Occupational medicine for one and all*

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Abstract

In the 1930s in Britain, industrial medicine was a clinical discipline, the main purposes of which were to diagnose disability in applicants for work, to identify industrial disease in the dangerous trades, and to provide first aid treatment for those injured or taken sick in the workplace. Following rapid developments in epidemiology and occupational hygiene and with more emphasis on "group health" and less on "individual care", occupational medicine has tended to become less of a clinical discipline; yet clinical skills are needed to assess fitness for work, to identify adverse effects of work, and to undertake consultations on a variety of health problems. Although care of the individual worker is a major task, an occupational health service has a responsibility for the health of the workforce as a whole, using epidemiology to plan and administer health care, to identify and control work related disorders, and to promote health by identifying positive factors in the organisation that induce a sense of well being; and by health screening and education programmes. Academic occupational health should not lose its identity as a clinical discipline in any merger with environmental health. Medical skills are needed to assess fitness for work and to identify human responses to adverse factors in the environment and to evaluate control measures.

The title would be appropriate for a discourse on the Irish Faculty of Occupational Medicine, which ignores the north and south divide and is so obviously for one and all. This is not to be my subject. Nor am I pleading for occupational health services for all, recommended by the International Labour Organisation.¹ It is a worthy objective but of limited value if the service offered is not up to standard. Neville Cardus's comment on all round cricketers, "Com-

prehensive mediocrity adds up to nothing beyond mediocrity,"² applies to health services in workplaces. Less than half the British workforce has access to occupational health services, and many of those that exist are restricted and below standard because staff have not been professionally trained.³ I have no figures for Ireland, but have seen first hand a highly selected sample of two services that, as expected, were of exemplary quality. One was Smiley's service in a Belfast rope works and the other in a Kilkenny factory that had been set up by Ian Eustace, an old student from the London School of Hygiene. My subject is *quality* of service, which befits the memory of James Smiley whose professional standards were second to none. Two essentials for high quality are professional competence and the right content (what the service does to protect and promote health). On the first, there would be unanimous agreement—namely, that the service must have a competent, professionally trained, and caring staff. Thirty years ago, Jim Smiley wrote, "Occupational medicine beckons to it technically good doctors, generous in their sympathies, liberal in their sentiments, humble in their ignorance, adventurous in their seeking, and courageous when, as sometimes happens, they are misunderstood by those whom they serve."⁴

Occupational physicians, enlightened employers, and trade unionists will agree that the aim of an occupational health service is to protect and promote the health of people at work and not to serve narrow managerial or union interests. There will, however, be divergent views on how best to achieve these objectives. In particular there will be disagreement on the role of medicine in the workplace and its relation to other health services. I see less reason for conflict about occupational hygiene, the other major discipline in occupational health. It is primarily concerned with the evaluation and control of environmental agents affecting people's health. Unlike some of its protagonists, I do not see it as an alternative to occupational medicine. It is the combination of the two disciplines that is essential for preventing injury and disease and promoting health among working people.

Fifty years ago industrial medical officers had no special training in the preventive aspects of occupational medicine. They used clinical skills to diagnose disease in applicants for work, to treat those

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injured or taken sick at work, and to examine people employed in dangerous occupations. With the rapid developments that have taken place in epidemiology and occupational hygiene and with more emphasis on "group health" and less on "individual care", has occupational medicine declined as a clinical discipline? How much should it be for one (the individual worker) and how much for all (the group)?

Individual care

An important objective of medical practice is to diagnose and treat illness and injury. Prevention is accepted as important but is often seen as an administrative task, requiring few clinical skills.⁵ This is not so in occupational medicine. Its primary aim is preventive, but the occupational physician and nurse use their clinical skills in their interaction with individual workers (1) to assess fitness for work, (2) for surveillance of persons exposed to occupational hazards or whose health may adversely affect the health and safety of others, and (3) to treat injury and illness occurring at work and to be available for consultation about health problems.

FITNESS FOR WORK

The purpose of the pre-employment examination has changed and factors to be considered in fitness have changed because more is known about the physical and psychological demands of jobs. When I began my career as an industrial medical officer in the mid-1930s, applicants for work found to have disabling disease of a minor order were rejected without regard to the demands of their job. As a young doctor used to seeing patients who were ill, examining hundreds of mostly healthy people was boring. It seemed bad medicine to deprive them unnecessarily of the opportunity to work. War, with its insatiable demands for manpower, changed the purpose of these examinations from detecting unfitness to assessing ability for work. Industry had to employ the less able to meet manpower shortages that followed an urgent demand for increased production and the call up of fit men and women to the armed services.

Wartime experience led to changes not only in the aim but also in the method of pre-employment screening. Usually the first step in screening is the questionnaire.⁶ When there is doubt about an applicant's fitness, he or she can be referred to the occupational physician for fuller investigation, thus avoiding unnecessary clinical examinations.

HEALTH SURVEILLANCE FOR EFFECTS OF HAZARDS

Pre-employment

For people to be employed in jobs with special health risks, the aim of screening is to identify those likely to

be vulnerable to particular kinds of exposure or who have established disease that could be aggravated by work. This screening is not simply a routine procedure to be delegated to nurses and technical assistants, although they play an important part in any programme. The skills of the physician are needed in the design of the programme and in deciding on the fitness of the individual worker, bearing in mind that they should not be excluded unnecessarily from exposure to a potential hazard. Tests used for screening have to meet certain criteria. They should be acceptable to workers and reproducible, which means standardising questionnaires and test methods. Their predictive value for development of disease has to be assessed before they are used routinely. For example, whereas skin test atopy is related to the development of occupational asthma from exposure to laboratory animals, it has a poor predictive value and is not useful as a pre-employment screening test.⁷ Similarly the predictive value of liver function tests for monitoring exposure to hepatic toxins is limited.⁶

In employment

In follow up examinations, tests for chemical and biological indicators of exposure, such as blood lead concentrations and lung function, make it possible to identify early adverse effects. This can lead to better environmental control and personal protection or, as a last resort, removal from exposure. A well designed health surveillance programme, based on the clinical records of workers and tests for pre-clinical evidence of exposure, can make an important contribution to preventing work related disease. A notable success was the elimination of lead poisoning by Professor Ronald Lane in a group of factories manufacturing lead batteries.⁸ It was achieved by a combination of environmental control and medical surveillance, and by making the person understand the danger of his work. This demanded clinical expertise and patience in educating management and workers in their responsibilities.

EFFECTS OF HEALTH ON WORK

Surveillance at first employment and subsequently after illness or injury is important for those whose disabilities may adversely influence the health and safety of fellow workers and the community. Examples are airline pilots, vehicle drivers, railway workers, and food handlers. Fitness is important among senior executives who make decisions and supervise others. A psychiatric illness, alcoholism, or cerebrovascular disease may cloud and distort judgement and seriously impair quality of leadership.

TREATMENT AND CONSULTATION

It is wasteful of limited resources and creates disharmony if occupational physicians offer a general practitioner service to employees. Exceptions are building operations in isolated areas and in developing countries where no primary health care exists in the community. A widely held view is that, except in emergencies, treatment and consultations by occupational health service staff should be confined to work related injury and disease. This nosological distinction between occupational and non-occupational disease has been encouraged to define responsibility for health care and compensation. A better understanding of the multiple causality of disease and more advanced techniques for identifying risk factors at work in common disorders, like asthma and coronary heart disease, broadens the concept of occupational medicine and makes such distinctions untenable and not in the best interests of either the employee or the employer. Apart from less tangible effects on morale, a strong case can be made for providing services such as efficient and speedy first aid treatment of serious injuries and acute poisonings and the continued treatment of minor conditions to save employees' time away from work. Consultations for advice on health problems can identify workers affected by adverse environmental agents. Clinical observation may provide the first clue to a work related disease.⁹

A simple method of recording and analysing illnesses and injuries gives clues to unsuspected occupational risks. For instance, repeated attendances for treatment of back pain by men from the despatch department of a factory indicated faulty methods of loading trucks.

Consultations may also bring to light illnesses that are not related to work and offer opportunities for personal counselling on social and emotional problems and health education. Occupational physicians who make themselves available for consultations (I sense this is becoming less common) enhance the value of the service and gain the confidence and support of management and work people. Records of individual care provide data that can be used to improve the effectiveness of the service by the process of clinical audit.

Care of the working population

Although care of the individual worker is a major task of an occupational health service, it has responsibilities for improving the health of the workforce as a whole by identifying poor health and its causes, adopting and evaluating preventive measures, and auditing the quality of the service. This has to be done by epidemiology, which has three main uses: (1) in the planning and administration of health care, (2) in the identification and control of work related

disorders, and (3) in the promotion of health.¹⁰ Occupational epidemiology tends to be regarded as the discipline of academics who exploit mortality and morbidity data routinely collected by others and who undertake special surveys. As a one time plant physician, I see it as an essential tool in daily practice. Epidemiology does not require a profound knowledge of statistical techniques but rather common sense and an ability to observe people as groups as well as individual subjects.

PLANNING AND ADMINISTERING HEALTH CARE

Health care resources are limited in any community by costs and shortages of skilled personnel. Thus a service has to assess its priorities, allocate its scarce resources, and measure their impact. A health information system is necessary for planning a new service or reforming an existing one. It is an essential for occupational epidemiology. It refers to all routinely and specially collected data (table 1). Routinely collected information on employees is needed to ensure efficient care of individual workers in terms of their treatment and management, for job placement, and assessment of their fitness for work. The same information can complement data especially collected for a study of adverse health effects. Treatment records can indicate dangerous work practices and risks of occupational disease.

If the service provided is to be planned according to population needs, a health information system has to give usable data and avoid the collection of useless records. In this way it can show what needs to be provided for occupational health care. Correctly managed it can indicate where intervention is needed—for example, environmental control or health education. It can measure intervention effects and help to establish priorities. There are three basic components to measure:¹⁰

- (1) *Impact*: (effect) a change of risk or health state.
- (2) *Coverage*: the number who benefit from a particular activity out of those who need it.
- (3) *Costs*: in terms of supplies and manpower needed to set up and maintain a particular programme.

An occupational health service has to declare its

Table 1 Health information systems

Health information	Sources
Routinely collected:	
Deaths	Pension funds
Sickness absence	Health service
Accidents	Health service
Minor illnesses	Health service
Health surveillance of hazardous work	Health service
Specially collected:	
Organ system screening	Clinical surveys
Symptoms, work attitudes	Questionnaires
Exposure levels	Environmental measurements

priorities. A choice has to be made in allocating resources. This requires an appraisal of costs of each service activity in relation to its impact on the working population.

IDENTIFICATION AND CONTROL OF WORK RELATED DISEASE

Early epidemiological studies of occupational disease were *descriptive*; giving little more information than the occurrence of a disease in a population, usually a rare one like scrotal or nasal cancer, or like silicosis and plumbism, which are relatively easy to diagnose. A classic example is Percivall Pott's observation, more than 200 years ago, of the frequent occurrence of scrotal cancer in chimney sweeps. Since the 1920s epidemiology has undergone a remarkable change of face inspired by Sir Austin Bradford Hill through the example of his own research and his unforgettable teaching of logic and numeracy to members of the medical profession.¹¹ Improved epidemiological techniques make it possible to identify disorders, and their causes, that commonly occur in the community and may be related to work, like coronary heart disease (CHD), chronic obstructive pulmonary disease, and lung cancer. Notable improvements have been: (1) the sample studied represents the population at risk; (2) confounding factors, such as ageing and smoking, are controlled; (3) questionnaires and tests of disordered organ function are more reliable; and (4) adverse effects in people are related to environmental exposures. Thus *analytical* or *aetiological epidemiology* has emerged and made it possible to identify hazards with more certainty, to find causes, to determine occupational exposure limits more rationally, and to evaluate control measures.

CORONARY HEART DISEASE AND WORK

Risk factors associated with lifestyle probably account for much of the CHD occurring among workpeople. There are, however, other factors more directly related to work. Lack of exercise is not just a lifestyle issue. A classic observation by Jerry Morris showed that conductors on double decker buses had less CHD than drivers.¹² Toxic environmental agents have been associated, with varying degrees of confidence, with heart disease (table 2). Well documented evidence indicates that carbon disulphide, carbon monoxide, and nitrates are risk factors for CHD.¹³ Independent studies of viscose rayon workers in Britain and Finland indicated that exposure to carbon disulphide (CS_2) had a significant effect on mortality from CHD.^{14,15} In the Finnish factory, where concentrations of CS_2 were reduced by a factor of four and operatives with evidence of coronary insufficiency were removed from exposure, the mor-

Table 2 Well documented environmental toxic risk factors in cardiovascular disease¹³

Coronary heart disease	Cardiac arrhythmias	Direct myocardial damage
Carbon disulphide Carbon monoxide Nitrates	Hydrocarbons Fluorocarbons	Cobalt

tality excess from CHD among exposed workers was eliminated (fig 1). This preventive action, based on environmental control and clinical appraisal of individual workers with the aid of epidemiology, saved an estimated 40 lives¹⁵ and led to a reduction of the occupational exposure limit for CS_2 from 20 to 10 ppm.

Much debate goes on about the causal connection between stress and CHD. If a connection exists, can it be due to the lifestyle of stressed people? There is increasing evidence that adverse psychosocial conditions at work are risk factors for cardiovascular illness.¹⁶

A study of a group of women clerks, monitored for CHD over 10 years, showed that the combined effects of highly demanding work and lack of clarity from their supervisors were a powerful predictor of CHD (SG Haynes, Monterey, California, USA, 1985). Trends in Britain between 1970 and 1983 show an absolute increase in mortality from CHD among manual workers (fig 2).¹⁷ Similarly in Sweden, mortality from cardiovascular diseases increased between 1961 and 1986 among manual workers in industry but declined among the professional and administrative classes (fig 3).¹⁸ There is evidence from Sweden¹⁷ that whereas smoking plays an important part in this class difference, work conditions characterised by high demand, monotony, and low levels of

Figure 1 Mortality rate ratio (RR) of ischaemic heart disease among 343 workers exposed to CS_2 relative to 343 unexposed workers during a 15 year follow up. (Source: Nurminen and Hernberg.¹⁵)

Figure 2 Changes in standardised mortality ratios (SMRs) by manual (○) and non-manual (●) groups in men aged 20-64, Great Britain 1970-2 to 1979-83. (Adapted from Marmot and McDowell.¹⁷)

control by the individual worker may have become more prevalent during this period. Inequalities in health seem to be present wherever they are sought in western industrial society and well intentioned policies of previous decades have failed to solve them.¹⁹ Acheson has emphasised the need for more effective health monitoring and identifying points of intervention. The adverse mortality trend for CHD in manual workers is clearly a subject for further investigation in which occupational health services should participate. The hypothesis to be tested is that changes for the better both in lifestyle and conditions of work are conducive to a lower incidence of CHD. This kind of intervention is part of daily practice. Its evaluation, however, will require extensive follow up studies.

HEALTH PROMOTION

Health promotion follows axiomatically from more

Figure 3 Direct age standardised mortality rate ratios (SRRs) for cardiovascular diseases among Swedish men aged 45-64 in manufacturing industrial and professional administrative occupations. (Adapted from Diderichsen.¹⁸)

effective planning and administration of health care and identifying and controlling work hazards. Health promotion that goes beyond preventing injury and disease has been neglected because of difficulties in defining health and wellbeing. There are two approaches to more positive health in working people. Firstly, work itself can provide three basic needs for inducing a sense of wellbeing: (1) to have some degree of influence and control over one's work; (2) to perceive the product of work as meaningful and worthwhile; and (3) to have an affinity with the work group as a social support system and identify with it through one's work.²⁰ As well as identifying factors at work that are injurious to health, epidemiology may indicate positive factors in the organisation of work that promote these basic needs. Secondly many opportunities exist for occupational health services to undertake health promotion programmes that include screening for early evidence of disease, such as breast and cervical cancer in women; attention to lifestyle factors by counselling; and education on smoking, diet, alcohol, and exercise. Cogent reasons exist for these programmes in workplaces. Occupational health services have ready access to people before they get sick. Economic benefits to the employer should follow the reduction of unnecessary disability and the promotion of better health. What is needed is more evidence of the effectiveness of health promotion programmes; occupational health services could provide such evidence by studying the effects of their programmes.

Occupational medicine in the future

I have tried to make a case for occupational medicine being practised as a clinical discipline for the care of individual workers as it was 50 years ago when I was an industrial medical officer, but with important differences: to use clinical skills to assess fitness and not unfitness, to detect early as well as frank evidence of disease, and to ask what caused the disease. Clues may come from clinical observations, but a fuller understanding of the disease, its causes, and its control follow from observing the interaction between internal defects in the worker and external agents.⁵

This broader approach to the use of clinical skills and epidemiology should be introduced to the undergraduate student, but for those who are to practise occupational medicine, postgraduate training is essential. It has to be set to a syllabus that embraces the clinical aspects of their discipline. It is encouraging to find that both the Irish and English Faculties of Occupational Medicine include in their examinations for membership, tests of clinical competence as well as epidemiology. Academic occupational medicine must not lose its identity as a clinical discipline in a merger of occupational and environmental health. I fear this may happen at the London School of

Hygiene, following closure of the Institute of Occupational Health, at least for the time being until wise counsel prevails and restores occupational medicine as a vital component of its teaching and research. Promoting occupational and environmental health in its broadest sense has to depend on medical skills to assess fitness for work and to identify human response to adverse factors in the environment and to evaluate measures for their control.

Conclusion

I am deeply honoured to have been invited to give this lecture and to become an Honorary Fellow of your Faculty. It was a great privilege to have Jim Smiley as a friend and a colleague. He was always a source of inspiration through his absolute integrity and his compassion. He was one of the very few of our generation who had the inclination to sit back and think of the significance of his work and its contribution to the health and happiness of the industrial community. I am encouraged by his own words, which are relevant to the subject I chose for this lecture:

"There is a separation if not quite a divorce of clinical medicine from social medicine to-day. It may be that those of us who accept clinical responsibilities (as perforce to some extent we must) and at the same time have the maintenance of the health and welfare of the industrial population while at work, as our duty, will be agents in their reconciliation."⁴

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