INDUSTRIAL MEDICAL SERVICES IN GREAT BRITAIN

A CRITICAL SURVEY

BY

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Problems of 1914-18

It is an interesting fact and a sidelight on British mentality that the significance of industrial health and its relative importance in the scheme of things has been generally appreciated only when the country has been in a state of extreme emergency—namely, in the great war of 1914-18, and again in the present war. At the end of 1915 an unparalleled health problem was created because of the massing together of large numbers of munition workers—very many of them women—their abnormal hours of work, the intensive speeding up of production, and labour unrest generally. Fatigue became a primary cause of absenteeism and definitely interfered with the war effort, and the Government was therefore forced to take action. Lloyd George set up what he termed the Health of Munition Workers Committee “to consider and advise on questions of industrial fatigue, hours of labour, and other matters affecting the health and physical efficiency of workers in munition factories and workshops,” and the results of its investigations are reported to have done much to improve conditions. This committee was replaced at the end of 1918 by the Industrial Fatigue Research Board. The Board is responsible to the Medical Research Council, which in turn is under the control of the King's Privy Council. An account of the work of the committee and the Board, known from 1928 onwards as the Industrial Health Research Board, has recently been published (Vernon, 1940) with particular reference to present-day health problems in factories.

Developments after 1918

Much of the pioneer work of the Health of Munition Workers Committee was either forgotten or disregarded after the war, and a general apathy developed on the part of both employers and organized labour regarding health matters. Academic research was continued by the Industrial Fatigue Research Board, but these efforts were rarely translated into practice. With trade revival in 1923 and during the next three or four years a number of the larger firms in England developed their own medical services—for example, Boots Pure Drug Company, the Chloride Electrical Storage Company, the Mond Nickel Company, J. Lyons and Co., and Imperial Chemical Industries Limited. By 1927 the number of whole-time industrial doctors was probably about 20 in all, including those employed by the General Post Office (Bashford, 1938), and Woolwich Arsenal, two large Government-owned industrial concerns which for many years before 1914 had whole-time medical officers. There was a gradual increase up to 1935, when the demand for contact and mutual help between doctors doing this type of work resulted in the formation of the first British scientific society in connexion with industrial medicine—the Association of Industrial Medical Officers. This association soon increased its membership, and the subject of health in industry began to take its place as a specialized branch of medicine, due largely to the pioneer work of Howard Mummary, Lane, and Lockhart; a branch which soon proved to link up closely with the work of the general practitioner and hospital specialists, and to be in its turn but a part of social medicine and the

practice of public health. Regard must also be had to the work of Hyde and the Industrial Welfare Society in this connexion. His efforts from the earliest days did much to forward the case for industrial medical services in this country.

Developments in this War

In September, 1939, there were some 60 whole-time industrial medical officers in England and, so far as is known, only one in Scotland, but it was not until the introduction of the Factory (Welfare and Medical Services) Order of July, 1940—a direct result of the appointment of Ernest Bevin as Minister of Labour—that industry and the medical profession both realized that the Cinderella of our health services had been given a place in the front rank. Since then there has been a rapid development, and it is estimated that to-day there are over 150 whole-time and probably over 500 part-time medical officers employed by industry in Great Britain, practically all of them in factories. Many of the part-time doctors are also factory examining surgeons (the number of whom is over 1,750), who are appointed by central Government under the Factories Act mainly to examine all juveniles under 16 years of age entering factories and to give certificates in connexion with industrial diseases.

A similar impetus to industrial nursing was given by this Order. Not only have employers had to appoint medical officers but even more frequently they have had to appoint nurses. The Ministry of Labour, acting in collaboration with the Royal College of Nursing, has undertaken the training of nurses wishing to enter industry, and has advised that factories making new appointments should, wherever possible, employ fully trained State-registered nurses. This is an advance of some significance, replacing as it does the old conception that any woman could become a capable factory nurse simply by practice. The scope of the industrial nurse's work is gradually widening, and in the smaller units in particular—i.e., those employing fewer than 1,000 persons—her sphere is becoming more closely associated with preventive medicine and public health.

Why is there a Need for Industrial Health Services?

The term “industrial health” is not confined solely to a state of bodily and mental fitness in the individual, but includes what is really the state of the public health in groups of employees, both small and large. Productive capacity and output are dependent on health, and the economic status of any country is therefore closely related to the physical and mental well-being of its workers. The present health services of Great Britain—namely, the National Health Insurance Scheme, the fields of general and consultant practice, hospital services, and municipal and Government health services—do not cater fully for industry, because they have not given enough consideration to the varying physical and psychological factors within factories and business organizations which can so profoundly affect health. There are therefore in the nation's health service certain gaps which can be bridged only by the appointment of industrial medical officers and by the formulation of a comprehensive industrial medical policy as part of the general health services of the country. The more important of these gaps are as follows:

1. The First Treatment of Men and Women Injured or becoming Sick while Actually at Work

Hitherto this part of treatment has been mainly in the hands of persons with doubtful qualifications, first-aid workers of all types, and untrained nurses. Even where fully trained nurses are employed there is often no medical supervision of their work, and incidentally this is probably the only branch of nursing in which there can be a complete absence of medical

control. Because of this, casualty and first-aid services in industry have developed slowly and unsatisfactorily. For example, over 11% of all injuries reported* to the Factory Department in 1939 were septic. This is due not only to a lowering of individual resistance to infection and to carelessness in reporting so-called trivial injuries but also to the comparatively low standard of equipment required by the Factories Act, and the absence of any standard of treatment except a statement (Section 45) that the person carrying out this work in factories employing more than 50 persons shall be "a responsible person trained in first aid." The present first-aid organizations in Great Britain do not cater specially for this type of training, but the British Medical Association has considered the matter constructively and in some detail in a special report (1939).

Where a medical officer and trained nurses are appointed to a firm it has been proved that there is an immediate return to both the employer and the employee through the marked increase in the efficiency of the first treatment services. One proof of this is the reduction of sepsis that can rapidly be brought about (Stewart, 1939).

2. Medical Supervision of the Return to Work of Sick and Injured Employees

Sick and injured workers are often sent back to their jobs too soon and in a state of sub-fitness which for some considerable time makes it difficult for them to be really efficient; and, again, it may be that the doctor keeps a man or woman off work too long, and for that reason earning capacity is interfered with and production unconsciously retarded. The fact is that the majority of medical men and women have a scanty knowledge of the physical and mental requirements of the occupations of their patients; the return to work is determined by rough-and-ready hit-or-miss methods, and rehabilitation in the fullest sense of the term is a closed book to a great many of them.

The industrial medical officer who acquires an extensive and accurate knowledge of the different occupations in his industry can be of great help to medical practitioners and hospital authorities in assessing capacity for work. His part in rehabilitation is as essential as that of any occupational therapy clinic, and proof of this lies in the fact that where an industrial medical officer is employed the process of return to work is facilitated, to the greater satisfaction of both the worker himself and his employer. There is an opportunity for continued supervision under working conditions, of obtaining true alternative or "light" occupation during the toning-up process, of giving supplementary treatment in the factory clinic while the man is at work, and of obtaining for the workman a degree of indulgence from his supervisor for a short period which is so essential in completing rehabilitation. In any scheme for the setting up of accident hospitals, such as that already started at Birmingham, the position of the industrial medical officer as an essential part of the service must not be overlooked.

The implications of this side of his work are wider than is perhaps realized at first. During illness the patient consciously or subconsciously wishes to maintain some contact with his employer because of an inherent sense of insecurity, and particularly so if illness is prolonged, because there are limits to which financial assistance can be given, even if based on insurance methods; and so the industrial medical officer can be of assistance not only to sick and injured workers but to general practitioners, specialists, and hospital officers as their medium of contact with the employer on behalf of their patients. Because of his neutral position he can conserve a certain balance between employers and labour, and by so doing can build up good will and make a contribution of importance to industrial relationships.

3. The Effect of Working Environment on Health in Relation to Preventive Medicine

Because the medical profession knows so little of what goes on inside industry it becomes imperative that knowledge gained in the field of industrial medicine should be widely disseminated and the fullest facilities for education and research made avail-

able to the medical profession. The unique opportunities now afforded to many hundreds of doctors for preventive work within the factory walls will be wasted for future generations if some scheme of co-ordination is not evolved. Practical research into the prevention of accidents, industrial diseases, and sick-absenteeism generally, all offer scope for the best brains of the profession on economic grounds alone, apart from the value to the individual worker and the health of the nation.

Much research work, which before this war was of its kind outstanding in the world of scientific medicine, has been carried out by the Industrial Health Research Board. This work has included studies on hours of labour; environmental conditions in the factory, such as lighting, heating, and ventilation; dusts and toxic vapours; and the physiology and psychology of work. Each annual report in itself is a comprehensive document, and the individual reports on these various subjects are unique in their respective fields. Nevertheless there has been the greatest difficulty in having the results of the Board's investigations put into actual practice in British industry—a difficulty which the Board itself has recognized. It may be that terms of reference preclude it from propaganda and advertisement, but it is more urgent now than ever before to form some policy which will enable the results of health research work from all sources to become embodied as an essential part of industrial management. For example, industry should have some authoritative statement at an early date regarding the vexed questions of the use in industry of vitamins, physiotherapy, and inoculation in the prevention of the common cold and its derivatives, generally accepted to be the most frequent cause of sick absence in factories.

The Factories Act (1937) is a document of great significance. Its trend and appeal are towards an improvement of health; and as a contribution to preventive medicine its potential importance has perhaps as yet not been fully realized. Suggestions regarding medical supervision of factories are laid down in a pamphlet recently published by the Ministry of Labour (1940), which also will repay close consideration. And how industrial health is influenced by war conditions is described in an emergency report of the Industrial Health Research Board (1939). But perhaps the fullest account of the position in the country before September, 1939—an account not only of industrial health but of the British health services as a whole—is contained in a comprehensive report published by Political and Economic Planning in 1937.

The B.M.A. Medical Planning Commission, set up recently to consider the present and future development of Britain's health services, will undoubtedly have much to do with industrial health, especially with its relation to other branches of medicine. The suggestions of the Commission are to be fully considered at every stage by the profession as a whole, for it is only by the help of open and frank constructive criticism from all parties that any comprehensive scheme to meet the needs of the community can be evolved satisfactorily and put into practice.

What is the Nature of the Present Service?

Our present industrial medical services are mainly in factories and are for the most part voluntary in nature, medical officers being appointed and paid by the employer. There is no control, therefore, either by the medical profession itself or by the State, over the development of this type of service. The efforts of individual factory doctors have done much to improve health in industry, but mainly in the larger firms which could afford the service; and because of the lack of a suitable propaganda medium these benefits have often not been fully available for the great mass of workers.

* A "reportable" accident is one which has caused an absence from work of three days or more. (See Annual Reports of the Chief Inspector of Factories.)

There has been only a sporadic attempt to arrange for any training of the many new medical officers appointed to factories, nor is there any provision for education in the health problems of mines, the transport industry, or shipping. With the exception of London and Manchester the universities have done little to help. Birmingham University in 1935 set up a Department of Industrial Medicine, which for a number of reasons was closed in 1938; and because of the demand from individual doctors Manchester, Birmingham, and Sheffield Universities have within recent months organized successful week-end courses of training. The methods of selection and appointment of new industrial medical officers under the present system are open to criticism. Salaries and conditions of appointment vary greatly, and some general practitioners obtaining part-time appointments do so without much interest in industry; nor, with the responsibilities of a large general practice as their major problem, have they the time to develop this work.

The main way in which the State has come into the picture is because firms have been recommended and in some cases forced to appoint whole-time and part-time industrial medical officers by the Factory Department of the Ministry of Labour under the Factory (Medical and Welfare Services) Order, acting on behalf of the Minister of Labour. The Department has no say in how these services should be developed, but has given suggestions in the Memorandum on Medical Supervision in Factories already referred to.

The Factory Department itself has on its staff thirteen medical inspectors under the supervision of a senior medical inspector. These doctors are grouped regionally and supervise the statutory aspects of health in the 250,000-odd factories throughout the country. They work in close liaison with the lay inspectors, and have been helpful both to medical officers entering industry and to employers who have had to introduce medical and nursing services into their factories. Because of their extensive knowledge and experience of factory conditions they play an important part in the prevention of occupational diseases, and much of the success in eliminating these diseases from British industry in the past fifteen years has been due to their efforts.

The Ministry of Supply has since the start of the war set up its own medical service under a Chief Medical Officer, who is responsible for the administration and policy of the health services for all Government-owned factories in the control of the Ministry. Already he has under him 50 whole-time and a large number of part-time medical officers situated in various parts of the country, so what is really the first State-controlled medical service in the history of British medicine has now been set up, and its development will be watched with considerable interest.

The Mines Department has only one medical inspector, but a number of colliery owners and insurance companies interested in compensation problems among miners—for example, accident treatment and silicosis—have appointed their own doctors to supervise health conditions in mines. The Silicosis and Asbestosis Board is a body of doctors grouped regionally and appointed primarily to examine suspected cases from the point of view of capacity for work and compensation claims, but its individual members have been of considerable help to employers in the prevention of these diseases in industry.

Medical officers of health have little to do with health in factories, although it is a significant fact that local authorities are themselves often large employers of labour. The Ministry of Health has so far taken little part in industrial problems, being forced by circumstances to leave

the matter largely in the hands of the Factory Department of the Ministry of Labour.

Relation of Industrial Medical Service to General Practitioners and Hospital Services

This relation was the subject of considerable controversy during 1935 and 1936, and a special committee of the British Medical Association was appointed to discuss the matter. As a result a set of ethical rules was drawn up by both sides, and these on the whole have operated satisfactorily from that time. In 1940 the Association appointed an Industrial Health Committee "to further the co-ordination of industrial medical practice with other forms of medical practice, in particular with general practice and the public health and hospital services," and its first report will be issued shortly.

Relations between general practitioners and industrial medical officers throughout the country are good, particularly in the case of whole-time medical officers. Where part-time medical officers who themselves are also general practitioners are employed there is evidence that relations are not always fully satisfactory or of the happiest. This is particularly noticeable where the part-time works doctor has an appointment in his own area and where he may unconsciously attract members of the works and staff of his factory to his private practice. The question of part-time medical service in industry is one of importance and must be closely considered in planning for the future, because a large proportion of the working population is employed in units of 250 or less. There is one view which suggests that industrial medical service after the war should be linked up with general practice, and another which maintains that an industrial medical service should be set up consisting of specially trained personnel who would devote the whole of their time to this type of work.

Hospital authorities have so far given little consideration to the effect of work and working environment on their patients' lives, especially in relation to the rehabilitation of the sick and injured. Schemes are on foot for improving conditions in hospitals with particular regard to the treatment of accidents, and a memorandum drawn up by the Birmingham Accident Hospital (1941) for industrial concerns in the Midlands brings out some of these points very clearly.

The Worker's Point of View

During the past ten years there have been complaints from individual workers and from organized labour about the employers' methods in connexion with the medical examination of workers. It was strongly felt that factory medical officers were essentially on the employer's side because they were appointed and paid by him; that they therefore had a biased outlook; and that if a man was found by medical examination to be unfit for certain work and this was disclosed to the employer, it would lead in many cases to injustice being done and in the end outweigh all the potential value of industrial medical services. But when the doctor understands the problem of relationships and has a reasonable outlook, and when he is fearless in his statements and gives opinions founded on accurate facts and observations, his position is soon recognized by employer and employees alike to be that of one entirely uninfluenced by the vested interests of either party, and his opinion is fully accepted by both sides in any matters to do with health. It is only by obtaining this bilateral confidence that the industrial medical officer can be successful in his work.

The Employer's Point of View

There are many employers in the country to-day who fully agree with the introduction of industrial medical ser-

vice and have welcomed its increase. They realize the economic value of such service and acknowledge that they have a responsibility in management beyond that of being merely custodians of the shareholders' money. This outlook is encouraging and provides greater reason for confidence that the service must have a place of no little importance in any future health planning for the nation. On the other hand there are still employers of labour who consider that the health of their employees is little or none of their business; they are prepared to fulfil the letter of the law and keep their statutory obligations, but are unwilling to go further. Where doctors are appointed under the new Order to such firms they have a great responsibility. They have to prove to the employer that the service they are giving is helpful not only to the workers but to industry as a whole, and one not lightly to be discarded after the war.

BIBLIOGRAPHY

- Bashford, H. H. (1938). *Proc. roy. Soc. Med.*, **31**, 185.
 Birmingham Accident Hospital: Memorandum on its Policy Relating to Industry (1941).
 Collis, E. L., and Greenwood, M. (1921). *The Health of the Industrial Worker*, London.
 Factories Act (1937). H.M. Stationery Office, London.
 First Aid in Industry (1939). British Medical Association, London.
 Health of Munition Workers Committee (1915-17): Reports and Memoranda. H.M. Stationery Office, London.
 H.M. Chief Inspector of Factories, Annual Reports. H.M. Stationery Office, London.
 Home Office Welfare Pamphlets, Nos. 1-8. H.M. Stationery Office, London.
 Industrial Health Research Board, Annual Reports. H.M. Stationery Office, London.
 Industrial Health in War (1939): Emergency Report No. 1. Industrial Health Research Board. H.M. Stationery Office, London.
 Ling, T. M. (1937). *Recent Advances in Industrial Hygiene and Medicine*, London.
 Lockhart, L. P. (1935). *Med. Ann.*, **266**, Bristol.
 Memorandum on Medical Supervision in Factories (1940). H.M. Stationery Office, London.
 P.E.P. (1937). Report on British Health Services, P.E.P., London.
 Stewart, D. (1939). Milroy Lectures. *British Medical Journal*, **1**, 963, 1019.
 Vernon, H. M. (1940). *Health and Efficiency of Munition Workers*, Oxford University Press.

"ETHER CONVULSIONS"

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"Ether convulsions" were described simultaneously in May, 1927, by two Manchester anaesthetists—K. B. Pinson (1927) and the late S. R. Wilson (1927). Pinson thought them to be due to an over-accumulation of CO₂. This explanation has never been generally accepted, for not only have convulsions occurred during endotracheal administrations, when the alveolar CO₂ content is at its lowest, but the administration of CO₂ has been found an effective method of treatment. Wilson, on the other hand, attributed the convulsions to impurities in the ether, aldehydes and peroxides having been detected in the samples used. Walton (1928) found impurities which supported Wilson's theory, but Sykes (1930) and Ross Mackenzie (1931) did not find them, or only in such minute quantities as to be negligible. This theory, however, received much attention both from the chemical houses producing ether and from the makers of anaesthetic apparatus. It became customary to sell ether in dark-coloured bottles wrapped in black paper, and the ether bottles of some anaesthetic apparatus were made of heavily tinted glass. Later, copper was found to be a powerful anticatalytic agent, and the tubes which dip into the ether in Boyle's and similar machines were subsequently made of this metal. In spite of these precautions convulsions still occurred, and it has long been generally accepted that impure ether could not be regarded as their cause. Conclusive evidence of the correctness of this view is the fact that typical "ether convulsions" have

occurred when no ether has been used—for example, during operations under local (Hudson, 1936), chloroform (Bull, 1927), and nitrous-oxide-oxygen anaesthesia (Sington, 1927).

When the convulsions were first described it was uncharitably suggested that these new and extraordinary phenomena might be due to faulty provincial technique. As reports were published of similar convulsions having been seen in all parts of the country this explanation had quickly to be abandoned, but, as will appear later in this paper, I consider the frequency with which they have occurred in Manchester to have a definite aetiological significance.

Since Pinson and Wilson first described this condition much has been written on the subject. Many case reports have appeared and numerous theories have been advanced, though none of them has been universally accepted. This is possibly because no one theory has explained and fitted in with all the known facts and the many observations that have been made. It is common knowledge, however, that the combination of youth, heat, and a septic condition with pyrexia occurs in some 85% of cases, and on this account the heat-stroke theory, first put forward by Dickson Wright (1935) and upheld by Woolmer and Taylor (1936), has received more support than any other. It is proposed in the present paper to support and elaborate both this theory and that of neurogenic shock advanced by Hudson (1936) and to explain the occurrence of the hyperpyrexia.

I suggest that ether convulsions are caused by a strong neurogenic stimulus in a hyperpyrexial patient. I consider that the hyperpyrexia is due to the administration of a general anaesthetic to a dehydrated pyrexial subject in a hot humid atmosphere, the subsequent rise in temperature possibly being increased by the previous administration of atropine.

Neurogenic Stimuli

In the cases recorded in Hudson's valuable paper the convulsions were undoubtedly initiated by neurogenic stimuli. This is equally true of a case reported verbally to the Anaesthetic Section of the Royal Society of Medicine. The last-mentioned patient was being given nitrous-oxide-oxygen for a thyroidectomy and had been premedicated with omnopon-scopolamine. The surgeon pulled rather hard to expose the upper pole, and convulsions started immediately. These settled in a minute or two, the operation was continued, and the surgeon repeated his over-forceful manoeuvre, whereupon the convulsions immediately restarted.

The exact stage of the operation at which convulsions began has unfortunately not been mentioned in all the published case reports. In the majority of those in which it has been recorded one cannot but be struck by such oft-recurring phrases as "just as the peritoneum was being opened" or "while the peritoneum was being shut"—i.e., while the peritoneum was being lifted upwards, possibly rather forcibly. Again, in two or three cases bone chiselling was taking place at the moment of onset. I have seen one case in which convulsions started the moment the peritoneum was picked up by forceps previous to incision. The convulsions were controlled and the operation continued. The convulsions restarted when the peritoneum was picked up again as a preliminary to closure. I have seen another case in which the convulsions definitely started just as cross-action peritoneal forceps were applied. Yet another case of mine showed this initiating nociceptor factor even more dramatically.

The patient, a boy aged 8, was suffering from an acute mediastinitis due to a swallowed pin, which had passed through the oesophagus. He was extremely ill, was badly dehydrated,