Anatomy of occupational medicine

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Lee, W. R. (1973). British Journal of Industrial Medicine, 30, 111-117. An anatomy of occupational medicine. Previous writers have attempted to describe occupational medicine by considering the functions of a doctor working in industry. In different communities, and even in the same community at different times, a doctor working in industry may have different functions. 'Occupational medicine', so described, would therefore not be a discipline but would merely be medicine practised in a certain area. Furthermore, such an approach leaves out other aspects of occupational medicine such as recompense for injury at work and statutory supervision of workplaces, and any interaction between these two.

Men think in terms of conceptual models which predetermine to a greater or less extent their approach to future problems. The present essay attempts to formulate a coherent intellectual framework of occupational medicine.

The conceptual model proposed here is based on the globe proposed by Himsworth (1970) as a model representing the structure of scientific knowledge. Using this, a place for occupational medicine can be determined related to medicine, industry, and the 'basic' sciences. Occupational medicine is thus seen as a coherent entity.

The argument is supported by a comparison of some of the provisions for occupational medicine in this country and in France. In this comparison the underlying components are distinguished from the mechanisms set up to deal with them. It is these components which go to make up the structure of occupational medicine and it is the coherence and close relationship of them which must be studied to find and describe an entity to be called occupational medicine.

Preface

The title word 'anatomy' has been deliberately chosen. Since its early usage it has had a wider sense than the restricted medical concept of describing the structure of the body. An Elizabethan writer, Philip Stubbes (1585), in his Anatomie of Abuses wrote in the manner of a Puritan condemning women for the finery of their dress. The continued usage of the word in this wider sense is demonstrated in Milton's (1641) 'Such an unripping, such an Anatomie of the shiest, and tenderest particular truths'; in Reid's (1814) more prosaic 'it must be by an anatomy of the mind that we can discover its powers and principles'; in Thomas Moore's (1849) 'he proceeded to the anatomy of the short poem'. More recent examples are The Anatomy of Swearing by Ashley Montagu (1968) and The Anatomy of Crime by Fabian (1970).

It has also served in a wider sense to include not only an examination of parts but also an analysis based on that examination. Thus was Robert Burton's (1621) The Anatomy of Melancholy and, in the present century, The Anatomy of Courage by Lord Moran (1945).

In the present title I use the word in the former sense of the dissection or dividing of anything, whether material or immaterial, for the purpose of examining its parts.

1Based on the BMA MacKenzie Industrial Health Lecture, 1972, delivered at Winchester, 13 July 1972
Introduction

At this time of development and change it is necessary for many decisions to be made which will affect profoundly the future of occupational medicine for very many years to come. It is, therefore, important to consider what is meant by occupational medicine, for the subject will advance only if we have a concept which is both clear and realistic. Without such a concept we are likely to move from one expedient to another. The dangers of this situation have been clearly illustrated by the recent discussion about occupational medicine in the European Economic Community.

An early draft directive of the European Commission, based presumably on the advice of its Permanent Committee of Doctors, suggested that postgraduate training in occupational medicine should last for one year. It was the shortest period recommended for any of the specialties in medicine and is the required period of study necessary to obtain the Diploma in Industrial Health in France at present (François, 1972, personal communication). A later draft directive of the Permanent Committee of Doctors proposed the omission of occupational medicine from the list of specialities on the grounds that it was not a specialty in itself, but only an area in which medicine was practised (Grey-Turner, 1972, personal communication).

That decision is being questioned. However, it is not difficult to see how it arose. Taylor in 1958 wrote that a large part of industrial medicine is neither more nor less than general practice conducted in the context of the factory or other workplace. Professor Tabershaw (1971), in the Sappington Memorial Lecture titled ‘Occupational Medicine: The Search for an Identity’, has recently considered this problem and described occupational medicine simply as ‘what the occupational physician does’. He was apparently not satisfied with this, for he added ‘we are an amorphous group bound to industry and labour, but functioning in almost every imaginable way’. Such a description does little to clarify the position. Neither is this problem discussed in either of the two publications The Functions of an Occupational Health Service in an Industrial Organization (Association of Industrial Medical Officers, 1956) or The Doctor in Industry (British Medical Association, 1971). However, this latter publication is subtitled ‘Policy of the Association approved by the Representative Body’, and it does not set out to be an academic analysis. All these approaches rest simply on what a doctor in industry does and not why he is there.

A major difficulty in occupational medicine at the present time, therefore, is to find a coherent intellectual framework for the specialty. To put it another way, we must try to find a conceptual model of occupational medicine because ‘To a considerable extent men think in terms of conceptual models and, according to the model they choose, they predetermine to a greater or less extent the assumptions on which they base their approach to future problems’ (Himsworth, 1970).

I do not intend to present a complete anatomy of occupational medicine but rather to present it with the help of a conceptual model in the hope that it will form a contribution to thought and a basis for discussion of the subject.

The model

In his recent book The Development and Organization of Scientific Knowledge, Himsworth (1970) has proposed a conceptual model of scientific knowledge which departs fundamentally from the long-established analogy of a tree of knowledge. The model that he puts forward is that of a vast globe of primitive ignorance around the periphery of which there is a whole series of problems prompting men to seek knowledge. From these different points of departure men have begun to penetrate toward the centre. The different series of problems at the periphery mark the frontiers of the different provinces of natural knowledge, and the penetrations are the development of these provinces of knowledge towards the centre. He has developed this concept from a consideration of biology, medicine, and other sciences in which he sees sequences proceeding from their specialized extreme, which he calls mission orientated, near the periphery toward an unspecialized extreme near the centre of the globe. Thus in medicine we have a sequence: clinical, pathological, physiological, biochemical, and so on to the molecular level. Furthermore, as we proceed inwards toward the unspecialized centre we find that the different sequences have progressively more ground in common, so that chemical knowledge, for example, has emerged from the mass of data coming down from a number of sequences (including medicine).

Where does occupational medicine fit into this conceptual model? I suggest that it lies, like clinical medicine, on the surface of this globe ‘where there are a whole series of problems prompting men to seek knowledge’ (Himsworth, 1970). Like other fields of medicine, occupational medicine reaches down to pathology, physiology, and biochemistry for the solution of problems which arise in the course of its activities. Elsewhere, like other branches of medicine, it reaches down to psychology and sociology for help with other problems. But essentially it is situated as a part of medicine on the periphery of this globe.

Occupational medicine is that part of medicine which is concerned with the problems which arise on the line of contact between medicine and industry.
It would be possible to make a formal list of parts of this line of contact and call it occupational medicine but that would be to ignore another dimension—time. Neither medicine nor industry is static and as the situations change new problems emerge and some older problems diminish in importance. The formal list must either span the centuries and risk becoming so great that it defeats the object or it must relate to one particular period such as the present and so define those parts along the line of contact where the problems are occurring at the present time. As different countries may be at different stages of industrial development at any one time, a corollary is that the content of occupational medicine may differ in different countries.

We should, therefore, specify both the country and the period of time under consideration when we identify the particular parts of the line of contact (the ‘problems’) which constitute occupational medicine. This is similar to the changes which take place over a period of time in the patterns of disease seen by general physicians.

Returning to occupational medicine, let us take two recent examples from our experience in this country. The abuses of child labour which brought doctors into industry in the first half of the last century have now disappeared in this country, and the organization of certifying surgeons (later called Appointed Factory Doctors) which was brought into being to deal with that situation is shortly to be disbanded (Employment Medical Advisory Service Act, 1972).

Another example we can take is a problem which has been coming increasingly to the fore in recent years. Recent social changes have led to the increasingly widespread practice of paying employees more or less their full wages while they are off sick. Now, although absence from work attributed to sickness has always been a problem (Froggatt, 1970), the rising rate of sickness absence under these new conditions (Morris, 1965; Whitehead, 1972; Thomson, 1972) has been attracting more and more interest.

Having located the area of medicine in which occupational medicine is practised, it is necessary to look more closely at this area. We must consider whether all the work done during the day-to-day practice of a doctor in industry automatically becomes occupational medicine, as Tabershaw (1971) would seem to imply. Does the hygiene inspection of a works canteen become occupational medicine? Is the primary treatment of an acute illness starting at work or, indeed, of a works accident in any way so different from such treatment in the general field of medicine or surgery as to distinguish it as occupational medicine? It is, of course, quite understandable and right that a doctor employed in industry should be prepared to do some of these things because he is a doctor and because he is there, but we must consider whether they thereby automatically become part of a specialty we would call occupational medicine.

We need to distinguish between these two types of activity. If we take the basic premise from our conceptual model, that occupational medicine comes into existence because of the problems which arise on the line of contact between medicine and industry, it is clear that the distinction comes not from asking the questions ‘What is done?’ or ‘Who does it?’ but from the question ‘Why is it done?’

This may be illustrated by a consideration of the medical examination of senior executives. If the purpose of the examination is to monitor their general health so that they may feel reassured or sent for treatment, if necessary, there is no reason why this examination should not be carried out by a general physician unconnected with the undertaking for which the executives work, for the examinations are not part of occupational medicine. If, on the other hand, the purpose of the examination is, perhaps, in the first place to monitor the health of the executive to determine whether or not he should continue to do his particular job or be moved to some other; or, in the second place, the purpose of the examination is to use the health of the executives as an index to monitor stresses in the situation where they work, then in both these instances the interpretation of the medical examination needs not only a knowledge of the management environment but an expertise in this field of occupational medicine. In fact, this would be an instance of the use of a group of persons as a biological monitor of their common working environment and of the steps to be taken if this monitor indicates an abnormal situation. In other words, the medical examination would then form a part, and only a part, of a system which examines and deals with the problems arising out of effect of work on health.

**Application of the model**

Returning to the conceptual model that occupational medicine lies at the line of contact between medicine and industry, we can now examine to see in what circumstances occupational medicine will become involved. To do this we add to the model a man, and we place him in the sector we have called industry. He will enter the interest of occupational medicine whenever he approaches or whenever he crosses the line of contact. He might cross the line of contact into medicine as the result of an accident at work or an occupational disease. He might, indeed, pass from the sector labelled industry to the sector labelled medicine without crossing the line of contact. He might, as it were, outflank it by passing through another sector called domestic or non-occupational.
Prevention and compensation

Let us first examine the different parts of occupational medicine which are brought into play as the man crosses the line of contact from industry in the sector called medicine. In the course of time in this country some of these aspects of industrial medicine have become separated so that we have come to regard them as being in distinct compartments, but they have not always been thought of as separate even in this country. Other countries, whose industrial development has been similar to our own, have developed systems where these aspects of occupational medicine are not so clearly separated as they are here.

To take prevention, factory legislation started in this country with the Health and Morals of Apprentices Act of 1802 which failed for want of an inspectorate to enforce it. The developments which led to the early establishment of the Factory Inspectorate in 1833 and the gradual widening of its area of influence up to the Factories and Workshops Act of 1878 are well documented (Thomas, 1948). In France the development bears some close resemblances but occurred somewhat later (Desoille, 1958). The French law of 1841 fixed the period of work at 8 hours for children of 8 to 12 years and at 12 hours for children of 12 to 16 years, but, like our earlier attempts, this law failed for want of inspection. The French had to wait until the law of 1874, which regulated the work of children and young girls, for an inspectorate to be set up. It was not until some 20 years later, in 1893, that the law for Health and Safety at Work was passed. From that time they have had comprehensive factory legislation and a factory inspectorate. Since then the developments in the two countries have been broadly similar although different in points of detail. However, it will be seen later how these different developments may have influenced developments in other parts of industrial medicine in the two countries.

To turn from prevention to compensation, despite preventive measures industrial accidents and diseases still occurred and workmen and their families suffered in consequence. Some of the events leading to the development of legislation in this country for workmen injured at work have been reviewed elsewhere (Lee, 1973). After the general election of 1895 when an act for workmen's compensation was assured, two courses were open. The advocates of prevention wished to put such a financial burden on the employer in case of accidents so as to provide a direct financial incentive to improve safety and lessen risks. On the other hand, the advocates of compensation preferred to concentrate attention on assuring adequate financial relief to the injured workman (Young, 1964). As we know, the compensationists prevailed. From then on, the systems of compensation and prevention became separated.

The discussion was re-opened in 1942 by the Beveridge Committee which proposed a special levy in industries of high risk to encourage the employers to take particular care. Beveridge argued that 'the number and severity of accidents can be diminished or increased by greater or less care on the part of those who manage industry' and as an incentive to the employers this levy would be worked out by calculating the average cost of compensation in each of the scheduled high-risk industries and then determining by how much their compensation costs exceeded the average cost of compensation over the whole of industry. He stated that his plan would give 'to employers a financial incentive for diminution of accidents and to the Ministry of Social Security a basis on which to press for preventive measures'. These suggestions were not accepted by the British wartime government (Minister of Reconstruction, 1944) and the National Insurance (Industrial Injuries) Act of 1946 continued the dichotomy between prevention and compensation.

One curious result is that when a patient is referred to my outpatient clinic by the Department of Health and Social Security for an opinion on whether or not he is suffering from an industrial (strictly speaking a 'prescribed') disease, I am sent a report on the working conditions by an inspector from the Department of Health and Social Security. These reports are of a very high standard and considerable value. Nevertheless, although history explains why this should be, I sometimes wonder whether there is not a place here for the Factory Inspector or the Employment Medical Adviser of the future.

It is not the same in France. When one considers the parallel developments in western European countries it is perhaps not remarkable that our Workmen's Compensation Act of 1897 and National Insurance (Industrial Injuries) Act of 1946 have been matched in France by a law for compensation for industrial accidents in 1898 and then the law of 30 October 1946. Although this law forms part of the French Social Security Code it is titled 'Loi sur la prévention et la réparation des accidents du travail et des maladies professionnelles'. It is also interesting that whereas the British Act of 1946 relates to accidents arising out of and in the course of employment the French Act of 1946 relates to accidents arising out of or in the course of employment and is, therefore, somewhat wider (Code du Travail, 1954). Expressed in English the wording of both is remarkably similar and the translation from the French is taken from a publication of the International Association of Legal Sciences (Spielmeyer, 1965).

There are, of course, other differences in detail but what concerns us here is that the French Social
Security Fund is not merely concerned with payment of benefits (and the refund of medical expenses) but also has an interest in accident prevention. Comparing the British and French systems of social administration, Rodgers, Greve, and Morgan (1968) write ‘While the action of the (French) Social Security Funds does not in any way reduce the force of government regulations or the activities of the Labour Inspectors and employers, it is an additional and powerful means of accident prevention and of associating employers and workpeople with the campaign against industrial injuries'.

The French explain their system by saying that the more flexible Social Security Fund is often in advance of the Factory Inspectorate and speeds up the procedure of obtaining control by preventive legislation (Gillon, 1972, personal communication). But it is no part of my task to compare the relative merits of two systems, in one of which there would appear to be duplication and in the other prevention and compensation are so widely separated. More is it my concern to show that at this part of the line of contact between medicine and industry we, in this country, at the present time tend to think separately of prevention and compensation. We have not always done so and our nearest neighbour runs the two systems quite closely together. We are beginning to see occupational medicine not as a place where some doctors practise, or as a series of duties undertaken by the doctor working in industry, but as a rational entity.

Resettlement

Returning to the conceptual model, let us consider the movement across the line of contact into industry of a person who has been, or still partly remains, under the care of medicine. He will, by the description of occupational medicine presented here, come within the purview of occupational medicine. We can look at some of the arrangements to deal with this to see what they are, and we can also see to what extent we can learn from arrangements in other countries.

Provision for the resettlement into industry of persons with disabilities began, in this country, from a number of separate starting points. One was the provision in the early part of this century of education and training for those who could not attend ordinary school because of certain disabilities, such as the Dame Agnes Hunt Hospital and the Lord Mayor Treloar's College for Cripples. Another was the provision made by private companies for their own injured workmen, such as those organized by Dr. Moore with the London Midland and Scottish Railway Company at Crewe and Dr. Morris-Jones with Pilkington's Glass Works at St. Helens, Lancashire. Yet another starting point for the provision of facilities for resettling persons into industry arose from the concern for the war-disabled, beginning after the Boer war with the Lord Roberts Workshop and after the first world war with the Sir Robert Jones Military Orthopaedic Hospital. This was accompanied by the establishment of Government Instructional Factories (later the name was changed to Government Training Centres) for persons requiring retraining for other work.

However, the actual resettlement into industry of the war-disabled depended on voluntary effort through the King's National Roll Scheme by which employers took on a quota of disabled persons. The second world war led to developments beyond the altruistic training of the disabled and the voluntary resettlement of war-disabled. The added objective was to bring into employment, that is, to resettle, all those who could be employed to help in the war effort. At the same time the scheme would serve to assist in the resettlement of both the newly disabled and those whose disability was of longer standing (Department of Employment, 1971). This move, The Disabled Persons (Employment) Act (1944), went beyond the training of cripples and the setting up of workshops and training for war-disabled. Its object was to get disabled persons from whatever cause into industry.

Throughout this time the Workmen's Compensation Act was in operation for those whose disability was caused by industrial accident or disease, and despite some notable attempts already referred to by a few enthusiasts to associate this with resettlement, there was no general provision along these lines. Indeed, a man might be given a certificate for 'light work', and in 1920 County Court judges giving evidence to a government committee declared that 'light work' was not easily found and was merely a euphemism for ending compensation (Young, 1964).

In Britain, a person off sick for whatever cause obtains treatment under the National Health Service and generally returns to work without much difficulty. Many return to their former employment either directly or assisted by a works doctor. Others are aided by the services provided under the Disabled Persons (Employment) Act, although many of these persons are changing their jobs at the same time.

In this country we tend to think of the rehabilitation and resettlement services as something quite separate from the industrial injuries scheme. It has not always been so. Indeed, one of the original aims of the Workmen's Compensation Act had been to keep the link between employer and employee so that the injured man could be re-employed, preferably in his own job, if he was fit enough, or at least with his old firm (Young, 1964). This question of linking payment of industrial injury benefit with facilities for resettlement was considered by the Beveridge Committee (1942). One of their proposals
was for a statutory association of employers and employees in some, if not all, industries, and one of the functions of this association was to be "promotion of measures for rehabilitation and re-employment in that industry". Perhaps it was the development of the Ministry of Labour's industrial rehabilitation services at the same time that caused these two aspects of occupational medicine to become so clearly separated that we hardly think of the National Insurance (Industrial Injuries) Act and the Disabled Persons (Employment) Act as having anything in common.

It is not so in other countries. Britain's National Health Service is almost unique in that the full cost of medical treatment is free for all patients. In other European countries, France and Germany, for instance, this is not generally the case and the benefits available to a person suffering from an occupational accident or disease may be cash benefits, as we usually think of them, together with full medical care and rehabilitation (Rodgers et al., 1968).

As before, I am concerned not to judge the merits of the different systems operating in different countries but to demonstrate that certain elements of occupational medicine which, to us, appear to be disconnected are in fact much closer together historically in this country and, at the present time, in other countries. In so doing I am concerned to emphasize the integration of occupational medicine as a discipline.

The working environment

Let us return again to the conceptual model. In occupational medicine we are concerned not only with the people who cross the line of contact between medicine and industry but also with people who are approaching the line of contact. Particularly may we be concerned to prevent people approaching the line of contact from the sector labelled industry from crossing it into the sector labelled medicine.

To achieve this aim we relate the man, still in the industry sector, to his working environment, which is generally analysed into its physical, chemical, psychological, and microbiological components. Various fields of endeavour have come into being to deal with some of the problems which arise. We can recognize industrial toxicology, occupational hygiene, ergonomics, health physics, and others besides, some of them overlapping to a greater or less extent with the others.

As an example, we as doctors may take industrial toxicology. Here we find ourselves, often in company with our professional colleagues such as general physicians, haematologists, and chest physicians, digging down together, as it were, into this globe and so making contact with workers in the basic sciences such as pathology, physiology, biochemistry, and perhaps immunology and genetics.

But whereas the physician wants that knowledge so that he can better understand the mechanisms of action of the substances and therefore of the body so that he will be better equipped to treat the patient, we bring back that knowledge from the underlying sources in order to put it to a quite different use.

Our object is to use that knowledge to improve our methods of detecting early changes so that we can better monitor the working environment and exposed population to ensure that no harm comes to the persons exposed to that environment. It is when we try to achieve these objectives that we meet problems which are entirely those of occupational medicine. At first it was relatively straightforward; the doctor detected early evidence of disease and the man was removed before harm was done. But as diagnostic techniques have become more and more efficient we are able to detect changes at progressively earlier stages. So much so, that Hernberg and Nikkanen (1970) have recently demonstrated a good correlation between the activity of the erythrocyte enzyme ALA dehydrase and the blood lead concentration even when this latter is at the normal levels of persons not exposed to lead at work. This would lead on to the question of the principles to be used for the setting of threshold limit values which is one of the more important and interesting questions facing occupational medicine at the present time. I am not concerned to go into it here, for it has recently been reviewed in a typically thorough and thoughtful manner by Hatch (1972). My present concern is to point out that this field of application of knowledge, derived from developments in the basic sciences, or the deeper layers of the globe to use the model, is uniquely that of occupational medicine.

A man I saw in outpatients last month illustrates a number of these points. A chemical plumber was referred from another hospital to which he had been sent because he had been found to have a blood lead of 326 μg Pb/100 ml at a routine investigation. He felt perfectly fit and would admit to no symptoms, neither would he admit to any symptom over the past few months. That is not unusual; symptomless cases have been reported with much higher blood leads (Scott, 1967; Chamberlain and Massey, 1972), yet this completely symptomless man had been off work for seven weeks and was still off.

What do we learn from this case? Do we discuss the fact that although the blood lead concentration may have some value in the monitoring of exposed groups it has a low discriminatory value in the diagnosis of lead poisoning and, therefore, its use as a basis for the administrative action of keeping a man off work as in this case is questionable? If we entertain that idea, what other test would we use? Or do we look at the other aspects of the case and consider whether, although there might have been
reasons for removing the man from further exposure while the working conditions were being dealt with, is it right that a man feeling perfectly fit should be kept out of work for seven or more weeks? And whose job is it to see that this man is kept out of work for as short a time as possible? My point is that the fact that we can ask all these questions about this man from such different aspects illustrates the unity of occupational medicine. We are concerned not just with the mechanisms of industrial toxicology, interesting as those may be, but also with the effects of our interpretation of those mechanisms on the advice we give.

Conclusions
In this discussion of the anatomy of occupational medicine I have thought of it as that specialized area of medicine which is concerned with the problems that arise on the line of contact between medicine and industry. By regarding it as such we see that it forms a coherent entity. This is quite different from thinking of it merely as any or all of the activities of a doctor working in industry. If we do that, we do not enlarge or increase occupational medicine. On the contrary we run the risk of so diluting it that it merely becomes a place in which some doctors practise, as it was alleged to be by the Permanent Committee of Doctors of the European Economic Community, and it ceases to be a subject in its own right. In saying this, I am not denying that the occupational doctor might not carry out other tasks because he happens to be on the spot, but what I would question is whether these tasks thereby automatically become part of that specialty we call occupational medicine which has a coherence and unity of its own.

I would like to thank my colleagues over the years who have contributed to my thinking by their stimulating discussion, although I would not hold them responsible for my views. In particular I would like to thank Professor R. E. Lane who so often created the climate which encouraged our discussions.

I am grateful to Mrs. Dorothy Crofts of the Department of English, Elizabeth Gaskell College, Manchester for her advice on the meanings of 'anatomy'.

References


Received for publication September 13, 1972.
Accepted for publication November 17, 1972.
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doi: 10.1136/oem.30.2.111

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