Work related disorders

Occupational medicine at a turning point

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A new approach needed

With the successful control of many of the most serious occupational hazards to health, the focus of occupational medicine in developed countries has shifted to other work related disorders that are rarely fatal but cause substantial disability. This paper hypothesises that many of these disorders do not arise from detectable organic pathology, but rather are a psychologically mediated response to triggering exposures that is conditioned by individual characteristics and cultural circumstances. If correct, this has important implications for the way in which such illness should be managed and prevented. Proposals are made for ways in which the hypothesis could be tested.

Occupational medicine first emerged as a specialist discipline in response to chemical, physical, and biological hazards that caused serious and often fatal disease. A framework was developed for the management of such hazards that entailed assessment of the relation between exposure and risk; reduction of exposure (by elimination of the noxious agent, improved engineering, modified systems of work or the use of personal protective equipment); and monitoring to check that controls on exposure were effective. This approach has been notably successful, preventing much avoidable morbidity and mortality. For example, in Britain, occupational diseases such as bladder cancer in the rubber industry (from exposure to 2-naphthylamine)[1] and phossy jaw (caused by exposure to white phosphorus)[2] have now been eliminated.

As many of the most serious occupational hazards have been successfully addressed, attention has shifted increasingly to other work related disorders which are rarely fatal, but which nevertheless give rise to widespread illness and disability, and account for substantial loss of time from work and demand for healthcare. Thus, when Harrington and Calvert conducted a survey of managers and occupational physicians in 1996, both professional groups identified musculoskeletal disorders and occupational stress as the two highest priorities for research.[3] This is not surprising, given the enormous cost of these problems to the national economy. For example, in 1993 back pain alone was estimated to account for an annual loss of 52 million working days in Britain, and to cost the National Health Service some £480 million per year.[4]

At the same time, the successes of occupational medicine have raised public awareness of the potential dangers of occupational hazards, leading to widespread concern that new technologies such as pesticides, genetically modified crops, and mobile phones, could pose important unrecognised risks to health. These anxieties are reinforced by sensational reporting in the media, and in addition to the demand for research on musculoskeletal disorders and stress, there has been an imperative to focus activity on possible adverse health effects associated with technological innovation.

Perhaps not surprisingly, in turning to these new problems, occupational health practitioners have continued to apply the approach to risk management that has served so well in the past. It is assumed that a noxious agent or activity produces an injury that can be prevented by eliminating or reducing exposure.

In some cases, the model seems to work well. For example, there is now good evidence that frequent heavy lifting in the workplace is an important cause of degenerative damage to the hip joint,[5 6] which in Britain has led to the recognition of hip osteoarthritis as a prescribed occupational disease in farmers.[6] However, it is becoming apparent that for many other disorders the traditional paradigm may be less apt. These include ''mechanical'' low back pain; many neck and arm complaints; illness attributed to low level exposure to organophosphate insecticides; multiple chemical sensitivity; Gulf War illness in military personnel; sick building syndrome; and acute illness associated with the use of mobile phones. All of these disorders are associated with potentially noxious occupational exposures, but various observations suggest that their relation to work is not straightforward.

Some of them have exhibited remarkable time trends that cannot be explained by their assumed occupational causes. For example, in Britain, social security statistics indicate that rates of incapacity for work because of back problems increased more than sevenfold between 1953 and 1992,[4] at a time when the physical demands of work were generally reducing. And in Australia there was a major epidemic of disability from arm pain among office workers during the early 1980s that later subsided without any significant change in working methods.[7]

Similarly, there is marked geographical variation in their occurrence and in the public concern which they have generated, which cannot readily be explained by differences in industrial practices. Thus, the outbreak of arm pain in Australia during the 1980s was not paralleled in other countries that were using similar technology and working methods; multiple chemical sensitivity has been a more prominent problem in the USA than the UK;[8] ''electrical hypersensitivity'' has been reported more often from Scandinavia;[9] and chronic disabling illness following low level exposure to organophosphate insecticides seems to be particularly a problem in Britain.[10]

A feature which all of the disorders share is that despite much research, there is rarely convincing evidence of underlying pathology. Moreover, in many cases the reported symptoms are remarkably similar even when the alleged causal exposures are very different. Thus, complaints such as fatigue, difficulty with memory, difficulty with concentration, tinnitus, dizziness, and numbness and tingling have been linked with service in the Gulf War,[11] use of mobile phones,[12] and exposure to organophosphates,[10] and general tiredness is also the most common complaint in sick building syndrome.[13] These symptoms all occur in the population at large, but are found more frequently in people who have been exposed to the assumed occupational hazard. The non-specificity of symptoms and absence of identifiable underlying pathology raise the possibility that psychological factors contribute importantly to the illnesses.

In support of this, there is now a strong body of evidence that disorders such as low back pain and non-specific arm pain are consistently associated with, and predicted by, low mood and lack of vitality.[14] This is in apparent distinction to hip osteoarthritis. In a study of patients awaiting hip replacement for osteoarthritis, there was an

expected reduction in physical capacity compared with controls, but no lowering of mood or vitality.[15] Moreover, recently our group has found even stronger associations between non-specific musculoskeletal complaints and a general tendency to report somatic symptoms. This ''somatising tendency'' was assessed by asking people how much they had been troubled during the past seven days by each of six diverse physical symptoms; when the responses were used to classify subjects to three levels, the odds of reporting disabling arm pain in the highest compared with the lowest level were increased more than tenfold (submitted for publication).

Interestingly, although perhaps not surprisingly, this relation is also found for symptoms linked with chemical exposures. In another recent survey that we conducted, information about various aspects of work and health was collected by means of a postal questionnaire from more than 10 000 men living in rural areas of England and Wales. Of 4109 men who had used pesticides occupationally, 936 (23%) reported that at least one of a list of 12 symptoms had occurred within 48 hours of such work. Report of four or more symptoms following use of pesticides was again strongly associated with somatising tendency (OR 7.0, 95% CI 4.1 to 12.1).

Further support for an important role of psychological influences comes from experiments in which people with illnesses linked to suspected environmental hazards have been exposed blindly to the agents that precipitate their symptoms. For example, in a Finnish study of people who believed that they were sensitive to radio-frequency radiation from mobile phones, symptoms occurred more commonly with sham than with real exposure.[16] Moreover, there is evidence that the prognosis of disorders such as low back pain depends on patients' beliefs and expectations, avoidance of activities for fear of exacerbating the illness being associated with a worse outcome.[17] And in Victoria, Australia, a community based intervention aimed at modifying people's beliefs and expectations about back pain was followed by a reduction in morbidity that was not paralleled in nearby New South Wales.[18]

HYPOTHESIS

As has been outlined, there is now a range of evidence which suggests that much of today's occupational illness is not a simple function of excessive exposure to noxious agents or activities. In confronting this complication to our traditional conception of occupational hazards, we should start by making a distinction between illness and disease (see box 1). Disease is a pathological process that, at least in theory, is amenable to objective, external verification. Illness, on the other hand, is by definition a subjective state. Often the two go together—diseases commonly make us feel ill. But this is not always the case. Disease may be completely asymptomatic, or it may be recognised but not impact on wellbeing—a man with a prosthetic leg following an injury many years earlier may well not regard himself as ill. Conversely, we may feel ill in the absence of any objective evidence of underlying disease.

With this distinction in mind, I propose that much of the illness and disability which currently is attributed to injurious occupational exposures does not arise from underlying disease with detectable organic pathology, but rather is a psychologically mediated response to an external trigger that is conditioned by a combination of individual characteristics and cultural circumstances.

The trigger for such illness may be an acute injury that normally would be expected to resolve over a period of days or weeks; a normal physiological response to an exposure or activity (for example, irritation of mucous membranes by a chemical, awareness of unusual odour, or muscle ache after prolonged work); or simply a perception (true or false) that exposure to a noxious agent has occurred. The illness produced may vary somewhat according to the nature of the trigger. For example, acute injury to the back is more likely to precipitate chronic back pain than difficulty with memory. However, many symptoms are relatively non-specific and can be precipitated by a wide variety of external triggers.

Predisposing individual characteristics may be fixed (for example, sex, personality traits) or time varying (for example, mood). They include a generally increased awareness of (and tendency to report) somatic symptoms, and also conscious or unconscious personal gain from being ill (for example, in attention from others, escape from unpleasant situations, or financial compensation).

Cultural influences include beliefs about the causes of diseases and the types of illness that can be expected to result from noxious exposures. For example, in the mid nineteenth century the concept of neurasthenia first emerged.[19] It was characterised by fatigue and general weakness which was attributed not to chemicals, but to overloading of the brain by the increased pace of modern industrial life, and analogies were drawn with a run-down battery, electricity being a novel technology at the time. It was reported that in the early 1900s, 15–30% of patients seen by physicians in the southern USA were diagnosed as having neurasthenia. Another more recent example is an outbreak of koro that occurred in Singapore in October 1967.[20] Koro is a disorder that occurs in Chinese men, in which it is believed that the penis is shrinking into the abdomen, and that if this is not prevented, death will ensue. The epidemic in 1967 followed a newspaper article in which it was alleged that koro could result from eating pork from pigs vaccinated against swine fever, and at its height 97 cases were seen in one day at Singapore General Hospital. As in this last example, cultural beliefs and expectations are often strongly influenced by media publicity.

IMPLICATIONS

I am not the first to advance this hypothesis. A very similar proposal was set out, for example by Spurgeon and colleagues in 1997,[21] and more recently has been articulated as the ''biopsychosocial'' model of back disorders.[22] If

Box 1 Definitions of terms

Illness
An absence of wellbeing as perceived:
- by the affected individual (in the form of one or more symptoms); or
- by others (from an abnormality of function, or from an abnormality of behaviour for which the affected individual cannot be held responsible)

Pathology
Abnormality of tissue structure or of biochemical or physiological function that has the potential to cause illness or death

Disease
A combination of pathological abnormalities that are thought to be inter-related

Disorder
A broader term encompassing both illness and disease

correct, however, it has profound implications. In particular, it raises the possibility that controls on exposure will not reduce the risks of some occupational illnesses to the extent that would be expected from observational epidemiology.

For example, observational studies have repeatedly shown an increased risk of low back pain in people whose work entails frequent heavy lifting.[23] In response, employers in the UK are now required to assess the risks from manual handling, and if necessary take steps to reduce them. In workplaces such as hospitals, mechanical aids to lifting have become commonplace, but as yet it is unclear whether this improvement in ergonomics has produced the intended benefits. It is possible that the gains from reduced physical stresses on the spine are offset by a reinforcement of nurses' beliefs that their work carries a major risk of serious back disorders.

If controls on exposure do not reduce risk as expected, then we need to know about it, because the resource may be more usefully directed elsewhere. Furthermore, there may be scope for preventing illness more effectively by modifying cultural beliefs and expectations in a positive direction, as in the campaign on back pain in Victoria mentioned earlier.[18] And interventions to change patients' understanding of their illness may also be beneficial in the management of individual cases, although care is needed in how this is undertaken. Patients often have strong preconceptions about the causes of their illness, and a clumsy attempt from a doctor to disillusion them is likely to destroy trust, and may simply prompt them to seek care from someone else who is more sympathetic.

TESTING THE HYPOTHESIS

In view of its potentially important practical implications, there is an urgent need to test the hypothesis further. To this end, several lines of investigation are worth pursuing.

First, we need to look carefully at case definitions, and try as far as possible to distinguish illness with clear underlying pathology from illness where there is none. If the hypothesis is correct, it is the latter group to which it will apply.

Second, it would be helpful to carry out cross-cultural comparisons of relevant categories of occupational illness to assess further the variation in their occurrence, and the extent to which this can be explained by differences in occupational exposures and in cultural beliefs and expectations.

Third, more longitudinal studies are needed to assess the prediction of occupational illness by psychological risk factors, and particularly those that have received less attention to date, such as somatising tendency and personal beliefs and expectations. Longitudinal investigation is important to minimise uncertainties about the direction of cause and effect. For example, it is quite plausible that someone's beliefs about back pain will be modified by experience of the disorder. In this respect, experimental studies could be even more convincing. They are harder to conduct, but are feasible in some circumstances. Trials could be carried out, for example, to assess interventions aimed at modifying the beliefs and expectations of workers disabled by non-specific musculoskeletal disorders.

Finally, much more work is needed to evaluate the many interventions that have already been made with the aim of preventing illness such as back and neck pain. This must go beyond the assessment of changes in exposure (is the frequency of higher risk work practices reduced?) and look also at impact on symptoms and disability.

CONCLUSIONS

In many ways, the research proposed is more challenging than the traditional investigation of occupational hazards. However, it is eminently feasible, and the importance of the problems at which it is directed makes it a high priority.

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