evacuation had a very high proportion of old people and a very low proportion of children; before the evacuation there were about 10,000 children under fourteen years of age, and about 8,000 of them were evacuated :

Emergency Census—July 1940

Males:	65 years and over	1,807	
	64 ,, to 19 years	8,067	
	18 ,, ,, 14 ,,	865	
	13 ,, ,, 6 ,,	460	
	5 ,, ,, 1 ,,	446	
			11,645
Females:	60 years and over	2,931	
	59 ,, to 19 years	7,322	
	18 ,, ,, 14 ,,	843	
	13 ,, ,, 6 ,,	551	
	5 ,, ,, 1 ,,	469	
			12,116
Babies:			220
			23,981

The extreme density of population and the absence of a drainage system in the larger part of the Island gave rise to serious sanitary difficulties which the Germans were quite unable to cope with, their extemporised arrangements being entirely inadequate; and, the gross overcrowding of houses occupied by foreign labourers (up to 12–14 per room), taxed the sanitary accommodation far beyond its capacity.

THE HEALTH OF THE POPULATION

Outbreaks of intestinal diseases seemed inevitable, especially as there were large numbers of cases of typhoid fever in Paris and other parts of France and as many of the German troops came from the Russian front to recuperate, but none actually occurred. There were three civilian cases of typhoid in 1941 and two in 1943; there was one case of paratyphoid

in 1943, and in 1944 there were three cases among civilians who were working in the kitchen of a German anti-aircraft battery, the personnel of which had 33 cases of the disease, which the Germans attributed to a civilian carrier in the kitchen.

Two extensive epidemics of Sonne dysentery had occurred in Guernsey in the summers of 1937 and 1938, but there was no outbreak during the occupation. There were, however, many cases of diarrhoea; some of these were fully investigated to exclude diseases due to infections, and these cases must be attributed to the diet, which consisted principally of bulky vegetable matter. Post-mortem examination in several patients who died from this diarrhoea, revealed almost complete destruction of the mucosa of the small intestine.

The death rate from intestinal obstruction and strangulated hernia was ten times the pre-war rate.

Most of the foreign labourers, and a large proportion of the Germans arrived lousy and dirty; the German authorities refused to arrange for delousing them at the French embarkation ports and did not keep their promise to delouse them on arrival in Guernsey until an outbreak of typhus among the foreign labourers occurred in 1943, when the Germans got very busy. No case of typhus occurred among the civilian population who were very free from infectious disease.

Although there was a number of cases of diphtheria among the Germans, there were very few civilian cases (six in all). This good result can be attributed to the small number of children in the Island and to immunisation which had been made compulsory in 1939.

There was a number of cases of severe septic throat in the autumn of 1942; in these patients there was acute inflammation of the throat, followed by the rapid formation of very large sloughs, sometimes accompanied by cervical cellulitis. Bacteriological findings were indefinite; in no case were Klebs-Löffler bacilli or the fusiform bacilli of Vincent's angina found and no other organisms were constantly present. Three patients died from toxaemia.

The only other outbreak of infectious disease was in 1940, when there were twenty cases of poliomyelitis and polioencephalitis with two deaths.

The number of cases of venereal disease increased very much as compared with pre-war years, and the States passed a Law in 1942, giving extensive powers for compelling treatment of cases and for compulsory isolation when necessary.

The death rate from tuberculosis increased considerably, as will be seen in the table of selected mortality statistics.

The health of the civilian population suffered, as would be expected, both physically and mentally; the former was due to subnutrition and cold from the lack of fuel, the latter partly to the physical deterioration and partly to boredom, isolation, monotony and to subjection to an alien race of completely different mentality.

For the housewife, the mental strain was increased by the anxiety and difficulty of obtaining sufficient food and by the lack of adequate means of cooking it. Loss of weight was general except in the children, who are referred to later. This ranged from a few pounds to eight stone, the latter in a man who had weighed eighteen stone before the occupation and stated he was then in perfect health; he became a complete invalid. Together with the loss of weight there was often general lassitude, muscular weakness, shortness of breath on exertion, and great susceptibility to cold. Cases of extreme emaciation were admitted to hospital; many of them proved fatal within a few days.

Chilblains were common and in some cases had not cleared up even by 1949; also blueness of the extremities, sometimes progressing to superficial ulceration and gangrene of the fingers, toes or feet. Nutritional oedema occurred in a number of people. These conditions were most frequent in 1942. Some of the worst cases of gangrene died.

There were numerous cases of stomatitis and gingivitis, and many cases of recurrent diarrhoea, already referred to. Flatulence and abdominal distension, dyspepsia and gastric and duodenal symptoms suggestive of ulcer were widespread. Acute abdominal conditions such as obstruction due to bands, volvulus, and internal hernias and strangulated external hernias were far more frequent than they were before the occupation. Cases of acute distension, due presumably to fermentation and atony of the bowel, relieved by enemas, also were frequent. There were many fresh cases of hernia.

There was a multitude of pathological skin conditions such as excessive dryness, erythemas, brittleness and ridging of nails with inflammation of the nail bed, boils and carbuncles, septic bullae, which left an intractable ulcer, and a general tendency for cuts and abrasions to become septic.

It seems that people over forty years of age suffered more than the younger, and that the greatest sufferers were the aged who suffered from debility and emaciation frequently resulting in death.

As was to be expected, the death rate went up considerably, though the altered age distribution of the population must be held partly responsible.

The effect of cold is shown in the monthly death rates given below:

Monthly Death Rates per 1,000

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1940	—	—	—	—	—	—	15·0	10·0	15·0	10·5	17·5	23·0	—
1941	27·5	17·5	14·1	15·5	10·0	18·5	13·5	16·0	13·0	16·0	18·1	17·1	16·6
1942	41·1	34·0	32·0	16·9	19·4	14·4	14·1	14·1	14·1	23·5	16·7	25·5	22·3
1943	20·5	18·3	29·7	19·3	15·6	14·1	11·5	13·0	15·6	17·2	14·6	21·4	18·3
1944	28·7	33·9	33·9	15·9	16·6	12·2	13·2	16·9	12·7	7·4	23·8	31·8	21·1
1945	45·0	31·1	24·6	16·9	12·2								

The infant mortality remained low and the still-birth rate was much less than pre-war, presumably because of the supply of milk to expectant mothers. The maternal death rate was small. The health of the children was maintained better than had been expected, this no doubt being due to the extra rations they received, particularly the special milk ration.

Doctors visiting the Island after the occupation commented that the physical condition of the children was much better than they had expected and also on the bright alert expression on their faces. Most of the children increased in weight and height satisfactorily, though there was a number of notable exceptions.

A survey of the children's teeth was made by Miss E. M. Knowles, L.D.S. of the Ministry of Health, soon after the end of the occupation, the results of which were published in the Ministry's *Monthly Bulletin* (Volume 5) in August 1946. It was found that the dental condition of children who remained on the Island during the occupation was, on the whole, very good and in striking contrast with that of children who had been evacuated. For example, of the children aged 3 to 5 years examined in Guernsey and Sark, 47 per cent. were found to have a full complement of sound teeth, compared with only 12 per cent. of the evacuees. The corresponding figures for children aged 6 to 7 years were 29 per cent. and 10 per cent.

When the Island had been freed, the work of rehabilitation was begun in co-operation with the Field Hygiene Section of the R.A.M.C. A very large proportion of habitations were found to be verminous and about 75 per cent. were left in a deplorable condition after occupation by Germans and foreign labourers; the latter lived under appalling conditions on a diet hardly sufficient to maintain life. Squads of labourers were organised to remove the refuse and rubbish from dwellings; and, for the cleansing of cesspits and other filth left by the Germans, German prisoners were employed.

Selected Mortality Statistics

Year	Infant mortality	Still-births	Pulmonary tuberculosis
	Rate per 1,000 live births	Rate per 1,000 live births	Death rate per 1,000 population
1937	53·2	37·8	0·74
1938	43·4	37·6	0·35
1939	44·3	43·2	0·62
1940	46·4	28·5	0·59
1941	20·5	20·8	1·0
1942	38·1	30·7	0·91
1943	47·5	15·1	0·90
1944	43·0	20·2	1·2
1945	28·1	23·1	0·47

In addition to over 300 houses destroyed, the amount of destruction, often wanton, was enormous, and affected over 1,000 houses.

The selected tables indicate the principal variations in vital statistics during the period of enemy occupation as compared with the pre-war years:

Comparative Vital Statistics

Year	Births			Deaths			Deaths under one year of age	
	Estimated civilian population to middle of each year	Number	Rate per 1,000	Number	Crude rate per 1,000	Adjusted rate per 1,000	Number	Rate per 1,000 births
1934	40,900	751	18·3	528	12·9	9·0	38	50·6
1935	41,160	777	18·9	518	12·6	8·8	46	59·2
1936	41,950	708	16·9	545	12·9	9·0	42	59·3
1937	42,410	827	19·5	575	13·6	9·5	45	53·2
1938	43,015	851	19·8	524	12·2	8·5	37	43·4
1939	43,820	744	16·9	559	12·7	8·9	33	44·3
1940 January-June	43,000	400	18·6	334	14·0	—	21	52·5
July-December	23,976	168	14·0	179	14·8	—	6	35·7
1941	23,901	243	10·1	398	16·6	—	5	20·5
1942	23,561	262	11·1	525	22·3	—	10	38·1
1943	22,641	337	14·9	414	18·3	—	16	47·5
1944	22,408	395	17·6	472	21·1	—	17	43·0
1945	25,500	391	15·3	436	17·1	—	11	28·1

THE MINISTRY OF HEALTH'S INSPECTION IN THE CHANNEL ISLANDS AFTER THE LIBERATION.

An investigation into the food supply, the nutritional status of the population, the state of the public health and other matters of medical interest in the Channel Islands was carried out by Dr. A. L. Banks and Dr. H. E. Magee of the Ministry of Health shortly after the liberation, and their findings were recorded in the *Monthly Bulletin* of the Ministry of Health, Volume 4, September 1945.

Their report contained observations on the food supply and the effects of the diet on the health of the people during the occupation, based on information supplied by the Medical Officers of Health as well as on observations made during their visit. These observations included the following:

Nutritional State. They examined with varying degrees of thoroughness samples of infants, school children and adolescents, inmates of orphanages and certain hospital patients. They did not examine adults other than hospital patients, but were satisfied from their visits of inspection to people at work, both manual and sedentary, as well as from discussions with practitioners, that there was very little wrong with the health and efficiency of the adult population.

They agreed that the development of school children had suffered somewhat, especially in Jersey, but observed that the bulk of the children appeared to be in good nutritional state.

They examined nearly all the children and adolescents in Sark, and found them in good condition, as were also the members of the only family which remained on Alderney.

Patients in Hospital and Scheduled for Evacuation. There was nothing noteworthy about the patients in the General Hospital in Jersey, except that there were 2 cases of nutritional oedema which were well on the way to recovery. There were also 41 cases of tuberculosis, mostly pulmonary, in the isolation hospital and sanatorium; 7 of these were scheduled for evacuation for further treatment.

In Guernsey they saw eight adult cases of malnutrition which were in various stages of recovery. There were also cases of advanced tuberculosis, malignant disease, eye diseases, etc., scheduled for evacuation to England; 13 of these were sent for treatment about the end of May 1945.

There was no ophthalmologist or surgical specialist in Guernsey, nor was there a resident doctor in any of the three hospitals. The facilities for medical and surgical work were not so good as in Jersey; there were only eight doctors in Guernsey compared with twenty in Jersey. They made arrangements for an ophthalmologist and a specialist in tuberculosis to visit the Islands. Accordingly Mr. Goulden, F.R.C.S., and his assistant, Dr. Jardine, spent several days in Guernsey at the end of June. They made many examinations and did several operations during their stay; they also recommended 56 cases, mostly cataracts and glaucomas, for operation in England.

Dr. Heaf visited the Islands a few weeks later. He found that the facilities for systematic treatment of pulmonary tuberculosis had suffered much during the occupation, mainly through deterioration in radiological equipment; conditions were more satisfactory in Jersey than in Guernsey. The commonest type of pulmonary lesion found was the chronic fibroid which allows the patient to be comparatively symptomless except for increasing dyspnoea, though a chronic ambulant carrier of infection. He recommended ten cases for treatment in England.

At the time of their visit, Drs. Banks and Magee found there were about 30 German prisoners in hospital, of whom about ten had been suffering from malnutrition and were in varying stages of recovery.

The commonest condition was oedema, but several of them were emaciated, and a few were very anaemic. Their medical history had been roughly similar to that of the civilians. The investigators were informed that a much larger proportion of the Germans than of the civilians were seriously malnourished. The military authorities had in fact removed before their arrival a significant number of such cases. It seems from this and other evidence that the food situation was worse with the Germans than with the civilians.

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