LOW back pain in the workplace takes up a high percentage of the occupational physician’s time; it is widespread across many occupations, from heavy industrial through to light office work.

There has been much research into the field of back pain looking at various aetiologies, the epidemiology, the effects of new and existing legislation, and the success of different treatments. Despite this, if an employee is absent from work for >6 months with back pain, there is only a 50% chance of him returning to work. This decreases to 25% if the absence is over a year [1]. In this paper, we review current literature, attempt to clarify some grey areas, and show how an occupational health service can tackle this significant problem. We also discuss the current management of low back pain as practised at the Rover Group.

EPIDEMIOLOGY

Back pain occurs in ~80% of the population at some stage during their working life. Of this 80%, fewer than 1% have a serious disease (primary bone cancer, paravertebral abscesses, arthritis, trauma or cauda equina lesion) and fewer than 5% have a prolapsed disc—the majority of which do not need surgery. Most of what remains is encompassed under the umbrella term mechanical back pain, although only a proportion have a definite mechanical disturbance.

This is not simply a new problem that has sprung out of the Western World in the last century due to increasing industrialization. The first recorded case of occupational back pain was a patient of Imhotep, a construction worker on one of the pyramids in 2780 BC [2]. Back pain as a workplace injury in the UK was first notified in the nineteenth century and the cost since then has escalated. The cost of low back pain in the UK has been estimated at £2000 million/year (1987–88) in terms of lost output [3]. In the USA, it has been estimated that the cost in terms of medical expenses of each back care patient is $18 000 and an additional $22 000 can be added in terms of interrupted income and loss of related benefits [4].

Nurses appear to be the most common occupational group studied epidemiologically. A French study published in 1994 followed up 469 nurses for a period of 10 yr in six public sector hospitals. Using questionnaire analysis during that period, they found that 57.9% had suffered some back pain and 40.5% had chronic relapsing back pain. From longitudinal analysis, the authors concluded that not only was physical workload a risk factor, but also other factors such as smoking, psychological stresses at work and even the length of commuting [5]. A further investigation into back injuries among nurses showed a 3.7 times greater prevalence among nursing personnel who performed stressful patient handling tasks compared to those who did not [6].

RISK FACTORS

Previous back injury

A study looking at possible predictors in pre-employment screening showed a history of previous back injury as the most important risk factor for future problems. This was supported by a recent paper which stated that a previous history of back trouble was a much stronger predictor of future risk of back pain compared to any anthropometric data [7]. We believe that an applicant with a history of back pain within the last year should be seen by an occupational physician before being passed fit. Heap [6] showed that auxiliary nurses had a higher incidence of back injury compared to trained staff, probably due to delegation of manual tasks. It is no surprise that all NHS trusts have made lifting and handling courses compulsory, and some trusts are introducing a no-lifting policy.

Work-related risk factors

In industry, low back pain has been the subject of many studies looking at work-related risk factors. Risk factors looked at include the following.

(a) Heavy physical/manual work. There have been cross-sectional studies looking at an association between heavy physical work and radiographically detectable lumbar disc degeneration [8, 9]. Some of these have found an association, but other extrinsic factors may have provided a bias in these studies. Indeed, the Clinical Standards Advisory Group guidelines on low back pain [1] only recommend an X-ray if a clinical ‘red flag’ is breached. These include age at onset < 20 or > 55 yr, a past history of cancer,
weight loss, constitutional symptoms, and widespread neurological signs. X-rays and magnetic resonance scanning in mechanical back pain can be very ambiguous and, despite the apparent reassurance of normal radiological investigations, this can prove to be counterproductive in the management of individuals. Such individuals can quite easily cross over to chronic illness behaviour and long-term absence without proper care [10, 11].

(b) Manual handling. Manual handling carries a significant risk of back injury resulting from overloading of tissues if the technique of lifting is incorrect. This has led to regulations making the employer responsible for the teaching of correct lifting methods to the employee, which are discussed below. A study carried out on men aged 18–55 yr who lifted at least 20 kg more than twice a day showed that they were at increased risk of low back pain [12]. A study of three-dimensional dynamic trunk movements, covering over 400 industrial lifting jobs in 48 industries, showed that an increase in dynamic factors such as load movement, lifting frequency and trunk twisting velocity in association with a high-risk job magnified the risk of low back pain by 11 times [13].

(c) Twisting and bending. Twisting and bending with loads is a significant risk factor. Video analysis of workers in various industries has shown that the more severe the trunk flexion whilst carrying a load, the greater the likelihood that a back injury will occur. At various industries, including Rover Group, ergonomics has grown in importance. At Rover, associates (employees) are taught the importance of ergonomics and improvements in certain work processes are suggested, thereby decreasing the incidence of musculoskeletal problems.

(d) Whole-body vibration. Whole-body vibration in motor vehicle driving has been found to be a risk factor for low back pain. Vibration in motor vehicles often coincides with the natural frequency of the lumbar spine, thus rendering tissues vulnerable to injury from resonance. Combined with drivers taking loads to and from destinations, this can lead to increased incidence of low back pain [14–17].

(e) Trauma. Trauma to the back may result in long-term mechanical and psychological effects even when the acute injury has healed. Some cross-sectional studies have shown back accidents as a causal factor for back problems. A general population survey suggested that 16.5% of sciatica and 13.7% of mechanical back pain was due to trauma [18].

(f) Psychosocial factors. Low job esteem, high workload, low control and pressures from managers all play an important role in the psychological aspects of back pain. Cross-sectional studies have shown monotonous work and working under pressure to be particularly associated with back pain [4]. Indeed, our experience within motor manufacturing has shown that individuals with low job esteem are the most difficult to rehabilitate.

INDIVIDUAL RISK FACTORS

Height, weight and age have been studied as risk factors, and have not shown any significant association. Smoking is a habit which crosses various occupational groups. Some studies have shown an association with low back pain even though some of the evidence is contradictory [19]. Animal studies have shown that exposure to smoking impairs nutrition of the disc, causing metabolic changes to the disc which can last up to 3 h. This can lead to increased changes and hence injury.

SOCIAL CLASS

The incidence of back pain is linked to a lack of educational level. Those in social class 4 and 5 have a higher frequency of low back pain, which can be attributed in part to heavy manual jobs. However, a lack of understanding of back pain and its natural
course, and back care education, are also important. Therefore, we have developed Backwatchers classes at the Longbridge Rover plant, which introduce all aspects of back pain and its management to the layman.

REGULATIONS

There are three sets of regulations which deal with back pain in the workplace, which have come into effect since the Health and Safety at Work Act 1974 [20, 21]. These are: (a) The Management of Health and Safety at Work Regulations 1992 (MHSW); (b) The Manual Handling Operations Regulations 1992 (MHO); (c) The Provision and Use of Work Equipment Regulations 1992 (PUWE).

The MHSW Regulations require the employer to make a suitable assessment of the health and safety risks to which the employee is exposed, including manual handling tasks. This risk assessment acts as a means of identifying any action required to control the risks.

The MHO Regulations are one of the ‘six pack’ of UK regulations which came into effect in January 1992. The regulations state that employers should ensure that manual handling operations are avoided wherever possible; the employer should assess and record any hazardous operations which cannot be avoided, and remove or reduce risk of injury through a risk assessment. The responsibility is placed on the employer to designate someone who is responsible for the implementation of these regulations.

The PUWE Regulations place a duty on the employer to ensure that work equipment is designed to be suitable for the task in hand. Any equipment that an employer intends to install must be within the constraints of the working environment and not constitute a health hazard to the employee.

A viewpoint article in 1994 looked at the regulations and the incidence of back disorders [22]. It concluded that although the regulations are based on sound scientific principles, the implementation of these regulations has been disappointing in terms of the results. This is borne out by the continuing rise in incidence and cost of back pain.

A cursory glance at the recent Olympics, and in particular the weight-lifting competition, would reveal how important lifting techniques are. Nobody is suggesting that employees should be lifting loads over three times their body weight, but poor lifting methods obviously increase the risk of injury. Advice on how to lift correctly is to be found in the MHO Regulations. Employers should also ensure that there are plenty of visual aids around on this topic in areas where such tasks are performed.

ERGONOMICS

Ergonomics is the study of human movement and the co-existence of humans and machines in the workplace. It has a role in the rehabilitation of people with back pain, but its prime role is in relation to the prevention of back pain. This is done in three distinct phases: medical screening, training (covered above) and ergonomic job design.

Medical screening looks at the individual and attempts to direct that person away from potentially hazardous jobs, e.g. a 5 ft 6 inch person doing a job needing constant stretching over a particular height which a 6 ft person would have no problems with.

Ergonomic job design is directed at looking at the job concerned and changing it in an attempt to reduce the hazard at source. There are two principles involved: change the work organization to decrease the frequency of exposure to problem tasks or produce changes to the workplace to reduce the severity of the task. The latter is the most obvious area where ergonomic job design can contribute.

Various studies have looked at ergonomic intervention. Gravelling et al. [23] looked at physical and physiological stress in coal face operations, and concluded that postural muscle loading was a significant factor in modern mining. Machine design was found to be a particularly important causative factor in postural muscle loading and stress, so changes to machine design were recommended. Various ergonomic studies have led to industry realizing the importance of teaching such principles to employees. It is now commonplace to have ergonomic external consultants visiting industrial settings to pass on ergonomic principles.

The Rover Group experience

We have introduced a system at the Rover Group Longbridge plant with the help of our German counterparts at BMW. This is an ergonomic risk assessment called ABA (Associate Job Analysis) and takes into account various activities at the workplace. There are 26 criteria measured, including required height, mobility of arms, overhead work, lifting and carrying, noise, climate, lighting, shift work and risk analysis. Values for illumination, noise and weights carried are recorded.

A scoring system has been devised, allowing a trained assessor to tick particular boxes on a form according to the criteria being measured. By ticking a box with one of three abbreviations, decisions can be made to adjust a particular workplace activity to reduce the chances of injury. The abbreviations are as follows: g = design objective met; a = action required; r = high-priority action required. All criteria of a job carrying an r rating are immediately acted upon, whereas an a rating, if in isolation, would be addressed less urgently unless this was an environmental factor such as noise or lighting. This allows the assessor to identify particular problem areas and recommend action.

This system has only recently been devised, but we are hopeful that it will prove successful in identifying potential problems.

We have a working population of 17 500. The occupational health service includes two occupational physicians, two sessional GPs, three physiotherapists,
one sports therapist, an acupuncturist, 11 full-time nurses and a part-time radiographer.

Musculoskeletal problems form the largest percentage of our consultations at Rover, psychiatric problems follow as a close second. Back pain accounts for a large proportion of the musculoskeletal problems. Our approach to its management is based on the guidelines outlined by the Clinical Standards Advisory Group on Back Pain 1994.

Back pain can be divided, on simple clinical grounds, into three groups: simple backache, nerve root pain and serious spinal pathology. From an occupational physician’s point of view, we see patients from the first two groups and become involved actively with these. Patients with serious pathology can be fast-tracked to the appropriate speciality.

Characteristics of simple backache include onset between the ages of 20 and 55 yr, mechanical nature of the pain, absence of constitutional symptoms and pain localized typically to the lumbosacral region.

Patients in this group follow our usual pathway of doctor to physiotherapist and hopefully back to work. Part of the problem we have observed is that associates are given variable, and sometimes incorrect, advice in the primary care setting about back rehabilitation. The first doctor seen is normally the associate’s own GP, who gives the patient an MED3 certificate and invariably tells him to rest. Trials have shown that rest for early recovery should only be 24–72 h and early activity is the key [24]. However, it is still common to see associates who have been told to rest for 3–6 weeks.

At Rover, the associate is usually seen in a clinic within 2 weeks of his absence unless he self-presents earlier. Here, the doctor assesses the associate, excluding any serious pathology. An immediate referral to the physiotherapist is possible. An associate can be seen within 24 h, a major advantage over normal GP referrals to NHS physiotherapy departments, which can take several weeks. A recommendation to change the associate job to an alternative job not involving heavy lifting, twisting or excessive bending for a period of time is made to management with suggestion of further review if required. This is not seen as an effort to endorse a ‘no-work’ period, but a gradual rehabilitation to an early return to normal work.

Associates seen from the second group with nerve root signs are also treated by our physiotherapy department, unless there is worsening of their symptoms. Fifty per cent of these patients tend to improve sufficiently to return to work within 6 weeks, some of these are referred on to the orthopaedic department, but the majority, after investigations, settle with conservative measures. Future assessment may involve workplace assessment by our department on return to work.

Our physiotherapy department takes up the vast amount of workload seen in our clinic. A total of 1400 treatments/month are dealt with in the department of which at least 50% are back problems. The department acts as a proactive service using various pieces of equipment, including traction, vibrotract couches, ultrasound and trophic stimulation. The philosophy of the department is not which technique is better, but which technique is the most successful for a particular case. The key to the treatment in the department is manipulation. Backwatchers classes are also run through the department. This is an initiative sponsored by the National Back Pain Association with an aim to improve overall fitness as well as back care. Each individual is assessed, looking at blood pressure, body weight, as well as back problems. A 30 min exercise programme is set up as well as group discussions on general back care. This is an important concept, especially if one takes into consideration the psychology of back pain. By addressing issues in a group, coping strategies can be discussed. Individual illness beliefs with respect to back pain can be addressed, hopefully correcting any misconceptions [25].

For our associates who fail to respond, we also offer a chiropractor. These associates are cross-referred by our physiotherapists, allowing an exchange of ideas. Rounding off our service, we offer an acupuncture service for the treatment of atypical pain. Some people have benefited from this treatment, but it is difficult to predict which individuals will be helped by acupuncture.

Our service at Longbridge attempts to provide numerous options in terms of treatment of back pain. This allows us to offer a complete spectrum for the management of back pain.

**COST-EFFECTIVENESS**

A study carried out at Atomic Energy from 1987 to 1991 showed that using an occupational health back school, there was a 68% reduction in sickness absence due to back pain [26]. The service thus pays for itself. At Longbridge, we have compared what happened in 1993, before the service was set up, to 1995. By looking at certificates for back pain and other musculoskeletal disorders and estimating the cost of a day lost at work, we have been able to measure cost-effectiveness in our department.

In 1993, there were 30 000 days of doctor-certified back pain. This works out to be 1.7 days/person/year in total, and represents 16% of all certificates for that year. Self-certified back pain approximated to 10 000 days/year, 0.5 days/person/year. Hence in 1993, 2.2 days/person were lost due to back pain. For other doctor-certified musculoskeletal disorders, 18 000 days/year were lost. Self-certified musculoskeletal disorders, excluding back pain, contributed 8000 days/year. In total, therefore, in 1993 we lost 66 000 days due to musculoskeletal disorders at a total cost of £3.3 million. In addition, the delays described above lead to extended sick leave for many workers.

Setting up a proactive physiotherapy department in our occupational medicine department cost £50 000 for a year with a further £50 000 to cover salaries. To be cost neutral, we would have to save 2000 days.

Analysis of 1995 figures shows a substantial saving.
The number of days saved was 6000, a 9% decrease on 1993’s figure. The additional 4000 days saved are equivalent to £200 000. Further decreases were seen in certificates for back pain: doctors by 16%, self by 14%.

This cost-effectiveness has allowed us to explore further expansion, such as ‘in house’ orthopaedic clinics, possible private treatments and the possible development of a centre of excellence allowing referrals to be sent to us from other industries or GPs.

**CONCLUSIONS**

Back pain is very common. It can affect anyone, regardless of age, sex, race or occupation. Most back pain is badly managed and there is no uniformity of management. Treatment can vary according to the doctor seen by the patient.

There needs to be consistent guidance on back pain management aimed at encouraging early mobilization rather than rest. This should be augmented by early referral to a physical therapist, e.g. physiotherapist, chiropractor, osteopath.

Physical rehabilitation programmes such as that developed at Longbridge should be applied across all sectors of industry.

The cost-effectiveness of such schemes within industry has now been proven. Serious pathology requires in-patient NHS care, as it always has done. By applying sensible consistent triage, the number of costly wasted referrals can be minimized, resulting in improved patient care, better utilization of resources and reduced sickness absence.

**REFERENCES**