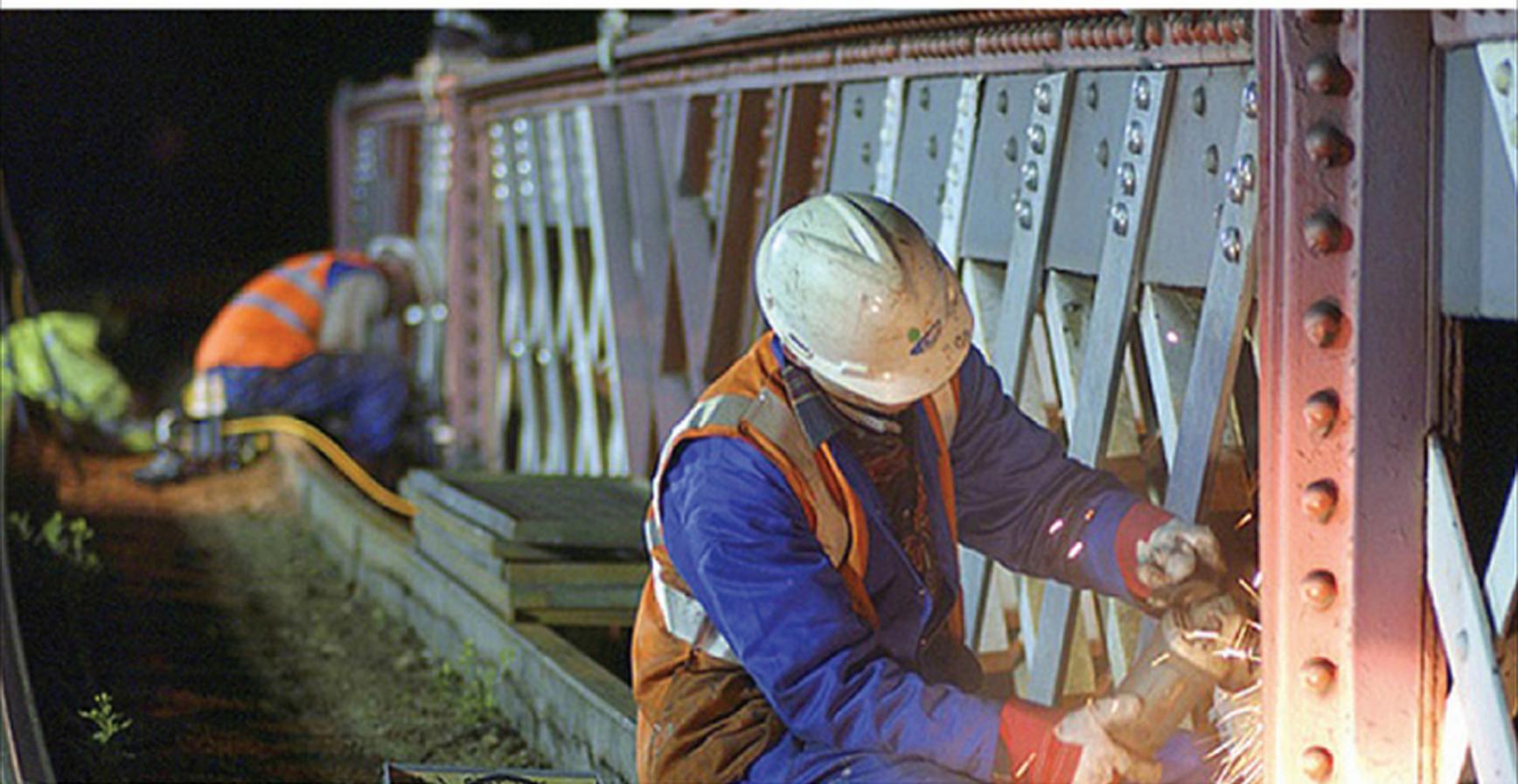


ABC of

Occupational and Environmental Medicine

THIRD EDITION

Edited by David Snashall and Dipti Patel



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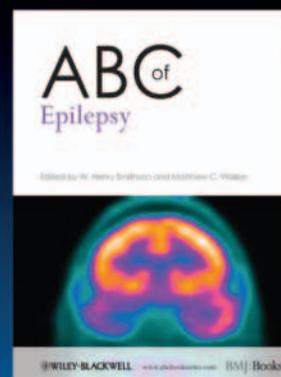
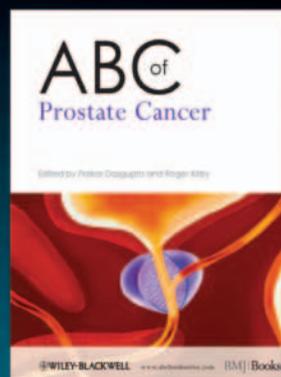
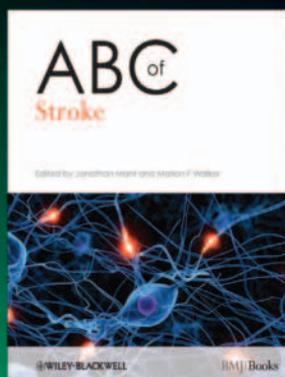
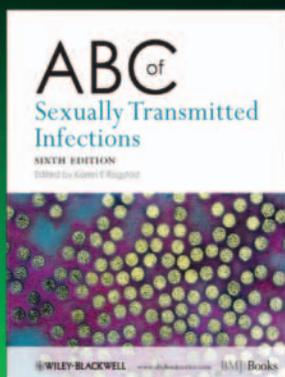
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Occupational and Environmental Medicine

Third Edition

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Preface

Although work is generally considered to be good for your health and a healthy working population is essential to a country's economic and social development, certain kinds of work can be damaging. Occupational health is the study of the effect – good and bad – of work on peoples' health and, conversely, the effect of peoples' health on their work: fitness for work in other words.

Work places are specialized environments, capable of being closely controlled. Generally speaking, it is the lack of control imposed by employers that is the cause of ill health because of exposure to hazardous materials and agents at work, and of injury caused by workplace accidents.

Working life does not, however, begin and end at the factory gate or the office door: many people walk, cycle or drive to work – a journey that often constitutes the major hazard of the day. Others have to drive or travel by other means as part of their job, live away from home, be exposed to other people, other food, other parasites. Even work from home, increasing in some countries, can have its problems, mainly psychosocial. Occupational health practitioners deal with all these aspects of working life.

A working population consists of people mainly between 15 and 70 years (disregarding for the moment the ongoing scandal of child labour), who may be exposed for 8–12 hours a day to a relatively high concentration of toxic substances or agents, physical or psychological. At least that population is likely to be reasonably fit – unlike those who cannot work because of illness or disabilities, the young, and the very old, who are more vulnerable and spend a lifetime exposed to many of the same agents in the general environment at lower concentrations. This is the realm of environmental medicine of such concern to those who monitor the degradation of our planet, track pollution and climate change, and note the effect of natural disasters and man made ones, especially wars.

This book was first published in 1997 as the *ABC of Work Related Disorders*. In 2003 a much expanded and updated second edition attempted in a compressed and easy to assimilate fashion, to describe those problems of health relating to work in its widest sense and to the environment. This third edition brings these subjects up to date.

The pattern of work is changing fast. There is relatively full employment in most economically developed countries now but low pay and job insecurity remain as significant threats to health manufacturing industry is mainly concentrated in developing countries where traditional occupational disease such as pesticide

poisoning and asbestosis are still depressingly common. Occupational accidents are particularly common in places where industrialization is occurring rapidly as was once the case during the industrial revolution in nineteenth-century Britain. Emerging economies often display a mixture of 'ancient and modern' work-related health and safety problems. Modern work is also more varied, more intense, more service oriented, more competitive, more regulated, and more spread around the clock in order to serve the 24-hour international economy. There are more women at work, more disabled people, and a range of new illnesses perhaps better described as symptom complexes which represent interactive states between peoples' attitudes and feeling towards their work, their domestic environment, and the way in which their illness behaviour is expressed.

All occupational disease is preventable – even the more 'modern' conditions such as stress and upper limb disorders can be reduced to low levels by good management and fair treatment of individuals who do develop these kinds of problems and who may need rehabilitation back into working life after a period of disability. These particular disorders now dominate work-related ill health, mainly because their prevalence in the general population is high.

Attitudes to mental health are changing especially to common problems such as mild to moderate depression and anxiety, substance abuse and stress: like asthma, they come and go, can be successfully managed and are generally compatible with work – indeed are often improved by work. For no subject has there been such a revolution in the approach to management than the common musculoskeletal disorders. Medical treatment has its place and so do ergonomic and preventive initiatives in the workplace but wholesale application of the biomedical model has failed and a biopsychosocial approach has to be the answer if disability is to be reduced. These areas are covered in the chapters on musculoskeletal and, mental health (including stress) disorders, frequently intertwined at work. There are chapters also on the traditional concerns of occupational health practitioners such as dermatoses, respiratory disorders, infections, travel abroad and other chapters reflecting occupational health practice covering workplace surveys, fitness for work, sickness absence control issues, ethics and, unfortunately increasing, legal considerations. Genetics and its application to work and the effects of work on reproduction are described in Chapter 17. With a working population moving from providing physical labour to a 'knowledge economy'

demanding flexible responses in a complex technology-dominated world, better job design becomes imperative and human factors assume importance – just think of the massive increase in the retail sector and in healthcare and the safety considerations in high speed travel or nuclear energy production (Chapter 16).

Concerns beyond the workplace are covered in the chapters on global issues and pollution. The control of hazards in the general environment presents issues of problem solving at a different level. Ascertainment of exposure is more difficult than in workplaces, and to find solutions needs transnational political will and commitment as well as science to succeed. Many believe that the rash of ‘new’ illnesses attributed to environmental causes are manifestations of a risk-averse public’s response to poorly understood threats in the modern world and an unconscious wish to blame ‘industry’, or some state institution – agencies that represent irresponsible emitters of toxins, inadvertent releasers of radiation, careless sprayers of pesticides, or well-meaning providers of vaccinations. Chapter 14 addresses this important subject and Chapter 20 looks at what the future has in store.

Occupational medicine can be seen as a subspecialty of public health which itself changes according to the health problems thrown up by a changing environment. Demographic change is a major driver of health and therefore healthcare provision, no more clearly exemplified than by over-population which outstrips resources and an ageing work force typical of present day economically developed countries but also of those huge countries who will soon face this phenomenon(Chapter 18).

In common with the previous edition, this new edition of *ABC of Occupational and Environmental Medicine* will still appeal to non-specialists who wish to understand and practise some occupational medicine; but will also provide all that students of occupational and environmental medicine and nursing will need as a basis for their studies. Each chapter has an annotated further reading list. Most, but not all, of the book is written with an international audience in mind.

David Snashall
Dipti Patel

CHAPTER 1

Hazards of Work

David Snashall

Guy's and St Thomas' NHS Foundation Trust, London, UK

OVERVIEW

- Work has an important influence on health, both public and individual. It brings great health benefits but can also be detrimental to both
- Work related injuries and illnesses take a terrible toll and have massive socioeconomic effects. They are largely preventable
- Occupational disease is particularly poorly reported at a national level. Healthcare professionals need to suspect it and know how to manage it
- The world of work is changing fast and the spectrum of occupational ill health is changing in tune
- 'Traditional' occupational diseases persist in less well regulated industries but mental health and musculoskeletal disorders and hard to define 'symptomatic' illness are the major causes of work-related disability

Most readers of this book will consider themselves lucky to have a job, probably an interesting one. However tedious it can be, work defines a person, which is one reason why most people who lack the opportunity to work feel disenfranchised. As well as determining our standard of living, work takes up about a third of our waking time, widens our social networks, constrains where we can live and conditions our behaviour. 'Good' work is life enhancing, but bad working conditions can damage your health.

Global burden of occupational and environmental ill health

According to recent International Labour Organisation (ILO) calculations, every day 6300 people die as a result of occupational accidents or work-related diseases – more than 2.3 million deaths per year (including 12 000 children) – and 337 million people have workplace injuries, causing disability and time off work. Two million workplace-associated deaths per year outnumber people killed in road accidents, war, violence and through AIDS, and

consume 4% of the world's gross domestic product in terms of absence from work, treatment, compensation, disability and survivor benefits, not to mention the human cost (Figures 1.1 and 1.2).

The burden is particularly heavy in developing countries where the death rate in construction, for example, is 10 times that in developed countries, and where workers are concentrated in the most heavy and dangerous industries – fishing, mining, logging and agriculture.

In the United States some 60 300 deaths from occupational disease, 862 200 illnesses and 13.2 million non-fatal injuries with 6500 deaths occur each year.

Environmental disease is more difficult to quantify because the populations at risk are more diffuse than the working population. As an example, it is estimated that lead poisoning accounts for almost 1% of the global burden of disease, most of the exposure affecting children in the developing world. Air and water pollution and extremes of climate also have profound effects on health

Reporting occupational ill health

Occupational diseases are reportable in most countries, but are usually grossly underreported. Even in countries like Finland (where reporting is assiduous), surveys have shown rates of occupational disease to be underestimated by three to five times.

Classifications of occupational diseases have been developed for two main purposes: for *notification*, usually to a health and safety agency to provide national statistics and subsequent preventive action, and for *compensation* paid to individuals affected by such diseases. There are no universally accepted diagnostic criteria, coding systems or classifications worldwide. Modifications of ICD-10 (international classification of diseases, 10th revision) are used in many countries to classify occupational diseases, along with a system devised by the World Health Organization for classifying by exposure or industry.

It is the association of these two sets of information that defines a disease as being probably occupational in origin (Box 1.1). The WHO, in the ICD11 classification, is going to incorporate occupational attribution.

A number of reporting systems exist in the United Kingdom but these are neither comprehensive nor coordinated. After all, they arose at different times and for different purposes.

Box 1.1 Classification and notification of occupational diseases (WHO)

- 1 Diseases caused by agents
 - 1.1 Diseases caused by chemical agents
 - 1.2 Diseases caused by physical agents
 - 1.3 Diseases caused by biological agents
- 2 Diseases by target organ
 - 2.1 Occupational respiratory diseases
 - 2.2 Occupational skin diseases
 - 2.3 Occupational musculoskeletal diseases
- 3 Occupational cancer
- 4 Others

Notification

In addition to the diagnosis of occupational disease, additional information should be included in the notification. ILO has defined the minimum information to be included:

- a. Enterprise, establishment and employer
 - (i) Name and address of employer
 - (ii) Name and address of enterprise
 - (iii) Name and address of the establishment
 - (iv) Economic activity of the establishment
 - (v) Number of workers (size of the establishment)
- b. Person affected by the occupational disease
 - (i) Name, address, sex and date of birth
 - (ii) Employment status
 - (iii) Occupation at the time when the disease was diagnosed
 - (iv) Length of service with the present employer

Classification for labour statistics (ILO)

International Standard Classification of Occupations (ISCO-08) as:

- 1 Employees
- 2 Employers
- 3 Own-account workers
- 4 Members of producers' co-operatives
- 5 Contributing family workers
- 6 Workers not classifiable by status
 - International Classification of Status in Employment (ICSE)
 - International Standard Industrial Classification of all Economic Activities (ISIC)
 - International Standard Classification of Education (a UNESCO classification) (ISCED)
 - Classifications of occupational injuries

Occupational injuries are also reportable in Great Britain under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR) and, for purposes of compensation, to the Department of Work and Pensions' Industrial Injuries Scheme (see also Chapter 5). The recording of injuries is generally more reliable because injuries are immediately obvious and occur at a definable point in time. By contrast, cause and effect in occupational disease may be far from obvious, and exposure to hazardous materials may have occurred many years beforehand (Box 1.2).

Box 1.2 Health and Safety Executive (HSE) statistics

Self-reported ill health 2009–2010

1.3 million workers and 0.8 million former workers reported ill health which they thought was work related. Musculoskeletal disorders and stress formed the most commonly reported illness types.

Reports of ill health by general practitioners (GPs) and specialist physicians

These surveillance schemes which collect reports of new cases of work related ill health confirm that musculoskeletal disorders are the most common type of work related illness but that mental ill health gives rise to more working days lost. Specialist physicians report on musculoskeletal disorders, mental ill health, skin disorders, respiratory disease and audiological disorders.

Ill health assessed for industrial injuries disablement benefit

The number of new cases was 7,100 in 2009. The largest categories were arthritis of the knee in miners, vibration white finger, carpal tunnel syndrome and respiratory diseases associated with past exposures to substances such as asbestos and coal dust.

The trend in numbers is generally downwards except for diseases associated with asbestos.

Labour force survey

The rate of reportable injury from this survey was 840 per 100,000 workers, and falling compared with earlier estimates. When compared with the statutory reporting of injuries (RIDDOR) it is apparent that only about half of such injuries are reported by employers.

Enforcement notices

These detail action taken against employers for health and safety infringements by the regulatory authorities.

The labour force survey is a national survey of over 50,000 households performed each quarter.

Standard industrial classification and standard occupational classification systems are used in UK official statistics.

Industry sectors with ill health rates statistically significantly higher than the rate for all industries, were health and social work and public administration whereas for injuries, agriculture, transport, storage and communication and construction had statistically significantly higher rates than for all industry.

Workers in personal service occupations have statistically significantly higher rates of both injury and ill health compared to all occupations. Associate, professional and technical occupations and professional occupations have statistically significant high rates for ill health but relatively low injury rates. Skilled trades, process plant and machine operatives and elementary occupations have injury rates which are statistically significantly higher than the average.

Occupational or work related?

Some conditions, such as asbestosis and mesothelioma in ladders, and lead poisoning in industrial painters, are hardly likely to be anything other than purely occupational in origin. (About 70 of these 'prescribed' occupational diseases are listed by the UK Department for Work and Pensions.) However, mesothelioma can

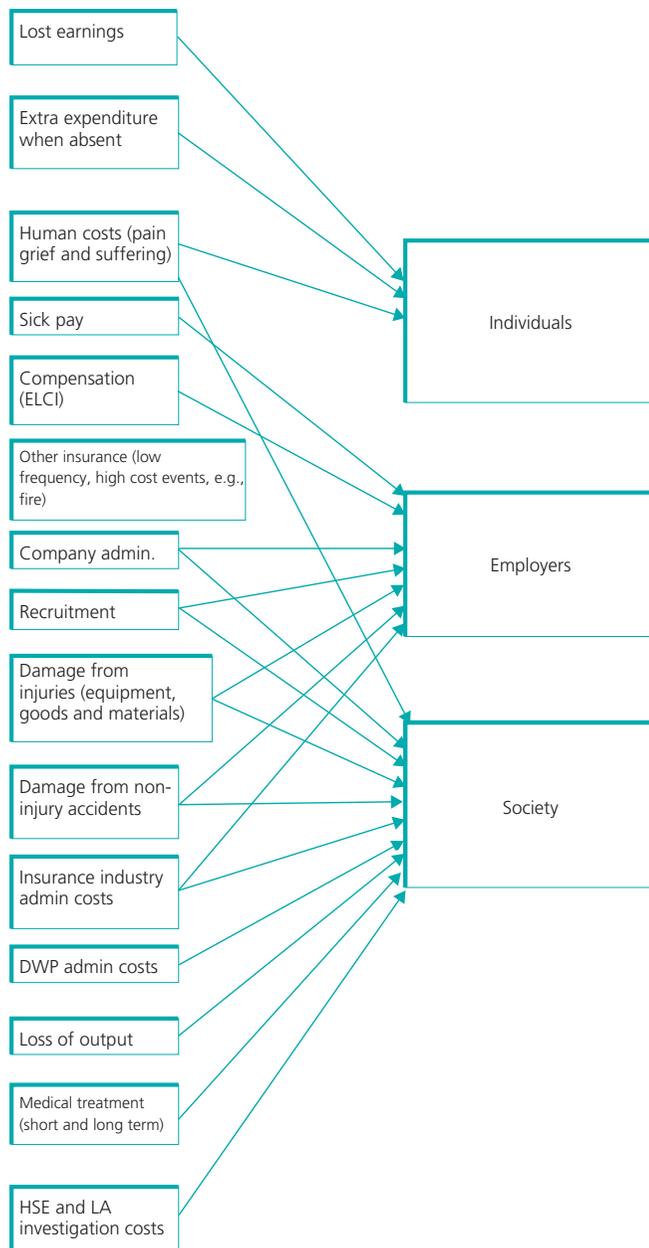


Figure 1.1 Cost categories. HSE, Health and Safety Executive; and LA, local authority.

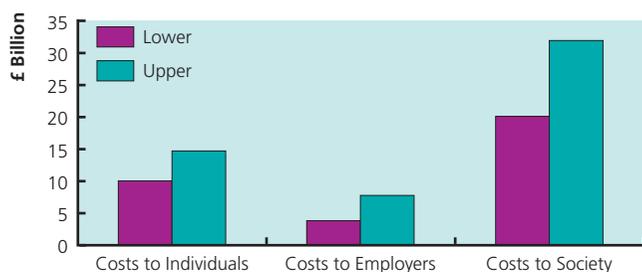


Figure 1.2 Costs to Britain of workplace accidents and work-related illness, 2001/02.

be the result of environmental exposure to fibrous minerals (as in the case of cave dwellers in Turkey), and lead poisoning can be a result of ingesting lead salts from low temperature, lead glazed ceramics used as drinking vessels, mainly in developing countries. In these situations the history and main occupation will differentiate the causes. The situation may be far less clear for conditions such as back pain in a construction worker or an upper limb disorder in a keyboard operator when activities outside work may contribute, as might genetics, psychological factors and symptom thresholds. A lifetime working in a dusty atmosphere may not lead to chronic bronchitis and emphysema, but when it is combined with cigarette smoking this outcome is much more likely. Common conditions for which occupational exposures are important but are not the sole reason or the major cause can more reasonably be termed ‘work-related disease’ rather than ‘occupational disease’.

Some important prescribed diseases such as chronic bronchitis, emphysema and lung cancer are considered work related in an individual case only on the ‘balance of probabilities’, one common approach being to view occupational attribution as more likely than not if the relative risk exceeds 2.

Certain occupations carry a substantial risk of premature death, whereas others are associated with the likelihood of living a long and healthy life (Table 1.1). This is reflected in very different standardized (or proportional) mortality ratios for different jobs, but not all the differences are the result of the various hazards of different occupations. Selection factors are important, and social class has an effect (although in the United Kingdom this is defined by occupation). Non-occupational causes related to behaviour and lifestyle also contribute

Presentation of work-related illnesses

Diseases and conditions of occupational origin usually present in an identical form to the same diseases and conditions caused by other factors. Bronchial carcinoma, for example, has the same histological appearance and follows the same course whether it results from working with asbestos, uranium mining or cigarette smoking.

The possibility that a condition is work induced may become apparent only when specific questions are asked, because the occupational origin of a disease is usually discovered (and it is discovered only if suspected) by the presence of an unusual pattern (Box 1.3). For example, in occupational dermatitis, the distribution of the lesions may be characteristic. A particular history may be another clue: asthma of late onset is more commonly occupational in origin than asthma that starts early in life. Indeed, some 40% of adult onset asthma is probably occupational. Daytime drowsiness in a fit young factory worker may be caused not by late nights and heavy alcohol consumption but by unsuspected exposure to solvents at work.

The occupational connection with a condition may not be immediately obvious because patients may give vague answers when asked what their job is. Answers such as ‘driver’, ‘fitter’ or ‘model’ are not very useful, and the closer a health professional can get to extracting a precise job description the better. For example,

Table 1.1 Work-related mortality in England and Wales, 1979–2000.

Job Group	Number of deaths from all causes	Cause of death (ICD-9 code)	Excess deaths	Excess deaths per 1000 deaths from all causes
Publicans and bar staff	12 446	Other alcohol related diseases	263	21.1
		Cirrhosis	98	7.9
		Cancer of the oral cavity	75	6.0
		Cancer of the larynx	64	5.1
		Cancer of the liver	43	3.5
		Cancer of the pharynx	39	3.1
		Total work-related mortality	582	46.7
Coal Miners	24 621	Chronic obstructive pulmonary disease	586	23.8
		Coal workers pneumoconiosis	423	17.2
		Total work-related mortality	1058	43.0
Aircraft flight deck officers	814	Air transport accidents	33	40.1
Steel erectors	3675	Cancer of the bronchus	106	28.8
		Total work-related mortality	139	37.9
Fire service personnel	2643	Cancer of the bronchus	60	22.7
		Motor vehicle traffic accidents	25	9.5
		Total work-related mortality	93	35.3
Managers in construction	5578	Cancer of the bronchus	112	20.0
		Total work-related mortality	128	22.9
Fishing and related workers	1284	Water transport accidents	25	19.1
Metal polishers	970		18	18.4
Moulders and coremakers (metal)	2198		37	16.9
			3	1.4
			40	18.3
Vehicle body builders	1305	Cancer of pleura	15	11.2
		Total work-related mortality	23	17.8
Synthetic fibre makers	204	Asthma	3	17.0
Mine (excluding coal) and quarry workers	1658	Silicosis	13	7.8
		Other lung disorders	7	4.2
		Work-related accidental deaths	7	4.2
		Total work-related mortality	27	16.2

Job groups with largest excesses of work-related mortality as a proportion of total deaths from all causes: men aged 20–74 years, England and Wales, 1991–2000.

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Box 1.3 How to take an occupational history

Question 1

What is your job?

or

What do you do for a living?

Question 2

What do you work with?

or

What is a typical working day for you?

or

What do you actually do at work?

Question 3

How long have you been doing this kind of work? Have you done any different kind of work in the past?

Question 4

Have you been told that anything you use at work may make you ill? Has anybody at work had the same symptoms?

Question 5

Do you have any hobbies, like do-it-yourself or gardening, which may bring you into contact with chemicals?

Question 6

Is there an occupational health doctor or nurse at your workplace who I could speak to?

an engineer may work directly with machinery and risk damage to limbs, skin and hearing, or may spend all day working at a computer and risk back pain, upper limb disorders and sedentary stress. Sometimes patients will have been told (or should have been told) their job is associated with specific hazards, or they may know that fellow workers have experienced similar symptoms.

Timing of events

The timing of symptoms is important because they may be related to but not necessarily coincident with exposure events during

work. Asthma provides a good example of this: many people with occupational asthma develop symptoms only after a delay of some hours and the condition may present as nocturnal wheeze. It is essential to ask whether symptoms occur during the performance of a specific task and if they occur solely on workdays, improving during weekends and holidays. Sometimes the only way to elucidate the pattern is for the person to keep a graphic diary of the time sequence of events.

Working conditions

Patients should be asked specifically about their working conditions. Common problems are dim lighting, noisy machinery, bad office layout, a dusty atmosphere and oppressive or, almost as bad, inconsistent or 'unjust' management. Such questions not only open up possibilities, but give the questioner a good idea of the general state of a working environment and how the patient reacts to it. A visit to the workplace may be a revelation, and every bit as valuable as a home visit if one wants to understand how a patient's health is conditioned by their working environment and how (both) might be improved. Knowing about somebody's work can help to provide context and insight. Patients are often happy to talk about the details of their work: this may be less threatening than talking about details of their home life and can promote a better relationship between patients and health professionals.

Occupational disease can extend beyond the workplace, affecting local populations through air, water or soil pollution. Overalls soiled with toxic materials such as lead or asbestos can affect members of workers' families if the overalls are taken home to be washed.

Trends in work-related illnesses

Changes in working practices in the industrialized world are giving rise to work that is more demanding in a psychosocial sense but less so in terms of hard physical activity. Jobs are also safer (although this may not be true in those countries where extremely rapid industrialization is occurring) – the result of a shift in many countries from agricultural and extractive industry via heavy factory industry to technology-intensive manufacturing and services, which are inherently safer. Also, most countries have a labour inspectorate that can orchestrate a risk-based strategy of hazard control with varying degrees of efficiency. In those that do not, and where the 'informal sector' dominates, risks are higher for those who have to earn their living that way – there are no health and safety rules when it comes to scavenging in dumps. Life outside work has also become safer, although rapid industrialization and growing prosperity in some countries have meant huge increases in road traffic, with an accompanying increase in accidents and pollution. Traditional occupational diseases such as pneumococcosis and noise-induced deafness can be adequately controlled by the same strategies of hazard control used to limit accidental injury. However, the long latent period between exposure and the appearance of occupational diseases makes attribution and control more problematic. Thus, the modern epidemics of musculoskeletal disorders and work-related stress reflect new work

patterns and a working population with different characteristics from its forebears, as well as changes in the work environment itself.

Completely new jobs have appeared, with their accompanying hazards – for example, salad composers (dermatitis), aromatherapists and nail enhancers (allergies), and semiconductor assemblers (exposure to multiple toxins). Some ancient crafts have been associated recently with hitherto unrecognized hazards, such as renal failure in traditional Chinese herbal medicine factory workers. Nanotechnology is in its infancy with only a vague appreciation of its hazards. Mesothelioma has yet to reach its peak incidence in the UK, causing over 2000 deaths per year from the major occupational carcinogen, asbestos, significant exposure to which ceased decades ago.

Although working conditions are undoubtedly cleaner, safer and in many ways better than before, work itself has changed. In the economically developed world there has been a shift from unskilled work to more highly skilled or multiskilled work in largely sedentary occupations. There is greater self-employment and a remarkable shift towards employment in small and medium-sized enterprises. More and more people work non-standard hours with consequences to their health. The percentage of women in employment has been growing for decades. Not everyone can cope with the newer, more flexible, less stable, intensively managed work style demanded by modern clients and contractors, and there is an increasing clamour for 'work-home balance'.

Heavy industry and 'dirty' manufacturing have been progressively exported to the developing world where occupational disease is still rife. Public perceptions and an expectation of good physical health and associated happiness, allied to improved sanitation and housing, availability of good food and good medical services, have highlighted those non-fatal conditions which might hitherto have been regarded as trivial but which have large effects on social functioning (such as deafness), work (such as backache) and happiness (such as psychological illness), contributing in turn disproportionately and adversely to disability-free years of life. The public is also more environmentally aware and concerned that some of the determinants of ill health are rooted in modern life and working conditions, giving rise to allergies, fatigue states and various forms of chemical sensitization. The estimation, perception and communication of risk may still, however, be quite primitive even in the most sophisticated of populations. The media definition of risk remains 'hazard plus outrage', and life as a threat has become a reality for many (Box 1.4).

Box 1.4 Annual death risks HSE

Annual risk of death for various causes averaged over the entire population

Cause of death	Annual risk
Cancer	1 in 387
Injury and poisoning	1 in 3137
Road accidents	1 in 16 800
Gas incident (fire, explosion or carbon monoxide poisoning)	1 in 1 510 000
Lightning	1 in 18 700 000