

BACK PAIN



BACK PAIN



Office of Health Economics
12 Whitehall London SW1A 2DY

No 78 in a series of papers on current health problems published by the Office of Health Economics. Copies are available at £1.00
For previous papers see inside back cover.

© July 1985. Office of Health Economics.

ISSN 0473 8837

Cover illustration from Mary Evans Picture Library

This paper was researched and written by **Nicholas Wells**

Office of Health Economics

The Office of Health Economics was founded in 1962 by the Association of the British Pharmaceutical Industry. Its terms of reference are:

To undertake research on the economic aspects of medical care.

To investigate other health and social problems.

To collect data from other countries.

To publish results, data and conclusions relevant to the above.

The Office of Health Economics welcomes financial support and discussions on research problems with any persons or bodies interested in its work.

Introduction

Back pain is a symptom experienced by a large proportion of the population. It causes personal discomfort and national economic loss of a magnitude wholly misrepresented by that which might be inferred from its characterisation as the malingerer's complaint and its adoption as a target for humour. Indeed such are the consequences of back pain that in 1976 the then Minister of State for Health, Dr David Owen, established a multi-disciplinary Working Group to investigate the problem. The Group's report (DHSS 1979) was published at the end of the decade and contained recommendations flowing from the identification of several unresolved issues. Of particular significance among the latter were the means of 'improving understanding so as to provide a basis for developing more effective remedies'.

Today back pain continues to generate considerable economic and social burdens. It also remains a subject of parliamentary interest, giving rise to members' questions akin to those which triggered the official investigation in the second half of the 1970s. Against a background of therefore seemingly little success in reducing the impact of back pain, this paper attempts a detailed quantification of its present costs to the community and explores the potential for diminishing this expense in the future.

The number of sufferers

Back pain is an extremely common ailment. It emerged as the third most frequently experienced symptom (after headache and tiredness) in Morrell and Wale's (1976) study based on health diaries kept for a 28 day period by 198 women aged between 20 and 44 years. Ingham and Miller (1979) found that 21 per cent of a randomly selected sample of individuals aged 16–75 years who had not attended their general practitioner for at least three months declared themselves at interview to be suffering from back pain.¹ And Dunnel and Cartwright (1972) reported that 21 per cent of their sample population had suffered backache during the two weeks preceding interview.

It is not possible to derive from these findings a precise figure for the number of persons who develop back pain over the course of a year. The orders of magnitude are such, however, that the symptom is thought to be experienced at some stage in life by between 80 per cent (Auchincloss 1983) and almost 100 per cent (Roland 1983) of the population.

In most instances, however, pain is only short lived and of in-

¹ This average disguises extremes of 14 per cent for males under 36 years of age and 32 per cent for females aged 36 years or more.

Table 1 Males initiating a consultation for back pain during the course of one year, by diagnosis and age, rates per 1,000 population

<i>Back pain diagnoses (ICD No)</i>	<i>0-4</i>	<i>5-14</i>	<i>15-24</i>	<i>25-44</i>	<i>45-64</i>	<i>65-74</i>	<i>75+</i>	<i>All ages</i>
Sciatica (353)	—	0.1	0.2	1.8	3.0	2.9	2.3	1.5
Spondylitis osteo-arthritis (713 pt)	0.2	0.1	1.3	5.0	13.3	16.4	10.1	6.2
Lumbago not attributed to disc lesion (717.0)	—	0.5	7.3	11.6	13.9	8.6	8.0	8.3
Displacement of intervertebral disc (725)	0.2	0.6	3.0	12.9	12.2	5.1	1.5	7.3
Back pain (728.7, 728.9 (pt), 728.8)	0.4	1.1	14.0	25.6	25.8	20.8	13.2	17.0
Total	0.8	2.4	25.8	56.9	68.2	53.8	35.1	40.3

Source RCGP 1979

Table 2 Females initiating a consultation for back pain during the course of one year, by diagnosis and age, rates per 1,000 population

<i>Back pain diagnoses (ICD No)</i>	<i>0-4</i>	<i>5-14</i>	<i>15-24</i>	<i>25-44</i>	<i>45-64</i>	<i>65-74</i>	<i>75+</i>	<i>All ages</i>
Sciatica (353)	—	—	0.6	1.8	2.7	2.2	3.0	1.6
Spondylitis osteo-arthritis (713 pt)	—	0.2	1.0	7.1	17.2	17.1	13.6	8.3
Lumbago not attributed to disc lesion (717.0)	—	0.5	5.4	7.4	9.6	6.9	5.9	5.9
Displacement of intervertebral disc (725)	—	0.4	3.0	7.6	7.3	3.6	1.7	4.6
Back pain (728.7, 728.9 (pt), 728.8)	0.2	2.7	15.6	27.3	24.9	21.5	15.2	18.2
Total	0.2	3.8	25.6	51.2	61.7	51.3	39.4	38.6

Source RCGP 1979

sufficient severity to warrant consultation with a doctor. Thus Dixon (1980) has estimated that only 10 per cent of episodes are brought to medical attention. An even lower proportion of 2.6 per cent was found by Scambler and her colleagues (1981) in an investigation based on health diaries kept by a sample of women aged 16–44 years. This figure is in reasonably close agreement with that reported by Morrell and Wale (1976) from their study involving women aged 20–44 years. Nevertheless, the Second National Study of Morbidity in General Practice (RCGP 1979), which was conducted in 1971–72, indicates that back pain imposes a considerable burden on the family doctor services. Combining the appropriate diagnostic groupings, Tables 1 and 2 show the proportion in specific age groups that will initiate a consultation for back pain during the course of a 12 month period. Overall, a figure of around four per cent is observed for both men and women. Application of 1983 population data to the age specific rates shown in the two tables indicates that each year back disorders cause 2.2 million individuals to consult their general practitioner – three times the number attributable to coronary heart disease.

The age specific data suggest that susceptibility to back pain of an intensity or duration prompting resort to professional help reaches a peak during the second half of middle age. Thus 6.2 per cent of women and 6.8 per cent of men aged between 45 and 64 years consult a general practitioner for back pain at least once during any one year. This generalisation holds true for both sexes and for most back complaints. However, one exception may be noted: patient consultation rates for intervertebral disc displacement – popularly but mistakenly perceived as an extremely common, if not the most frequent, cause of back pain – peak at an earlier age, that is between 25 and 44 years.

Available data concerning the action taken as a consequence of the consultation show some degree of inconsistency. A study of acute back syndrome in general practice by Dillane and co-workers (1966) indicated that 11.4 per cent of male and 6.8 per cent of female patients were referred for specialist advice or treatment. For the two sexes combined, the study yielded an overall estimate of 9.3 per cent. However, Glass (1979) has suggested a somewhat higher figure of 12 per cent whilst Wood and Badley (1980) have estimated that 17.5 per cent of patients consulting general practitioners are referred for further help.² Imprecision is inevitable in view of differences in study definitions of back pain and in preferred management approaches. Against this background it is therefore perhaps most appropriately concluded that overall referral rates are unlikely to be less than 10 per cent and no greater than 20 per cent.

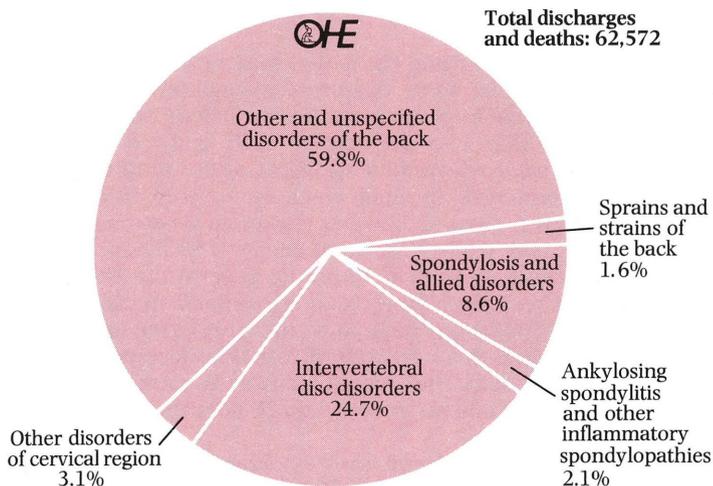
2 Partridge and Knox (1969) reported from their general practice survey that 56 per cent of males and 45 per cent of females under 65 years of age consulting their family doctor with lumbar and pelvic girdle pain during the course of a 12 month period had been referred to hospitals at some time in their lives because of the impairment.

Focusing on hospital inpatient treatment, figures from the Hospital Inpatient Enquiry for England and Wales coupled with those from the Scottish Hospital Inpatient Statistics indicate that in Britain in 1982 the combined back pain diagnoses resulted in 62,572 discharges from (or deaths in) hospital. This total exceeded the sum of hospital discharges and deaths recorded for acute, chronic and unspecified bronchitis and emphysema by 15 per cent. Nevertheless, it may be estimated that fewer than three in every 100 individuals consulting a family doctor for back pain in any given year will be admitted to a hospital bed.

An analysis of the discharges and deaths attributable to back pain in Britain in 1982 is shown in Figure 1. It is not possible to provide a detailed breakdown of these hospital data because such a large number of cases – three out of every five – are recorded under the heading 'other and unspecified disorders of the back'. Nevertheless, if this category is set to one side intervertebral disc disorders emerge as the single most important identifiable cause of hospitalisation for back pain patients. In 1982, such problems resulted in 15,479 admissions, accounting for one quarter of the total for back pain. One-third of these cases involved individuals aged 45–64 years but most, that is slightly more than half, were younger persons aged between 25 and 44 years.

Several types of surgical procedure are undertaken with the aim of alleviating back pain. Of these, operations on intervertebral discs

Figure 1 Hospital discharges and deaths for back pain: analysis by diagnostic category, Britain, 1982



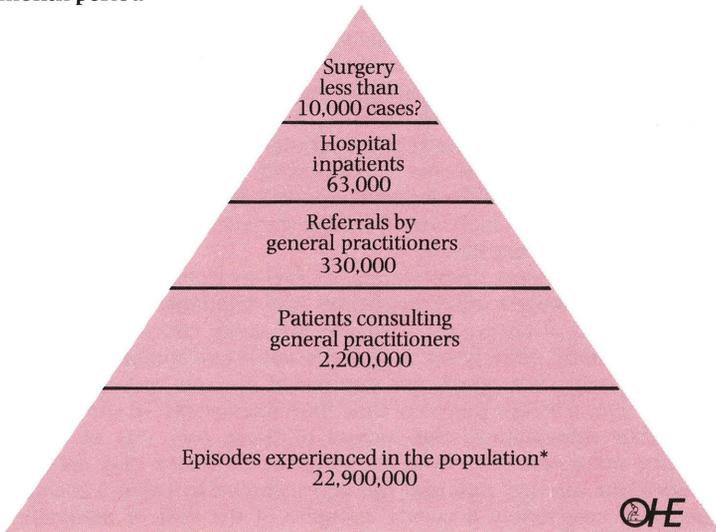
Source Hospital Inpatient Enquiry for England and Wales; Scottish Hospital Inpatient Statistics.

and laminectomies are the most clearly identifiable from the available data and in England and Wales totals of 4,300 and 4,480 respectively were undertaken in 1982. In the same year 1,950 spinal fusions and 17,360 other operations on the spine and spinal cord were also performed but the proportion directed specifically at the relief of back pain is unknown. These data suggest, therefore, that between 16 per cent and 50 per cent of patients admitted to hospital undergo surgical intervention. The exclusion of 'spinal punctures' yields a more precise range of between 16 per cent and 22 per cent.

The cost of back pain

Figure 2 summarises the data presented in the preceding section. It highlights the fact that in relation to the huge number of people who experience an episode of back pain during any given year, those who require treatment in the expensive hospital sector constitute only the tip of the iceberg. Nevertheless, as Table 3 demonstrates, the economic consequences of back pain are substantial.

Figure 2 Estimated impact of back pain over the course of a 12 month period



*Calculated on the basis of Dixon's (1980) estimate that only 10 per cent of episodes are brought to general practitioners. Other estimates, referred to in the text, suggest even smaller proportions and would of course yield a much larger total episodes figure than that shown in the base of the triangle. These figures should therefore be regarded as only crude approximations.

Source See text.

Table 3 The cost of back pain to the NHS, Britain 1982

	<i>£ millions</i>
General Medical Services	25.7
Pharmaceutical Services	38.9
Outpatient Consultations	25.3
Hospital Inpatients	66.2
	156.1

Source OHE Estimates

Beginning at the primary care level, the condition accounts for 2.6 per cent of the general practice workload (as measured by consultation rates), thereby generating an estimated expense of £25.7 million in 1982. The cost of medication prescribed by family doctors is not officially itemised and can be estimated only in rather crude terms. If it is assumed that each consultation with a general practitioner for back pain results in a prescription for four weeks' medication, then it may be calculated that the net ingredient cost drug bill amounted to £31.9 million in 1982.³ This sum rises to £38.9 million when pharmacists' dispensing fees are taken into account.

The accuracy of this estimate is open to question. It may, on the one hand, overstate the true cost of chemotherapy prescribed by general practitioners. This possibility arises for several reasons: some patients may not receive medicines for their back pain; the average duration of drug therapy may be less than four weeks; prescribing patterns for back pain may favour analgesics rather than non-steroidal anti-rheumatic preparations and the former, in terms of average net ingredient cost per prescription, incur only about one third of the expense of the latter; and MIMS data omit pure generics, the lower prices of which would reduce the average upon which the foregoing costings are based.

On the other hand, understatement derives from the exclusion of spending on various other medicines and appliances employed in the treatment of back pain – muscle relaxants, steroid and anaesthetic injections, anxiolytics, anti-depressants and spinal supports. It may also occur if a significant number of patients require chemotherapy over a longer period of time than four weeks. In the absence of further information, the impact of these two sets of factors remains unknown. It is, however, possible that they may counter-balance one another and that the figure shown in Table 3 is consequently a reasonably accurate estimate of the cost of medication prescribed for back pain.

Estimates of the cost of outpatient consultations for back pain are

³ This figure is the product of 4.5 million consultations (RCGP 1979) and the average cost of four weeks therapy calculated from the prices shown in the December 1982 edition of the Monthly Index of Medical Specialities (MIMS) for 40 of the 64 products listed as non-steroidal anti-inflammatory drugs.

equally susceptible to inaccuracy. Dixon (1980) has reported that problems relating to the spine constitute about 25 per cent of all outpatients seen in an orthopaedic clinic and that two-thirds of these are for back pain. Unfortunately attendances for the latter cannot be extracted from the available data which combine traumatic and orthopaedic surgical outpatients within one category. The number of consultations in rheumatology, neurology and other outpatient departments attributable to back pain is also unknown. In order to obtain an estimate of the costs arising in this sector use has therefore to be made of general practitioner referral data. An average of the survey findings noted earlier suggests that 15 per cent of persons consulting a general practitioner for back pain are referred for specialist opinion. This proportion implies a total of 330,000 referrals each year which may be estimated to have cost £25.3 million in 1982.⁴

Again it has to be recognised that the accuracy of this figure is not beyond challenge. Apart from the uncertainties surrounding the basic data, revision upwards may be necessary to take account of the extra costs generated, for example, by patients undergoing repeated examination and by hospital investigations requested by general practitioners but not involving referral to a specialist. Alternatively, an amendment in the opposite direction may be required as some hospital outpatient appointments are not kept because of the spontaneous disappearance of pain before the date of attendance falls due.

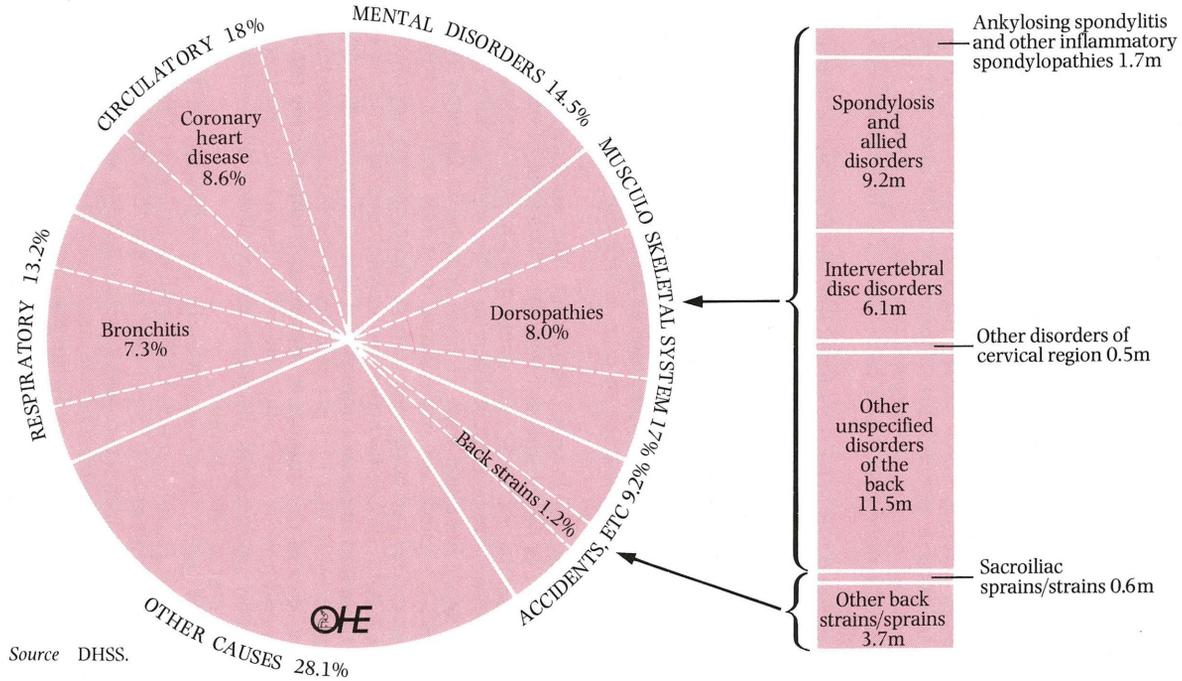
Focusing on hospital inpatients, the data sources upon which Figure 1 is based indicate that the 1982 total of 65,572 discharges and deaths for back pain generated 783,423 hospital bed-days in that year. Application of this sum to the average daily inpatient cost for acute hospitals with 51 beds or more in England and Wales in 1982-83 yields an expenditure of £58.8 million. However, this figure does not accurately reflect contemporary inpatient costs for back pain. Industrial action by hospital ancillary staff in 1982 led to a reduction in patient admissions during the year. Bed-days for back pain were in fact 11.3 per cent below the sum recorded for 1981. On the basis of the number of inpatients treated during the latter year, expenditure in 1982 might therefore have been expected to be £7.4 million greater than the figure shown above. This revision yields a new cost of £66.2 million.

Back pain may consequently be estimated to have cost the National Health Service £156 million in 1982 (Table 3). This sum was equivalent to 1.15 per cent of total NHS spending in Britain. It would have facilitated, had it been available, an additional expenditure on new capital schemes equivalent to more than one fifth of the amount actually spent on hospital developments and other projects

4 The cost employed in this calculation is the average per outpatient case in acute and mainly acute hospitals (excluding London teaching establishments) for England and Wales in 1980-81 adjusted to 1982 prices.

Figure 3 Days of certified incapacity for work, Britain 1982-83

Total days:
361 million



Source DHSS.

in England in 1982–83.⁵ Alternatively, this amount of money might have made possible a 20 per cent cut in the overall size of the NHS hospital waiting list.⁶

Non-NHS costs

The economic ramifications of back pain are not, of course, confined to those imposed upon the NHS. The acute discomfort and immobility caused by the complaint also result in a substantial volume of sickness absence from work. Figures from the Department of Health and Social Security indicate that 622,800 spells of certified incapacity attributable to dorsopathies (the umbrella label for the various back pain diagnoses) and sprains and strains of the back were current at some time during 1982–83. Focusing on dorso-pathies alone the data indicate that the median duration of a spell of absence was 14 days. However, for a not insignificant number of individuals incapacity for work can be considerably more prolonged: almost one spell in three terminating during 1982–83 had lasted for 25 days or more.

With regard to the extent of lost potential working time, the DHSS figures show that back pain was responsible for 33.3 million days of certified incapacity in Britain in 1982–83 (Figure 3). This total accounted for 9.2 per cent of all certified days of absence and exceeded the losses attributable to both coronary heart disease and bronchitis. It was also more than six times the number of working days lost through industrial stoppages in 1982.

The economic significance of certified incapacity for work is represented by the value of potential output that is lost and may be estimated approximately by applying earnings data to the number of days of absence. On the basis of the average levels of remuneration prevailing throughout all manufacturing and service industries in 1983, back pain may be calculated to have deprived Britain of output worth £1,018 million in 1982–83.

Certified incapacity attributable to back pain also results in the payment of benefits from the social security fund. Individuals absent from work because of back pain received an estimated total of £193 million from this source in 1982–83.⁷ However, sickness benefits are

5 This might have meant 18 new hospitals given that smoking-related illness is estimated to cost the NHS £170 million per annum which is approximately equivalent to the sum needed to construct 20 new hospitals (Patten 1985).

6 This estimate is calculated on the basis of an average cost per inpatient day of £75, a mean duration of stay per case of 12 days and a waiting list in Britain of 840,865 on 31 December 1982. Of course, it also assumes rather simplistically that revenue funding is the only factor determining the capacity for inpatient treatment. Furthermore, there are doubts surrounding the accuracy of hospital waiting list statistics (Timmins 1985).

7 Payments are also made from the social security fund in the form of injury benefits. In 1982–83, persons incapacitated by industrial accidents received a total of £64.5 million of which an estimated £8.6 million (18.5 per cent) went to individuals experiencing injuries to the back.

transfer payments and economists do not, therefore, regard them as conventional costs. Nevertheless, the distribution of such monies to this particular use does have an opportunity cost, that is it precludes their allocation to other areas of public and private expenditure.

The personal costs borne by individuals experiencing back pain are even less readily quantifiable than the overall community burdens. Focusing on financial outlays, the value of the market embracing special aids and supports for, as well as literature of relevance to, the back pain sufferer is unknown.⁸ It is also uncertain how much is spent out of private disposable income, both directly and via health insurance schemes, on therapy for back pain provided by practitioners of both orthodox and 'alternative' forms of medicine. Further, it is not possible to gauge with accuracy the size of personal expenditures on 'home remedies' or 'over the counter' medicines to treat back pain. Analgesics and preparations for muscular pain claim 18 per cent and 3 per cent respectively of the OTC market which, at retail prices, had a value of £440 million in 1982 (Euromonitor 1983). However, the latter source estimates that three-quarters of analgesic users employ such preparations to relieve headaches. Thus, if it is assumed that this percentage applies equally to actual consumption, retail spending on home medicines for back pain accounts for an unknown share of a submarket which, at maximum, was valued at just £33 million in 1982.

In addition to the types of cost identified above, back pain can generate severe personal hardship. In some cases, it is associated with physical impairments which inhibit the ability to undertake certain activities. The Government Social Survey of the *Handicapped and Impaired in Great Britain* (Harris 1971) found that two per thousand adults over 16 years of age living in the community were impaired by back pain. This rate implies that there are 88,000 people in Britain affected in this way at the present time and of these, according to the findings of the same investigation, 10 per cent are either severely or very severely impaired.

The types of disability experienced by these patients reflect limitations on physical independence and mobility and are illustrated in Table 4. But a more significant issue is whether activity restriction creates social handicap. The extent to which this occurs is shown in the context of occupation and participation in community activities in Table 5. Considerations of a practical nature underlie these findings but handicap is also influenced by individuals' expectations and it is noteworthy that there is evidence to suggest that the latter

⁸ The potential significance of personal spending on aids to counter disability is indicated by the findings of a study involving 78 women patients suffering from classical (seropositive) rheumatoid arthritis (Pullar *et al* 1982). Thirty-seven members of the sample purchased aids during the study year, each spending an average of £220. The supports were wide-ranging in type and included relatively expensive household items which under circumstances of 'normal' health may be regarded as non-essential labour-saving devices but in disability acquire the status of a necessity.

Table 4 Disadvantages resulting from impairment by back troubles

<i>Dimensions of handicap and underlying disability</i>	<i>Accomplishment or state</i>	<i>Proportion of persons impaired (%)</i>
Physical Independence		
Excretion disability	getting to and using WC	
	difficult	8.2
Personal hygiene disability	can't do on own	0.3
	having an all over wash	
Dressing disability	difficult	15.5
	can't do on own	5.1
Domestic disability	putting on shoes and stockings†	
	difficult	34.9
Domestic disability	can't do on own	8.3
	cooking*	
	has difficulty	66.9
	doesn't because of impairment	1.2
Domestic disability	laundry*	
	has difficulty	43.6
	sends to laundry because of impairment	10.4
Mobility		
Confinement disability	confined to house	
	bed or chair fast	0.3
	otherwise confined to house	0.9
Ambulation disability	able to get out of house	
	only if accompanied	0.3
	on own but with difficulty	21.2
	without undue difficulty but may take longer	77.2

†Does not include those with severe disability.

*Excludes those who would not normally carry out household tasks.

Source Badley *et al* 1981.

are often falsely high in regard to back pain (Wood 1983). These and the other social sequelae of back pain clearly constitute an important element of the overall cost profile and their irreducibility to financial terms should not be allowed to diminish recognition of their significance to patients and the relatives who care for them.

The scope for reducing the burden

It has been emphasised throughout the preceding analysis that the twin difficulties of identification and quantification imply that disease costing can necessarily only be an approximate exercise. More specifically, attention might also be drawn to some funda-

Table 5 Effect of back troubles on occupation and social integration

<i>Dimensions of handicap and underlying disability</i>	<i>Accomplishment or state</i>	<i>Proportion of persons impaired (%)</i>
Occupation		
Work status disability	ceased employment (because of disability)	
	prematurely retired	17.4
	now a housewife	5.4
	otherwise not employed	
	other retired*	9.4
	housewife	14.9
	temporarily sick	6.3
	in employment	
	at school or university	1.3
	in occupation centre	0.3
	other (working or unemployed)	46.0
Social integration		
Solitary life	single or widowed	21.2
	live alone (cf only 5% of general population)	13.0
	of those living alone:	
	do not have radio	2.4
	do not have television	22.0
	(cf 6% of those living with others)	
Recreation disability	unable to go to clubs	11.1
	unable to go to events (church, party, etc)	7.6
	given up things liked doing (ie hobbies)	65.2
	not had a holiday in previous 3 years	27.8

*Includes those permanently disabled and who have never worked.

Source Badley *et al* 1981.

mental questions surrounding the calculation of the single largest cost of back pain – the value of lost production. It may be argued, for example, that the figure of £1 billion is an understatement because absences of very short duration and ‘producers’ who remain outside the sickness benefit system, such as housewives, are not taken into account. Conversely, the methodology employed may overstate the true level of loss if work teams are able successfully to reorganise to accommodate the temporary absence of one of their members through back pain. In addition, estimates of production loss may be perceived as more notional than real in straitened economic circumstances in which high levels of unemployment prevail.

Nevertheless, even if there is a degree of ambiguity regarding the worth of such figures, back pain generates very real costs for sufferers and for the National Health Service so that initiatives aimed at

reducing these burdens are clearly desirable. In this respect, primary prevention might be seen as the optimal solution. Yet the Working Group on Back Pain (DHSS 1979) concluded that 'unfortunately, there is insufficient basis at the moment for formulating advice that could be incorporated into health education directed at the prevention of back pain'.

Preventing back pain

The scope for and potential benefits of prevention have been most extensively explored in the setting of the work place and there now exists a voluminous literature on the subject. However, substantial reductions in the incidence of back pain have yet to be achieved and this failure may be explained by difficulties in identifying those occupations carrying heightened risks and the reasons for these special disadvantages as well as by problems confronting the implementation of appropriate prevention strategies.

Focusing on the first of these areas, investigations designed to clarify the pattern of occurrence by occupation are subject to the influence of a number of factors. Thus the age structure of a given group of workers, the latter's previous job experiences, the possible operation of a process of natural selection⁹ and the extent to which specific tasks may continue to be performed despite back pain have all to be taken into account in assessing the degree of hazard associated with different types of employment (Davies 1984). Varying degrees of control for these factors and inconsistencies in the definition of back pain coupled with the potential distortions of point prevalence surveys imply that caution has to be exercised in interpreting the findings of individual studies and in drawing comparative conclusions.

Uncertainty also shrouds the variables underlying the heightened risk of back pain in certain occupations. A recent review of retrospective studies of workplace factors (Buckle 1984) revealed disagreement over the links between activities such as carrying, pulling and pushing and back pain. In part, this observation reflects the methodological difficulties which beset investigations of such relationships. But discrepancies also stem from the differences in susceptibility to back troubles of individual workers. It therefore follows that standardisation of criteria for admission to studies would be valuable but this too is unlikely to prove straightforward because of the ambiguity surrounding the risk factors – such as height, weight, strength and size of spinal cord – which may predispose an individual to the development of back pain.

In addition to the problems implicit in the foregoing of accurately

9 A form of natural selection is apparent in the construction industry – the apprentice who sustains a back injury early on in his career tends to leave the industry and those over 25 years have to be thought of as a survival population (Stubbs and Nicholson 1979).

targeting resources for prevention, this approach to back pain is further hampered by constraints of a practical nature. Three broad strategies have been engaged to prevent or reduce the incidence of back pain in industrial settings: pre-employment screening, training and the application of ergonomic principles to task design. The first of these aims to identify individuals at risk and to redirect those found to be susceptible away from potentially hazardous occupations. However, there is no single test which can predict an individual's liability to back pain and the relative importance of presently available indicators has yet to be established (MacDonald 1984).

Training seeks to ensure that employees are aware of the appropriate ways of undertaking manual handling and other operations which may cause injury to the back. Yet conventional instruction to promote correct lifting has been shown to be of little value (Simpson 1984). Focusing on the nursing profession, for example, research by Stubbs and his colleagues (1983) questioned the benefit of training in patient handling methods and found no relationship between the time spent learning the relevant techniques and the subsequent point prevalence of back pain. The general lack of success associated with this approach may be attributed to a combination of factors. The latter include the impractical nature of some of the advice that has been offered to those at risk and the perennial problem encountered in health education of persuading individuals to adopt suitably modified patterns of behaviour in the absence of any immediately apparent need to do so. In addition, Anderson (1980) has emphasised that advice alone is not enough . . . 'most people know the right and wrong ways of lifting or manhandling heavy objects, the difficulty is to get people to remember in the stress of the working environment'.

The remaining preventative strategy aims to reduce the worker's risk of developing back pain by concentrating attention on the source of the problem, that is by ergonomic job design. The latter may take the form of changes in work organisation in order to vary the frequency of exposure to potentially hazardous jobs or, more directly, of alterations in the workplace to diminish the severity of the task (Simpson 1984). It is clear that improvements in the design of equipment and the layout of the working environment could help significantly to reduce the risk of back injury although it has to be recognised that there are many industries where it would be difficult to make all tasks ergonomically appropriate (MacDonald 1984). Consequently, progress in prevention might be seen to depend on the application of all three strategies described above in combinations specifically designed to satisfy the requirements of different occupational settings. It is therefore unfortunate that 'an examination of the literature on the comparative effectiveness of medical screening, training or ergonomics reveals a great deal of discussion and anecdote but little which could be considered as good comparative science' (Simpson 1984).

Problems in diagnoses

In a chapter entitled 'Resources for Relief of Back Pain', the DHSS Working Group stressed that in most instances 'there is an overwhelming tendency for recovery without the need for professional help'. Generally, such episodes of pain abate after a short period of time, during which discomfort may be eased by self-medication and other types of self-care including activity restriction and exercise. However, the report argued that this spontaneous healing potential is insufficiently recognised and that this is 'reflected in current service utilisation by many people with milder forms of back pain'. It was further suggested that the behaviour of these individuals in this respect 'contributes to delays in access to help for the more severely affected'.

The impact of this inappropriate use of resources is extremely difficult to assess. In the first instance, the DHSS document did not provide, understandably, any estimate of the proportion of patient/doctor contacts that might be deemed unnecessary. The economic sequelae are equally uncertain. Greater reliance on self-care in milder cases of back pain might be expected to lead to an increase in the numbers of people with more serious conditions coming to medical attention over a specified period of time. However, if the latter cases require relatively more expensive investigative tests and care, the total medical costs attributable to back pain could rise. Yet it might then be argued that this impact (the magnitude of which will vary at different points along the referral chain between general practitioner and hospital) would be counterbalanced by the gain accruing from a greater volume of successfully alleviated pain – assuming such an outcome to be therapeutically feasible as well as measurable in economic terms.

Misallocation of scarce resources in the management of back pain may also arise because of a failure to establish an accurate diagnosis. Deficiency in this respect may lead to the adoption of inappropriate therapies which are eventually abandoned in favour of more suitable approaches, although clearly not before potentially avoidable costs have been incurred. However, precision in pinpointing the origin of back pain in individual cases is frequently difficult to achieve. Indeed, O'Brien (1984a) has suggested that 'the cause of back pain is actually found in as few as 20 per cent of cases'.

Back pain is a symptom – not a disease – and may be triggered by a variety of factors (Table 6). Medical causes, which include inflammatory conditions, neoplasms and metabolic disorders, are generally readily recognised (Jayson 1984) but in total they are involved in only one or two per cent of all cases of chronic, persistent backache (Asherson 1984). Similarly, sensations of pain experienced in the back but originating elsewhere in the body may be identified by elucidation of the clinical history and investigative tests. Psychogenic back pain is perhaps the least satisfactory of the categories listed in Table 6. Wood (1980) has commented that 'too often this

Table 6 The causes of back pain

<p>A Mechanical and traumatic causes Musculotendinous and ligament strains Fractures of the spine Prolapsed intervertebral disc Spondylolysis and spondylolisthesis Instability syndrome Congenital anomalies</p> <p>B Inflammatory causes Discitis Osteomyelitis Tuberculosis Brucellosis Paravertebral abscess Sero-negative B27 spondyloarthropathies Ankylosing spondylitis Reiter's syndrome Psoriatic arthropathy Bowel associated Ulcerative colitis Crohn's disease</p> <p>C Neoplastic causes Primary benign tumours Primary malignant tumours Metastatic disease</p>	<p>D Metabolic bone disease Osteoporosis Osteomalacia Paget's disease</p> <p>E Referred pain <i>Potential sources:</i> Visceral, eg posterior duodenal ulcer Retroperitoneal, eg carcinoma of the pancreas Urinary tract, eg renal colic Gynaecological, eg dysmenorrhoea Pelvic, eg carcinoma of rectum</p> <p>F Psychogenic causes <i>Pain associated with:</i> Acute anxiety Depression</p>
---	--

Source Edgar 1984; Asherson 1984.

label reflects little more than a lack of detectable physical signs, and it scarcely identifies any underlying psychopathology to which treatment could be directed. Moreover, the concept carries with it the hazardous implication that no physical disorder is present and, conversely, that individuals with back pain due to obvious physical causes have no psychiatric or psychological problem'.

The large majority of episodes of back pain stem from 'mechanical' or structural disorders. Within this category, diagnosis of a prolapsed intervertebral disc as the cause of suffering is relatively straightforward (*Lancet* 1981, Jayson 1984). In many other instances, however, the mechanical abnormalities giving rise to pain and, indeed, the origins of these defects themselves frequently remain the subject of speculation. Thus X-ray findings of degenerative changes affecting both the intervertebral disc and apophyseal joints do not necessarily identify the source of pain. In three population surveys covering a total of 1,702 persons low back pain was found in 59 per cent of those with radiological evidence of degeneration of the lumbar disc and in 47 per cent of those without (*British Medical Journal* 1979).

Microfractures in the spine, especially at sites of strain concentration, are a cause of back pain but without recourse to special investigative techniques such damage may not be discovered (Sims-

Williams *et al* 1978). Spinal stenosis – an alteration in the size and shape of the vertebral canal – is another diagnosis that may remain undetected by simple radiography. Back pain may also stem from the sacro-iliac joint but there is division regarding the identity of the precipitating factors – unequal leg length, postural abnormalities, flat feet and obesity, among others, have been considered relevant – and, more fundamentally, on the question of whether the mechanical abnormality involved is one of hyper- or hypo-mobility (*Lancet* 1983).

In view of the complex structure of the spine, it is perhaps unsurprising that in many patients it is not possible to define the precise source of back pain. In order to avoid the use of diagnostic labels that imply pathological changes which remain unproven, symptoms of uncertain mechanical origin are therefore most appropriately termed 'non-specific back pain'. Inevitably, such diagnostic ambiguity increases the risk that unsuitable treatments may be employed and this problem is exacerbated by the phenomenon of 'inappropriate illness behaviour' described by Waddell and his colleagues (1984). These authors have suggested that in a poorly understood condition such as backache the volume of treatment received by a patient may be influenced more by his or her distress and illness behaviour than by the actual physical problem. Thus a study of 380 patients with a history of low back pain of at least three months' duration found that individuals showing considerable inappropriate illness behaviour¹⁰ had received twice as much treatment as those at the other extreme of the behavioural spectrum. Furthermore, therapy which is misdirected in this manner is unlikely to be successful and this failure in turn may reinforce the illness behaviour, thereby establishing a self-perpetuating process. Apart from the implications these observations have for the wasteful use of resources, there is in addition the risk that patients may be exposed to progressively more hazardous procedures from which no benefit, that is pain relief, may be derived.

Evaluation of therapy

Advances leading to greater diagnostic precision might therefore be expected to generate benefits in terms of better patient care and a more rational use of resources. Of course, realisation of these two objectives also requires that the therapies utilised in back pain are effective. It is clear from Table 7 that a multitude of treatment approaches lies between the extremes of simple bed rest and major surgery. In general, physiotherapy and other techniques aimed at promoting mobility and increasing paraspinal and abdominal muscle strength are employed as second line strategies after analgesia and rest have been tried and found wanting; surgery is indica-

¹⁰ Defined as 'illness behaviour out of proportion to the underlying physical disease and related more to associated psychological disturbances than to the actual physical disease'.

ted only rarely and when a remediable lesion has been defined.¹¹ However, available evidence suggests that the efficacy of many interventions is open to question. Focusing on outpatient services, the DHSS report found 'disturbingly little evidence that whatever is done is effective in exerting any influence on the natural history of the underlying condition'. Even in cases severe enough to warrant hospital admission 'uncertainty about outcome . . . extends to many forms of intervention . . .' And in Dixon's (1980) view 'each therapist has his own theory, ranging from those which seem plausible and rational at one end of the scale, to theories which can only be described as systematised delusions at the other'.

The foregoing highlights the need for evaluation of the treatments employed in back pain. Yet much of the material available at present comprises observations and opinions which lack substantiating evidence; few investigations demonstrate adequate scientific rigour. Indeed the authors of the DHSS report identified from an extensive literature only 18 studies in which there was a possibility of arbitrating between the effectiveness of alternative methods of treatment. And, more recently, a review of 59 trials of conservative therapies for low back pain revealed a widespread failure to adhere to the methodological and other criteria universally regarded as essential to a well-designed and valid investigation (Deyo 1983).

These findings reflect, in large measure, the formidable obstacles which beset the conduct of evaluation studies in back pain. The latter are particularly difficult because of the spontaneous disappearance of the symptom in many cases. The significance of this phenomenon is illustrated by the studies of Sims-Williams and co-

Table 7 Therapies for back pain

Oral drugs	Injected drugs
Analgesics	Parenteral corticosteroids
Anti-inflammatory agents	Epidural steroids
Muscle relaxants	Epidural anaesthetics
Antidepressants	Local anaesthetics
	Intradiscal chymopapain
	Intradiscal collagenase
Physical measures	Counter-stimulation
Bed rest	Transcutaneous electrical nerve stimulation
Corsets	Cold massage
Manipulation	Percutaneous radiofrequency facet denervation
Traction	Implanted neurostimulators
Massage	Acupuncture
Exercise	
Weight loss	
Local heat application	
Surgery	Other
Surgical fusion of the lumbar spine	Biofeedback
Lumbar spondylotomy – term covering operations for disc removal including laminectomy	Patient courses
	Behaviour therapy

workers (1978a, 1979) comparing the efficacy of mobilisation/manipulation with that of placebo physiotherapy. Among a group of patients with non-specific back pain under the care of their general practitioners,¹² the former was associated with short-term benefits that were not replicated in an outpatient-based sample. The authors attributed this negative finding to the loss of patients from the outpatient group whose recovery might have been hastened by mobilisation/manipulation (as appeared to be the case with the beneficiaries in the 'GP' sample) caused by the intervention of spontaneous healing during the waiting period preceding hospital appointment.¹³ Against a background of similar observations, Waddell (1982) has commented that 'frequently treatment simply takes the credit for natural history and the passage of time'.

Assessment of therapy is further confounded by the problem of accurately identifying diagnostic subgroups within the overall patient population for whom specific interventions are intended. In addition, the choice of relevant outcome measure is not straightforward because of the subjective nature of pain. And 'behavioural' indices, such as return to work, do not necessarily constitute a satisfactory alternative. The latter, for example, is determined by factors such as eligibility for sickness benefit and the nature of the tasks that have to be undertaken rather than pain levels alone.

The timing of therapeutic intervention may also have critical significance. Surgical intervention for low back pain and sciatica is not usually considered an appropriate option until several periods of conservative treatment have been followed without success. Yet a study by Thomas and colleagues (1983) has suggested that 'surgery should be undertaken sooner rather than later (preferably within a year) . . . because a good outcome is less likely with longer duration of symptoms . . .'. The question of timing is also of relevance with regard to the choice of an appropriate length of follow-up period. This point is illustrated by the randomised control studies undertaken by the Ullevål Hospital, Oslo, into the management of acute disc prolapse. Follow-up at one year indicated that surgically treated

11 Surgery is regarded as a strategy of last resort because of its failure rate and the hazards involved. Focusing on the former, Waddell (1982) has suggested that 10 to 15 per cent of operations are unsuccessful. With regard to the latter, laminectomy carries a risk of ill-effects – ranging from the mild to the catastrophic (paralysis) – which lies between one and two per cent. This estimate was reported during a case recently heard before the Law Lords in which it was ruled that doctors have a legal duty to inform patients of substantial risks involved in medical treatment (*The Times* 1985).

12 These patients had back pain sufficient for their general practitioners to request radiographs of the lumbar spine but not, at this stage at least, the opinion of a specialist.

13 In 1966 Dillane and colleagues reported that 44 per cent of individuals who consult a general practitioner for back pain recover within one week. Eighty-six per cent are better within one month and for 92 per cent the pain has disappeared within two months. The study found that eight per cent experience pain that persists for more than two months.

patients had a more favourable outcome than the group allocated to conservative therapy. After four years, however, the advantages of surgery were less clear and at 10 years little difference in efficacy was observed between the two treatment approaches (*Lancet* 1984).

Finally, accurate assessment of therapeutic efficacy requires that control is exercised over the intrusion of other factors which may undermine the validity of the findings of a particular trial. One such potentially distorting input stems from the increasing use that the public is making of treatments offered by non-orthodox medical practitioners. Alternative medicine has been described as one of the few growth industries in contemporary Britain (Smith 1983) and a recent survey by Moore and co-workers (1985) suggested that approximately one person in every two seeking help from this source does so because of pain. Focusing specifically on back pain, a study by Higham and her colleagues (1983) found that 39 per cent of a group of 64 patients receiving treatment in a hospital rheumatological clinic had consulted alternative practitioners – an osteopath in two out of every three of these cases. The study further revealed that 94 per cent of the sample population had employed at least one self-prescribed remedy whilst being treated by a rheumatologist (Table 8).

Increasing resort to alternative or complementary medicine by the public reflects the success (real or imagined) of the techniques and procedures employed in this field as well as a new degree of scepticism about the effectiveness of conventional medicine (Lewith and Kenyon 1983). In addition, doctors themselves have in some cases started to show a greater interest in alternative treatments: a survey of 86 general practitioner trainees found that 70 members of the sample wanted education in techniques such as acupuncture,

Table 8 Use of different types of self-prescribed remedy by 64 back pain patients attending a hospital rheumatological clinic

<i>Remedy</i>	<i>Percentage of patients trying at least one item</i>	
	<i>At any time</i>	<i>Whilst consulting rheumatologist</i>
Liniments	81	37
Herbs	44	23
Home remedies	72	55
Alternative practitioners	39	9
Analgesics	77	53
Heat treatments	88	77
Borrowed prescribed drugs	13	3
Total items	100	94

Source Higham *et al* 1983.

homoeopathy and manipulation and that 12 of the group had in fact referred patients for therapy to non-medical practitioners (Reilly 1983). Yet the subject remains controversial and engenders sharply divided attitudes within the medical profession. In part the polarisation of views is the product of a debate that has tended to be conducted at an inappropriately general level, thereby disregarding the existence of many different types of alternative therapy and their relative merits. In addition, concern has been expressed at the training and qualifications of some practitioners, although the recently launched Council for Complementary and Alternative Medicine aims to establish minimum standards in these and other areas and thereby assuage this particular source of disquiet (West and Inglis 1985). But perhaps the principal explanation for the continuing discord lies in the inadequate exposure of these treatments to objective scientific appraisal. Remedying this deficiency could therefore promote greater recognition for the techniques of alternative medicine but, given the seemingly special nature of 'the undoubted benefits that many patients gain from a treatment they believe in given by a caring therapist' (Smith 1983), this solution may necessitate the development of valid new approaches to evaluation rather than the straightforward application of those methodologies currently available.

Conclusion

Back pain is not a clearly identifiable disease entity. Instead it is a symptom arising 'with distinct manifestations in various locations from diverse causes in dissimilar individuals in different situations' (Wood 1980). Therapeutic intervention is also problematic: uncertainty surrounds both the choice of appropriate treatment and its efficacy.

Imprecision in these respects undoubtedly boosts the financial burden attributable to back pain borne annually by the NHS – estimated at £156 million, more than two-fifths of which derives from hospital inpatient cases costing, on average, £940 each (1982 data). The magnitude of these 'unnecessary' costs is, of course, unknown because information of the type that would permit their calculation does not exist. Nevertheless their avoidance, thereby liberating resources which could be used, *inter alia*, to expedite access to medical attention for new back pain patients or to extend care facilities in other parts of the health sector, is clearly a desirable goal.

Ideally, this objective might be pursued through strategies aimed at prevention. Yet in industry, where back pain is a major cause of absenteeism, success with this approach has to date been inconspicuous. Indeed, the number of certified days of incapacity attributable to dorsopathies in Britain increased by 23 per cent over the three years to 1982–83. Nevertheless, encouragement may be

drawn from the stimulus to research being provided by the Society of Occupational Medicine and from specific projects such as those of Stubbs (1984) and Otun and co-workers (1984) in which sophisticated measurement techniques are being employed to generate the information needed to effect a reduction in the risks inherent in many tasks and working environments. Outside the occupational setting, it has been argued that inappropriate posture and poor bending and lifting techniques coupled with badly designed chairs, car seats and household fittings such as kitchen work-tops may lay the foundations for the future development of back pain (Million 1983). Consequently research might also valuably be targeted at the means of creating greater awareness of the threats that individuals in certain aspects of their daily lives and shortcomings in design in the home and elsewhere pose to the back.

In the immediate future the key to lowering the cost of back pain or, perhaps more accurately, promoting greater efficiency in the use of available resources, would appear to lie with initiatives aimed at enhancing diagnostic accuracy, extending therapeutic evaluation and developing improved means of intervention. In each of these areas current endeavours offer signs of promise. Thus diagnostic precision is being advanced by continued innovation in imaging techniques, the more recent fruits of which have included the epidurogram, epidural venogram, Computed Axial Tomography and magnetic resonance imaging (Willis 1983), and by empirical studies such as those of Waddell and his colleagues (1982) directed at raising the quality of clinical information gained via patient interview and examination.

Focusing on therapeutic evaluation, encouragement may be drawn from the growth of a keen awareness of the importance of health status assessment and from the efforts being channelled into the development of appropriate measurement techniques (Health Economics Bulletin 1984). In the specific context of back pain, Roland and Morris (1983) have developed a 'short, simple, sensitive and reliable' questionnaire for gauging self-rated disability and this might find useful application in appraising therapeutic intervention. In addition, the Medical Research Council's feasibility study for a trial to compare outpatient hospital management with chiropractic treatment of back pain of 'mechanical' origin could generate valuable insights into the precepts of legitimate therapeutic evaluation.¹⁴

With regard to progress in therapy, two developments reported during 1984 were indicative of the potential benefits of sustained

14 It would of course be naive to imply that better quality assessment of therapy is the sole determinant of enhanced patient care. It is axiomatic that the benefits of new knowledge can only be realised if appropriate modifications are made to clinical practice. In this respect it is therefore a matter of concern that the 18 scientifically acceptable studies identified by the DHSS report on back pain appeared to the document's authors to have exerted very little influence on established therapeutics.

research programmes. The first concerned the technique of discolysis in which chymopapain (a papaya-derived enzyme) is injected into an acute prolapsed disc causing shrinkage and thus relief of painful pressure in the nerve root. Although regarded by some commentators as controversial, the procedure appears to offer, in appropriate cases, a significantly quicker, cheaper and less traumatic alternative to conventional surgical intervention.

The other development was the finding by Jayson and his colleagues (1984) of evidence of impaired fibrinolysis in a sample of patients with severe chronic back pain. It is hypothesised that the defect 'could be associated with fibrin deposition and scar formation and be responsible for the development and/or perpetuation of chronic inflammation and scarring at sites of damage in the spine'. This research is still at an early stage but it raises the possibility that fibrinolysis-enhancing agents could emerge as a new source of relief for back pain sufferers.

Research in the areas outlined above is paving the way for improvements in the management of back pain. The latter should also benefit from the continuing investigation of pain in general and especially from better understanding of the endorphins, the powerful pain-blocking chemicals that occur naturally in the brain and spinal cord. Further gains might accrue if success can be achieved in bringing together the many different health professionals who have responsibility for the care of back pain patients in order to promote a more multidisciplinary approach to the investigation of the problem (O'Brien 1984). Wide-ranging research – embracing prevention, epidemiology, aetiology and therapy – is therefore of critical importance and its support by the Medical Research Council, by charitable organisations such as the Back Pain Association and the Arthritis and Rheumatism Council, and by the pharmaceutical industry must be sustained if back pain is to be more effectively and efficiently managed in the future.

References

- Anderson J A D (1980). *Clinics in Rheumatic Diseases*, 6, 17–35.
- Asherson R (1984). *MIMS Magazine*, June 1 issue.
- Auchincloss S (1983). *The Painful Back*, practical aspects of management. MEDICINE Publishing Foundation, Oxford.
- Badley E M, Bury M R and Wood P H N (1981). Arthritis and Rheumatism. In: *Going Home*, a guide for helping the patient on leaving hospital, Ed Simpson J E P and Levitt R. Churchill Livingstone.
- British Medical Journal* (1979). Back pain – what can we offer? 1, 706.
- Buckle P W (1984). 'Ergonomic needs in epidemiological studies of low back pain'. In: *Occupational aspects of back disorders*, Ed. Brothwood J. Society of Occupational Medicine.
- Davis P R (1984). 'Existing statistics of back disorder: a critique'. In: *Occupational aspects of back disorders*, Ed. Brothwood J. Society of Occupational Medicine.
- Department of Health and Social Security (1979). *Report of the Working Group on Back Pain*. HMSO.
- Deyo R A (1983). *JAMA*, 250, 1057–62.
- Dillane J B, Fry J and Kalton E (1966). *British Medical Journal*, 2, 82.
- Dixon A St J (1980). 'Diagnosis of low back pain – sorting the complainers'. In: *The Lumbar Spine and Back Pain*, Ed. Jayson M I V. Second Edition. Pitman Medical.
- Dunnell K and Cartwright A (1972). *Medicine Takers, Prescribers and Hoarders*. Routledge and Kegan Paul, London.
- Edgar M A (1984). *Br J Hosp Med*, 32, 6, 290–301.
- Euromonitor (1983). *The Health Report*. Euromonitor Publications Ltd, London.
- Glass J B (1979) *The Practitioner*, 222, 821–25.
- Harris A I (1971). *Handicapped and Impaired in Great Britain*. Part 1. OPCS Social Survey Division, HMSO.
- Health Economics Bulletin* (1984). 'Health Status Measurement'. Issue No 3 (September). HERU, Aberdeen University.
- Higham C, Ashcroft C and Jayson M I V (1983). *The Practitioner*, 227, 1201–05.
- Ingham J G and Miller P McC (1979). *J Epid Comm Hlth*, 33, 191–98.
- Jayson M I V (1984). *British Medical Journal*, 1, 740–41.
- Jayson M I V, Keegan A, Million R and Tomlinson I (1984). *Lancet*, 2, 1186–87.
- Lancet* (1981). Progress in Back Pain? 1, 977–79.
- Lancet* (1983). The sacro-iliac joint and backache, 2, 1468–69.
- Lancet* (1984). Management of the acute back, 2, 1020–21.

- Lewith G and Kenyon J (1983). *British Medical Journal*, 2, 494.
- MacDonald E B (1984). 'Back pain, the risk factors and its prediction in work people'. In: Occupational aspects of back disorders, Ed. Brothwood J. Society of Occupational Medicine.
- Million R (1983). 'The General Practitioner View of Back Pain – the Devil's Advocacy'. In: Low Back Pain and industrial and social disablement. Proceedings of a symposium organised by the Back Pain Association.
- Moore J, Phipps K, Marcer D and Lewith G (1985). *British Medical Journal*, 1, 28–29.
- Morrell D C and Wale C J (1976). *J Roy Coll Gen Practit*, 26, 398–403.
- Nelson M A (1980). 'Surgery of the spine'. In: The Lumbar Spine and Back Pain. Ed. Jayson M I V. Second Edition. Pitman Medical.
- O'Brien J (1984). 'An overview of low back pain'. In: *TalkBack* (the magazine of the Back Pain Association), 10, 6–7.
- O'Brien J (1984a). *MIMS Magazine*, June 1 issue.
- Otun E O, Anderson J A D, Heinrich I and O'Hare H (1984) 'Back pain: aspects of measurement'. In: Occupational aspects of back disorders, Ed. Brothwood J. Society of Occupational Medicine.
- Partridge R E H and Knox J D E (1969). *J Roy Coll Gen Practit*, 17, 144–54.
- Patten J (1985). Statement during an interview on the Radio 4 *Today* programme on 19 March.
- Pullar T, Capell H A, Millar A and Brooks R G (1982). *British Medical Journal*, 2, 1629–31.
- Reilly D T (1983). *British Medical Journal*, 2, 337–39.
- Roland M (1983). 'Back Pain . . . an unsolved problem'. In: *TalkBack* (the magazine of the Back Pain Association), 9, 4,4.
- Roland M O and Morris R W (1983). *Spine*, 8, 2, 141–44.
- Royal College of General Practitioners (1979). Morbidity Statistics from General Practice 1971–72, second national study. Studies on Medical and Population Subjects No 36. HMSO.
- Scambler A, Scambler G and Craig D (1981). *J Roy Coll Gen Practit*, 31, 746–50.
- Simpson G (1984). 'Ergonomic problems and solutions'. In: Occupational aspects of back disorders, Ed. Brothwood J. Society of Occupational Medicine.
- Sims-Williams H, Jayson M I V, and Baddeley H (1978). *Ann Rheumat Dis*, 37, 262–65.
- Sims-Williams H, Jayson M I V, Young S M S, Baddeley H and Collins E (1978a). *British Medical Journal*, 2, 1338–40.
- Sims-Williams H, Jayson M I V, Young S M S, Baddeley H and Collins E (1979). *British Medical Journal*, 2, 1318–20.
- Smith T (1983). *British Medical Journal*, 2, 307.

- Stubbs D A (1984). 'Back pain: methodology of field measurements and case study application'. In: Occupational aspects of back disorders, Ed. Brothwood J. Society of Occupational Medicine.
- Stubbs D A and Nicholson A S (1979). *J Occ Accidents*, 179-90.
- Stubbs D A, Buckle P W, Hudson M P and Rivers P M (1983). *Ergonomics*, 26 767-79.
- The Times* (1985). Law Report. February 22 issue.
- Thomas M, Grant N, Marshall J and Stevens J (1983). *Lancet*, 2, 1437-39).
- Timmins N (1985). Hospital waiting lists 'artificially high'. *The Times*, 14 May.
- Waddell G (1982). *Br J Hosp Med*, 28, 3, 187-219.
- Waddell G, Main C J, Morris E W, Venner R M, Rae P S, Sharmy S H and Galloway H (1982). *British Medical Journal*, 1, 1519-23.
- Waddell G, Bircher M, Finlayson D and Main C J (1984). *British Medical Journal*, 2, 739-41.
- West R and Inglis B (1985). 'Taking the alternative road to health'. *The Times*, 13 March.
- Willis J (1983). 'Back Pain: Ubiquitous, Controversial'. *FDA Consumer*, November issue.
- Wood P H N (1980). 'Understanding back pain'. In: The Lumbar Spine and Back Pain, Ed. Jayson M I V. Second Edition. Pitman Medical.
- Wood P H N (1983). 'Towards an appreciation of the social impact of back pain'. In Low Back Pain and industrial and social disablement. Proceedings of a symposium organised by the Back Pain Association.
- Wood P H N and Badley E M (1980). 'Epidemiology of back pain'. In: The Lumbar Spine and Back Pain, Ed. Jayson M I V. Second Edition. Pitman Medical.