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腰椎外科学
THE LUMBAR SPINE

（第3版）

国际腰椎学会（ISSLS）专业标准读物

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Basic Science

CHAPTER 1

Epidemiology and the Economics of Low Back Pain

Alf Nachemson

Epidemiology is critical to understanding the scope of a problem and gives information about its magnitude and the demand on medical and social resources. It is extremely important in our industrialized societies and gives information on the natural history, important for patient counseling about prognosis. It can also identify risk factors, both individual and external, which is beyond the scope of this chapter. It is also of importance to demonstrate both the societal burden of the ailment and its severe consequences for the individual quality of life (1).

Most studies in the literature talk about *prevalence* which is the percentage of people in a known population who have the symptom during a specified period. Point prevalence is the percentage who has pain on the day of the interview. One-month or one-year prevalence is the percentage who has pain at sometime within the past month or the past year. Lifetime prevalence is the percentage who can remember pain at sometime in their life. *Incidence* is the percentage of people in a known population who develop new symptoms during a specified period of time. It is commonly applied to those who report injuries or present for health care within a specified period.

Most recent surveys define low back pain as pain occurring between the costal margins and the gluteal folds. Some surveys use a diagram to show pain areas.

Back pain has often been defined differently. Epidemiologic rates for "back symptoms," "back disability," or "health care for back pain" respectively can all differ dependent of study sample.

Another major limitation of defining back pain is that surveys depend entirely on individual's own report of pain and disability, which is open to subjective bias, particularly when one is reporting from a disliked working environment. There may be recall bias: the longer ago the time of back pain is asked about, the more unreliable the answer. People with more severe trouble may be more likely to include earlier information within the period of the question (2–4) and present pain when questioned increases recall of earlier periods (5). Official statistics may overcome this problem to provide more accurate data about work loss, health care use, sickness verification and benefits, but these usually give lower rates for each of these than self-reports from population surveys (6). For example, a Danish study showed that only 25% of those reporting lower back pain in the past month ever visited a health care practitioner and less than 5% received sickness benefits; i.e., collecting unemployment (7).

There may also be sampling bias. Many surveys study selected group(s) of workers or patients, who may not be representative of the general population.

Raspe (8), Shekelle (9), and Andersson (2) reviewed altogether several hundred epidemiologic studies of low back pain from North America, Great Britain and Europe, in particular the Scandinavian countries. Because many of the surveys do not ask comparable questions, they give different results. Thus, the definition of morbidity chosen for the survey is of importance for the resulting frequency of pain.

The best available evidence on the epidemiology of low back pain is from large, representative, population surveys (2,10–19). Most recent surveys have used similar wording for their questions, and many have asked about pain lasting more than 24 hours, to exclude minor or passing symptoms.

Many international surveys of low back pain report a point prevalence of 15% to 30%, a 1-month prevalence between 19% and 43%, and a lifetime prevalence of about 60% to 80%. The exact figures in different studies appear to depend mainly on the wording of the question rather than any difference in the people studied (Table 1-1). What is clear, however, are the similarities of prevalence at any age, from 10 to 90 years of age.

TABLE 1-1. *One-month back pain prevalence at different ages and in different countries*

Age (yr)	Country	Yes (%)[a]
10–15	Sweden	40
12–15	France	50
15–18	Switzerland, Finland	32
25–35	Sweden, Denmark, Great Britain	35
40–50	Great Britain, Germany, Sweden, Finland, Tibet	40
40–60	Austria	68
55–65	Great Britain, Holland	30
70–85	Sweden	45
85+	Sweden	40

[a]Percentage of individuals who responded "yes" to the question, "Have you had any low back pain in the last month?"

The Nuprin Pain Report (17) found that 56% of American adults said they had at least one day of back pain in the last year. Fourteen percent had pain for more than 30 days in the year. Back pain was the second most common pain after headache. Most back pain was mild and short-lived and had very little effect on daily life, but recurrences were common. The most recent larger population study from Canada reported 8% with significant back pain in a 6-month period (20).

Von Korff et al. (18) found that 41% of American adults between the ages of 26 and 44 years had back pain in the last 6 months. Most people had occasional short attacks of pain, but they reported that they had had these attacks over a long period. Their pain was usually mild or moderate and did not limit their activities.

Some British surveys give comparable figures; Mason (21) found point prevalence around 15%, 1-month prevalence of 40%, and lifetime prevalence of 60%. Walsh et al. (19), Mason (21), and Papageorgiou et al. (13) found an almost identical lifetime prevalence of 60%, the same as reported in Belgium (16). In Tibet rural population the point prevalence was 34% and 12-month prevalence was 42% (22).

Population surveys suggest that the age of onset of back pain is spread fairly evenly from the teens to the early 40s. It is uncommon to develop nonspecific low back pain for the first time after the mid-50s. However, several recent studies of children show a higher prevalence of back pain than previously realized (Table 1-1). Brattberg (23,24) carried out a longitudinal study of 471 schoolchildren aged 10, 13, and 15 years in the county of Gävleborg in Sweden. In each year's survey, about 26% of children said they had back pain, but only 9% of the children reported back pain in both surveys in 1989 and 1991. Burton et al. (25) prospectively studied 216 adolescents from 11 through 15 years of age. Only 12% of 11-year-olds said they had ever had back pain, but by age 15 this number rose to 50%. The back pain these children describe was usually recurrent but did not deteriorate with time. Adolescents appear to have about the same prevalence of back pain as adults, but it is rarely disabling and few seek health care. Burton et al. (25) suggest that most adolescent back trouble should be considered a normal life experience and should not have undue significance attached to it. There is no evidence on whether it predicts low back trouble in adult life. The study by Hellsing (26) of 19-year-old conscripts suggests the same finding when they were followed up to 10 years later.

The General Survey on Living Conditions in Sweden (27) found that neck and back problems are among the most common causes of "chronic sickness." About 3% to 5 % of the population between the ages of 16 and 44 years and 11% to 12% of those between the ages of 45 and 64 years report back problems as a "chronic sickness". For those between the ages of 65 and 84 years the frequency of back pain is somewhat reduced or 9% to 11%, although Brattberg (28,29) reported a higher prevalence of 45%. Back trouble is the most common cause of chronic sickness in both men and women under age 64 and the second most common cause of sickness for those between the ages of 65 and 74. Only circulatory system problems are more common among those in the 65+ age group. There is a slight increase over time of back pain in the general population according to the General Survey on Living Conditions (27). As an average for the population between 16 and 84 years (men and women), 6.5% reported back pain symptoms in 1985 compared to 8.0% in 1994. Linton et al. (30), in a study covering subjects living in the middle part of Sweden, but limited to subjects 35 to 45 years of age, found even higher prevalence figures, although these were probably dependent on how the questions were asked.

Other Scandinavian studies (3,31–33) have all described point prevalence of around 30%, 1-year prevalence of around 50%, and lifetime prevalence up to 80% or more.

The traditional clinical classification of back pain is acute, recurrent, and chronic, but recent epidemiologic studies show that back pain is usually a recurrent, intermittent, and episodic problem. Croft et al. (12,34) suggest that the most important epidemiologic concept, and also an important clinical concept, is the pattern of back pain over long periods of the individual's life, and that the experience of back pain may be better expressed as the total days of pain over 1 year. Von Korff et al. (18) also described this recurrent trait in back symptoms in the United States, as have others (35,36).

WORK LOSS DUE TO BACK PAIN

It is difficult to get accurate information on the amount of work loss attributed to back pain. In many countries, including Sweden since 1991, the first 2 weeks of sick pay are paid by employers who hold the data individually and do not return any statistics to any central authority.

Social security data contain claims and benefits paid, which depend on entitlement. The recent monograph by Waddell et al. (37) goes to unsurpassed length to describe this. The back pain absenteeism from no less than 13 countries was compared, demonstrating differences as well as similarities. There is little, if any evidence to suggest any physical basis to the overall level of reported back pain or disability in any of the examined industrialized societies. Instead, cultural, societal, and economic factors seem to play a more important role. According to the Waddell report, "There is now extensive evidence that psychosocial factors are more important than any physical changes in the back for development and maintenance of chronic pain and disability" (37).

In the 1970s, Valkenburg and Haanen (38) conducted a study in Zoetermeer, Netherlands of 6,500 men and women 20 years of age and older and provided data as seen in Table 1-2. These authors performed a physical and X-ray examination that demonstrated increasing "degenerative" changes with age that were not directly related to disability. Many others have since supported these findings.

Andersson (2) found that back problems were the most common cause of activity limitation in adults under age 45 and the fourth most common in those between the ages of 45 to 64. Seven percent of adults reported a disability due to their back or due to both their back and other joint problems that limited their activities for an average of about 23 days each year. These figures suggest that 7% to 14% of U.S. adults have some disability due to back pain for a least 1 day each year, and just over 1% of Americans are permanently disabled by back pain and another 1% are temporarily disabled by back pain at any one time. These figures have been confirmed by Murphy and Volinn (39), with little observable change over the years studied.

Walsh et al. (19) conducted a population survey using clinical measures of low back disability based on eight activities of daily living. The 1-year prevalence of a disability score of 50% or more was 5.4% for men and 4.5% for women, while the lifetime prevalence was 16% and 13%, respectively. The 1-year prevalence of time off work because of back pain was 11% for men and 7% for women, while the lifetime prevalence was 34% and 23%, respectively.

TABLE 1-2. *Low back complaints and work disability in the Dutch city of Zoetermeer (38) in the 1970s*

	Men (%)	Relative (%)	Women (%)	Relative (%)
Point-prevalence	22.2		30.2	
Lifetime incidence	51.4		57.8	
>3 months	14.3	28	19.6	34
Unfit for work	24.3	47	19.5	34
Work change	4.2	8	2.4	4

The South Manchester Study (14) found that 8% of adults said they had bed rest for back pain at some time in the past 12 months. However, these figures are again self-reports about what people said they did about back pain, not the treatment they received.

The Clinical Standards Advisory Group (40) estimated that work loss due to back pain in the United Kingdom in 1993 was about 52 million days, while 106 million days' sickness and invalidity benefits were paid for back pain. However, there was only overlap of 7 million days between these two groups. Most of the workers who lost short periods of work were paid by their employers, did not receive any state sickness benefits, and did not appear in the official statistics, while most of the benefits went to people who were not employed (41).

Guo et al. (42) provide the best estimate of work loss due to back pain in the United States, using data on 30,074 workers from the National Health Interview Survey. In 1988, about 22.4 million people, or 17.6% of all U.S. workers, lost an estimated 149 million days of work due to back pain. This can be compared to the very recent figures in Sweden that claim the world record of sickness absence in recent years. Short-term sickness of less than 1 year was registered for a total of 380,000 workers in a population of 4.4 million of working age; and 480,000 subjects were sick more than 1 year or permanently disabled in 2001 (43,44). According to Murphy and Volinn (39), the prevalence of back illness has not changed much in the U.S. since those 1988 rates. Comparison can be made to recent Swedish rates provided in the following paragraphs.

In most studies, about half the total days missed from work due to back pain are accounted for by the 85% of people who are off work for short periods, with a median of less than 7 days (45). The other half is accounted for by the 15% of people who are off work for more than 1 month. This is reflected in the total social costs of back pain. It is widely quoted that 80% to 90% of the health care costs of back pain are for the 10% of patients with chronic low back pain and disability (2,46–48). Watson et al. (49) showed that the same is true for the social costs. In 1994, back pain in the island of Jersey accounted for 11% of all sickness absence. Only 3% of those off work with back pain were off for more than 6 months, but they accounted for 33% of the benefits paid.

WORK LOSS DUE TO BACK PAIN IN SWEDEN

The city of Gothenburg, with its 450,000 inhabitants, has been a source of much Swedish epidemiologic data through the late 1990s (2,45,47,50–54).

In the studies just mentioned from the 1970s, Svensson and Andersson (50–52) indicated that between 2% and 6% of all people reporting illness in Gothenburg suffered work loss due to back pain. An interesting fact was that one-fourth of the men who said they never had had back pain actually had been off work 1 day or more with that diag-

nosis when insurance data were checked. This illustrates the difficulty in relying on memory in questionnaire surveys. Sweden's workforce of approximately 4.4 million people between the ages of 18 and 65 years of age lost approximately 58 workdays per year on an average due to sickness in 2001. As a comparison, it can be calculated that the annual amount of working days lost among the 125 million people of similar age in the U.S. amounts to 150 million per year (42). In Sweden with 4.4 million people of working age the same work loss due to low back pain was 50 million days (i.e., approximately 8 times higher).

There was a reduction in number of subjects on overall sick leave from 1993 to 1997 after which time sick-listing again increased considerably (55) (Fig. 1-1). In addition there has been a steep increase in new permanent disability claims granted, from 45,000 in 1997 to 70,000 in 2002; 20% of which are due to back pain (43,44,54) (Table 1-3). The total number of days lost because of back disability in Sweden, including both short-term absenteeism and those on permanent disability exceeded 50 million in 2002 (43,44,55). This figure may be somewhat uncertain because the exact diagnosis is not always clear; it is known, however, that 49% of all sick subjects for more than 1 year have a musculoskeletal disorder, and

TABLE 1-3. *New disability pensions granted in Sweden (1996–2002)*

Year	Total no.	No. for back pain
1996	39.245	8.464
1997	41.198	8.673
1998	34.487	5.951
1999	39.506	6.735
2000	49.237	8.458
2001	57.081	10.014
2002 (approx.)	63.000	13.000

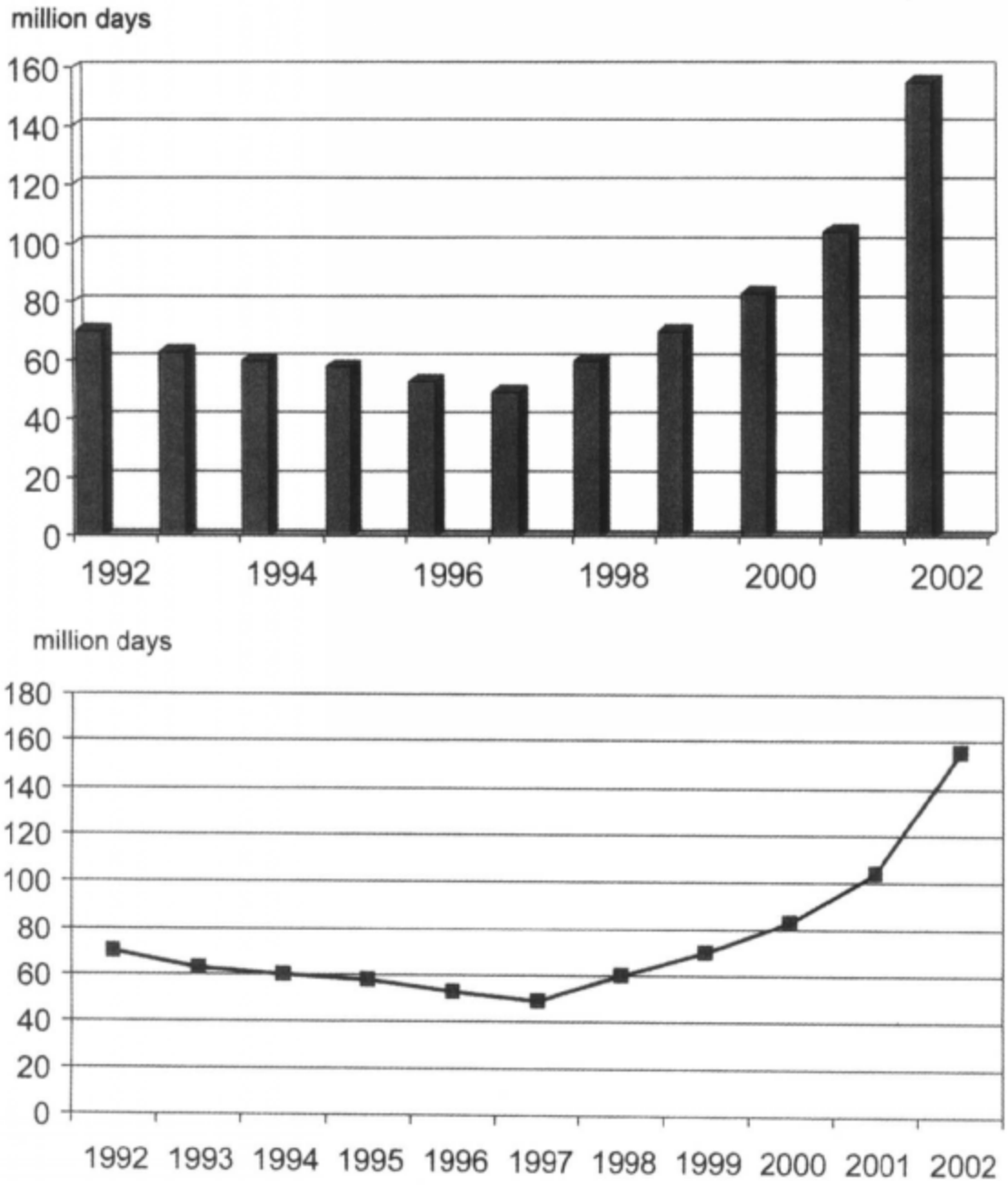

FIG. 1-1. Total number of sick days paid 1992 to 2002 in Sweden (excluding the first 14 days covered by employer), approximately 30% due to low back pain (43–45,54).

70% of this percentage according to the Gothenburg studies (45,54) is back pain, while 25% of permanent disability pensions are granted for back problems.

SCIATICA

Few surveys use strict criteria for "sciatica." Several reports give a lifetime prevalence of 14% to 40% for leg pain associated with back problems but they do not distinguish true radicular pain from the more common referred leg pain. Deyo and Tsui-Wu (56) estimated the lifetime prevalence of "surgically important disc herniation" to be about 2%. Lawrence (57) reported a prevalence of "sciatica suggesting a herniated lumbar disc" in 3.1% of men and 1.3% of women. Neither of these studies gave diagnostic criteria. Heliovaara et al. (58) in Finland reported the only large population survey with clinical criteria of radicular pain. That study had a lifetime prevalence of back pain of 77% in men and 74% in women, while the lifetime prevalence of any associated leg pain was 35% in men and 45% in women. Applying strict diagnostic criteria for radicular pain, however, the lifetime prevalence of actual "sciatica" was only 5% in men and 4% in women, also later confirmed (59). Svensson and Andersson (50–52) performed cross-sectional studies of two groups of subjects, one consisting of 940 men between the ages 40 and 46 years and 1,760 women between the ages of 38 and 64 years. They found prevalence rates for all back pain between 60% and 70% with a 1-month prevalence of 35%. Sciatica (or any leg pain) was described by around 30%. This is, however, a different symptom than true radiculopathy. In Belgium, such symptoms necessitating surgery amounted to a yearly incidence of 1 per 1,000 population (60).

WORK-RELATED BACK INJURIES

Back injuries make up almost one-third of all work-related injuries in the U.S., where there are now about 1 million worker compensation claims for back injuries per annum; the percentage in Sweden, with its general insurance system, is considerably less (5% to 6%) and actually not increasing (54). In Sweden, a steep decline by 80% was noted in 1995/1996 when the rules were changed and back pain was no longer regarded as clearly work-related (47,54).

In the U.K. in 1990/1991, the Health and Safety Executive recorded 34,720 nonfatal back injuries causing at least 3 days off work, which accounted for approximately 23% of all work-related injuries (61,62). Most back injuries were less serious "sprains or strains," but these minor back injuries led to longer time off work and to higher health and compensation costs than any other minor injuries. The issues of work-relatedness are dealt with in several recent reviews including those by the U.S. National Research Council (63) and the Sweden Institute for Working Life (64) as well as large prospective cohort studies (65). There is an association between reported low back pain and low back pain disability with certain taxing work postures, but there is an equally strong association between low back pain disability and psychosocial factors, especially those related to the workplace (37,66,67). The socioeconomic burden of back pain was recently very thoroughly described in a monograph by Waddell et al. (37). The authors describe how the whole problem of disabling low back pain must be looked upon from a wider psychological, social, and political perspective. When the different trends in low back pain disability are related to the ease of getting benefits, as well as the cultural views in different countries, the different percentages of wage replacements of sickness and permanent disability, and subsequently the absence rates are better understood. How a person is looked upon and accepted in society when declaring they are not fit for work is obviously also a factor.

IS BACK PAIN INCREASING?

An historical review by Allan and Waddell (68) concluded that human beings have had back pain all through history, and it is no more common or severe today than it has always been. Epidemiologic studies show no evidence of any convincing change in the prevalence of back pain. Leboeuf-Yde and Lauritsen (69) found no definite trend in 26 Nordic studies from 1954 through 1992, and apparent differences are probably mainly due to the wording of the questions. Leino et al. (66) in Finland found that the prevalence of back pain remained unchanged from 1978 to 1992 in annual surveys that have used identical questions each year. Murphy and Volinn (39) analyzed U.S. National Health Interview Survey data and found a 22% increase in chronic low back pain (continuous for more that 3 months) and a 35% increase in activity limitation due to back pain between 1987 and 1994, but a reduction thereafter.

Similarly, there is no clear evidence of any increase in the number of work-related back injuries. Data from the U.K. (11,40,62) show no definite trend. Data from the U.S. are conflicting (39,69). The National Council on Compensation Insurance (70) reported a gradual rise in the proportion of worker compensation claims due to back injuries from 1981 to 1990. However, Murphy and Volinn (39), also using data from the Washington State Department of Labor and Industries and a large worker compensation provider covering approximately 10% of the privately insured labor force, estimated that the annual low back pain claim rate actually decreased by 30% between 1987 and 1995. In Norway and the Netherlands, however, low back disability is increasing at a rate similar to Sweden (37,43,44).

Swedish data detailed until 1991 in the The Swedish State Health Technology Board (SBU) report (45) showed