

The economic cost of low back pain in Sweden in 2001

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Background Low back pain (LBP) is a common cause of lost work days and disability. In 2001, expenditure for back pain represented 11% of the total costs for short-term sick leave in Sweden, and about 13% of all early retirement pensions were granted for back problems, of which LBP is the most important symptom. The magnitude of LBP as a health problem justifies a closer look at its burden of illness to society.

Materials and methods We assessed the costs of LBP to society in Sweden in 2001. The study was conducted in a cost-of-illness framework, measuring both the direct costs of providing health care to LBP patients, and the indirect costs as the value of the production that is lost because people are too ill to work. The costs were estimated by a prevalence and top-down approach.

Results The total cost of LBP was 1 860 million EUR in Sweden in 2001. The indirect costs due to lost productivity accounted for 84% of the total cost.

Interpretation The cost of illness due to low back pain was substantial, but does not appear to have risen during the last 10–15 years.

In 2001, expenditure for back pain represented 11% of the total costs for short-term sick leave in Sweden. About 13% of all early retirement pensions granted were related to back problems, of which low back pain is the most important group (RFV 2002a, b). Since low back pain is common and difficult to treat effectively, it is a condition that leads to long-term absence and, consequently, a high economic burden to society (Maetzel and

Li 2002). About 15–30% of the population suffers from low back pain at any given point in time (point prevalence). The one-month prevalence is 19–43%, and the lifetime prevalence is 60–70% (SBU 2000).

Low back pain prevents normal activity and affects the capacity to work. For society, it means lost work days; for the individual, it means both lower income and a reduced quality of life as a result of pain and immobility. The health-related quality of life in patients with low back pain in Sweden is lower than for patients with conditions such as diabetes, angina pectoris, asthma, and even neck and shoulder pain (Burström et al. 2001). Most cases of low back pain are not severe and disappear within a few days to a few weeks, but for some the problems may become recurrent or chronic. Back pain is the most common chronic disease for those under 65 years of age (Waddell 1996, Andersson 1999). In Sweden, there are no national statistics on reduced work capacity as a result of low back pain, but some local epidemiological studies have been performed in Göteborg (SBU 2000). In this study, we estimated the total cost of low back pain in Sweden in 2001.

Methods

Cost-of-illness methodology

This study was performed according to traditional cost-of-illness methodology (for surveys, see Henriksson 2001, or Hodgson and Meiners 1982). We

used the top-down approach to cost estimation, which means that the total national costs for illnesses were partitioned between different diseases according to the frequencies of different diagnoses. In the bottom-up approach, which can be used either as an alternative or as a complement, data are collected directly from a sample of patients during or after medical visits, and then the figures from the sample are extrapolated to represent the whole population by using national prevalence figures.

The advantages of using the top-down approach are that no extrapolation is needed, and that it avoids the risk of double counting. The disadvantages compared to the bottom-up approach are that diagnoses may be underreported or misreported, and that important cost items are missing from the national illness registers. For example, costs for social services or unpaid home help are unaccounted for if a pure top-down approach is used. The value of household production lost as a consequence of disease is also missing from a top-down approach to cost-of-illness studies.

Costs

We chose a societal perspective, which implies that all costs—whether incurred by individuals, employers, or the government—are taken into account. On the cost side, both direct costs for medical visits, hospitalization and pharmaceuticals, and indirect costs for sick leave and early retirement were considered. Direct costs are costs for goods and services used in the prevention, diagnosis and treatment of the disease in question, as well as rehabilitation and other medical consequences of the disease. Private costs incurred by the patient and family and other public resources (e.g. transportation) are also included under this heading. Indirect costs are defined as the value of the output that is lost because people are impaired from working or too ill to work (Luce and Elixhauser 1990). Typical cost items in this category are costs for short-term absence from work, early retirement pensions caused by disability, and premature death.

The approach of evaluating life as the value of lost production is known as the human capital approach. This method is based on the assumption in neoclassic economic theory that, in a situation with full employment, the wage rate of an employee is equal to the marginal revenue that the employer gener-

ates by hiring him or her. For example, the loss of productivity associated with disability is evaluated using gross earnings lost or some proportion of the gross earnings if an individual is unable to work to his/her full capacity (Hodgson and Meiners 1982, Luce and Elixhauser 1990). Some favor the term productivity costs instead of indirect costs (Gold et al. 1996), but not even that term is ideal. The costs of lost productivity would perhaps be the most fitting description (Brouwer et al. 1997). In this study we will use the traditional term indirect costs, since it is still the most common terminology.

It has been argued that the human capital approach of measuring indirect cost overestimates the production loss from absence due to sickness, from disability, and from premature mortality (Koopmanschap et al. 1995). If an employer can replace a worker who is on long-term leave with someone who is currently unemployed, then the only period during which costs for lost productivity may occur is the friction period, i.e. the period between beginning of absenteeism and replacement. The friction cost method has been proposed as an alternative to the traditional human capital approach, since the latter does not take account of slacks in the economy such as unemployment (Koopmanschap and van Ineveld 1992, Koopmanschap et al. 1995). However, in the absence of empirical data on the length of the friction period in Sweden, and the extent to which employees on long-term sick leave are actually replaced by unemployed people, we have only used the traditional human capital method of estimating the indirect costs in this study.

Some would argue that intangible costs, which include pain, psychosocial suffering, and changes in social functioning and activities of daily living caused by the disease, should also be included in an estimate of the cost of illness. However, pain and psychosocial suffering would turn up on the benefit side rather than the cost side in a cost-benefit analysis, i.e. we are dealing here with health effects rather than costs (Koopmanschap et al. 1995). Although it is possible to assign a monetary value to health effects, we have not included any estimate of the intangible costs in the Results section, but we return to the issue of intangible costs in the Discussion.

Table 1. Inpatient discharges, bed-days, and costs for low back pain by hospital department

Department	Discharges	Bed-days	Per-diem cost (EUR)	Total cost (million EUR)	Share of the costs (%)
Orthopedic	8 797	48 218	475	22.9	69%
Surgery	1 240	5 505	422	2.3	7%
Internal medicine	862	4 523	413	1.9	6%
Geriatric	571	8 149	288	2.3	7%
Neurology	272	1 478	431	0.6	2%
Rehabilitation	58	1 705	464	0.8	2%
Other	830	5 113	413	2.1	6%
All	12 630	74 691	442	33.0	100%

Prevalence and incidence

Cost-of-illness studies can be performed by using either prevalence- or incidence-based methods (Hodgson and Meiners 1982). Prevalence-based studies examine costs incurred during a given time period, usually 1 year, regardless of the date of the onset of disease. Incidence-based studies examine costs for cases of the disease that have developed for the first time in that year. Future costs and production losses are then estimated for the entire lifetime of these patients, and calculated in terms of present values. Since incidence-based studies can be used to calculate the economic benefits of reducing the number of new cases, they are suitable for evaluation of preventive measures (Henriksson 2001). For a long-term disease with a changing pattern of incidence, an incidence-based cost-of-illness estimate may bear little relation to the current annual costs for the disease, which makes it difficult to compare these costs with the total annual healthcare expenditure. The prevalence approach is therefore preferable for comparisons of the annual costs for a disease with the total annual costs for other, or all, diseases. In this study, the prevalence approach was chosen since the goal of the study was to put the cost of illness of low back pain into a larger perspective rather than to evaluate any specific preventive measures.

Results

Hospital inpatient care

Data regarding inpatient care was obtained from a national inpatient register, where discharges are available according to ICD-10 codes. The fol-

lowing diagnoses were included: ICD-10 codes M480 (spinal stenosis), M510 (lumbar and other intervertebral disk disorders with myelopathy), M511 (lumbar and other intervertebral disk disorders with radiculopathy), M512 (other specified intervertebral disk displacement), M513 (other specified intervertebral disk degeneration), M514 (Schmorl's nodes), M518 (other specified intervertebral disk disorders), M519 (intervertebral disk disorder, unspecified), M543 (sciatica), M544 (lumbago with sciatica), M545 (low back pain), M546 (pain in thoracic spine), M548 (other dorsalgia), M549 (dorsalgia, unspecified).

The average number of bed-days in 2001 was combined with per-diem costs for the same year. The unit costs for different departments were obtained from hospital price lists in Malmö, Lund, Linköping, Uppsala, and Umeå. The inpatient costs are summarized in Table 1. Orthopedic care was by far the most important type of inpatient care, representing about 70% of the total inpatient costs.

In Table 1, only discharges where one of the above diagnoses was the main diagnosis were included. This leads to an underestimation of the costs, since there are cases in which the above diagnoses are important as a secondary diagnosis. However, if we include the cases where the above diagnoses are secondary diagnosis, it is difficult to get the costs right. If secondary diagnoses are included, and the costs are calculated in the same way as above, then the total cost would be 36.6 million EUR. The true costs are probably somewhere between 33.0 and 36.6 million EUR, but the lower figure has been chosen cautiously as the base case estimate.

Ambulatory care

Ambulatory care includes visits to physicians, nurses and physiotherapists. According to local Swedish studies, outpatient visits for back pain account for about 2–3% of all outpatient visits in Sweden. The back and neck pain report from the Swedish Council on Technology Assessment in Health Care refers to a study in the county of Jämtland, which reported that 2–3% of all outpatient visits in primary care concern back pain (SBU 2000). In southwest Stockholm, back pain (or more specifically ICD-10 codes M543-M545 and M549P) constituted about 2.8% of all outpatient visits in primary care (EK-gruppen 2003, Swedish Federation of County Councils 2003, and our own calculations). In the US, the corresponding figure was also estimated to be 2.8%, based on data from the National Ambulatory Medical Care Survey (Hart et al. 1995). In the absence of more precise information at a national level in Sweden, we have assumed that 2.5% of all outpatient visits concerned back pain. Since the national costs for primary care physicians were 1,228 million EUR in 2001 (Swedish Federation of County Councils 2002a), the costs for primary care outpatient visits were estimated to be 30.7 million EUR. The costs for outpatient visits in outpatient somatic care were 2,044 million EUR (*ibid.*), which implies costs for back pain of 51.1 million EUR. The total costs from outpatient visits were 81.8 million EUR.

The costs for physiotherapy are also important, since back-pain patients often visit physiotherapists more frequently than they visit physicians. The lack of national statistics on the proportion of physiotherapy visits that concern back pain makes it difficult to estimate these costs exactly. However, an estimate of the costs for physiotherapy can be obtained by combining the total costs for physiotherapy with local studies on the proportion of visits with back pain as the main diagnosis. There are some rather old estimates of the proportion of back pain patients attending physiotherapy, and in the absence of better information we have used these figures as a basis for an estimate of the costs. According to a study of physiotherapists performed in the county of Jämtland, 42% of the visits in primary care and 60% of the visits to private practitioners concerned back pain (the study is referenced in SBU 2000).

Table 2. Pharmaceutical costs for treating back pain in 2001

Diagnosis	Number of prescriptions	Percentage in ATC group M ^a
Lumbago/sciatica (M543–M545)	455 751	5.9
Total back pain	1 931 100	25.0
Total cost ATC group M (million EUR)		92
Estimated cost (million EUR)		
lumbago/sciatica		5.4
back pain, total		23

^a ATC group M: Musculoskeletal diseases. Source: the National Corporation of Swedish Pharmacies (Apoteket).

The total costs for physiotherapy in 2001 were about 344 million EUR, of which 205 million EUR involved public outpatient care and 140 million EUR involved private clinics (Swedish Federation of County Councils 2002a,b). Assuming that the percentages in the Jämtland study are applicable, the costs relating to physiotherapy for back pain were 170 million EUR in 2001. The total costs for ambulatory care, including medical visits and physical therapy, were 252 million EUR.

Pharmaceuticals

Since many of the pharmaceuticals used by low back pain patients are NSAIDs, analgesics, muscle relaxants, gastrointestinals and other pharmaceuticals that are prescribed to patients with co-morbidities and diffuse pain symptoms, it is not possible to identify the pharmaceutical costs for low back pain patients exactly. However, a reasonable estimate can be obtained by looking at the proportion of prescriptions that are written with low back pain as the main diagnosis. The cost of pharmaceuticals prescribed for low back pain can then be estimated by assuming that the proportion of costs is the same as the proportion of prescriptions.

The number of prescriptions for back pain was obtained from the “Diagnosis and Therapy Survey” of the National Corporation of Swedish Pharmacies (Apoteket AB), the Swedish state monopoly retailer of medical products. The total sales in ATC group M, 92.3 million EUR, were multiplied by the percentage of prescriptions for each diagnosis in order to get an estimate of the costs (Table 2).

Table 3. The number of working years lost

Age	16–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	All
Years lost	24	23	22	20	18	16	14	10	7	3	
Cases, men	0	3	22	59	146	221	326	513	764	896	2 950
Cases, women	0	8	42	147	261	409	481	765	1 114	1 047	4 274
Years, men	0	70	484	1 188	2 669	3 559	4 419	5 383	5 313	2 571	25 656
Years, women	0	187	923	2 961	4 771	6 587	6 520	8 027	7 747	3 004	40 727
Years, total	0	257	1 407	4 149	7 440	10 146	10 939	13 409	13 061	5 574	66 383

The total costs of pharmaceuticals for back pain were estimated to be 23.1 million EUR.

There are also pharmaceutical costs for inpatients, but these are already included in the general inpatient costs. OTC pharmaceuticals that are bought out-of-pocket by the patients for self-medication of low back pain ought to be included, but that was not possible in the current study, since a patient survey would have been required to obtain such information.

Short-term absence from work

The costs for short-term absence from work were estimated based on the expenditure of the Swedish National Social Insurance. In 2001, the total expenditure for short-term absence from work was 4,150 million EUR. Low back pain (M54) accounted for 10.7% of this amount, i.e. 444 million EUR (RFV 2002b). This is not a good measure of the production loss, however, since the sickness pay from the national insurance system is only about 80% of the ordinary salary. In order to estimate the production loss, the payroll taxes (32.8%) must also be added, since the value of production is equal to the total labor cost from the employer's standpoint rather than the salary received by the employee. The indirect costs due to absenteeism were $4,150 \times 0.107 \times 1.33/0.80 = 738$ million EUR.

Early retirement pensions

The indirect costs from early retirement pensions can be estimated in several ways. Since we do not know the exact proportion of expenditure due to low back pain, one option is to base the estimate on the number of diagnoses in the musculoskeletal area. In 1996, a total amount of 1 679 million EUR was paid out in early retirement pensions to people with diagnoses involving the musculoskeletal area (RFV 1998). Since 22.3% (37 112/166 431) of

these diagnoses involved low back pain, it is reasonable to assume that about the same percentage of the expenditure for early retirement pensions went to low back pain patients. Taking inflation (4.3% from 1996 to 2001), the reimbursement level (64%), and payroll taxes (33%) into account, the estimated value of lost production in 2001 was $1\,679 \times 0.223 \times 1.043 \times 1.33/0.64 = 811$ million EUR.

An alternative method would be to use the incidence approach, which is based upon the number of new pensions granted in a certain year. The prevalence approach, which was used above, is based instead on the expenditure for all who received early retirement pensions for low back pain during a given year, regardless of the year of onset of disease.

In the incidence approach, the number of expected working years lost is estimated by looking at the number of cases in each age group and then taking account of the mortality risk and the number of years left to the normal retirement age. In the calculation below, it has been assumed that people with low back pain have the same mortality risk as the average population. The working years lost in each age group have been discounted at a rate of 3% (Gold et al. 1996), and then multiplied by the number of new pensions granted in 2001 (RFV 2002a).

The problem is that not all cases in Table 3 concern low back pain, since the figures do not contain low back pain as a separate diagnosis. Low back pain is classified among "other and unspecified diseases of the back". The total number of cases in this group was 7 224 in 2001, and in the musculoskeletal group the total number of cases was 22 698. If we assume, as in the calculation above, that about 22% of the cases in the musculoskeletal group refer to low back pain, then the number of cases would be about 4 600.

Table 4. Total costs for low back pain in Sweden in 2001

Cost items	Million EUR	EUR per person with pain	Share of the total costs (%)
Hospital inpatient care	33	11	2%
Outpatient visits	82	28	4%
Physiotherapy	170	58	9%
Prescription of pharmaceuticals	23	8	1%
Direct costs	308	105	16%
Short-term absence	738	251	40%
Early retirement pensions	811	276	44%
Indirect costs	1 549	527	84%
Total costs	1 857	632	100%

If the number of working years lost is multiplied by the number of working hours per year and the labor cost per hour, the value of lost production due to early retirement pensions can be estimated. Assuming 45 full working weeks per year, 34.6 h per week for men, 26.8 h per week for women, and a labor cost of 20.5 EUR per hour (Statistical Yearbook of Sweden 2002), the costs for men were estimated to be 811 million EUR, and the costs for women to be 998 million EUR, giving a total production loss of 1 810 million EUR.

As about 60% (4 600/7 224) of these costs refer to low back pain, the costs for this diagnosis are about 1 100 million EUR, which is slightly higher but still roughly in line with the prevalence-based estimate presented above. As the base case, the figure based on national insurance expenditure and the number of back pain diagnoses linked to early retirement was chosen, primarily because it is a prevalence estimate. The two different calculations presented here show, however, that the results were in the same order of magnitude no matter which method was used.

Costs of low back pain in Sweden in 2001

The direct and indirect costs resulting from low back pain in Sweden in 2001 are summarized in Table 4. As the base case for the indirect costs, the prevalence approach based on expenditure in the National Social Insurance system was chosen. Indirect costs represent the greatest costs by far, while the direct costs for prescription pharmaceuticals and inpatient care are relatively small by comparison.

Calculation of the cost per patient requires a relevant prevalence measure. However, the prevalence of low back pain is very much dependent on how back pain is defined (SBU 2000). The 1-year prevalence is 40–50% (SBU 2000), but this figure is based on people's self-reported back-pain problems in population studies rather than actual use in healthcare and health insurance. Most people with occasional back pain problems do not seek healthcare for their symptoms. The main question here involves whether we should include all those who have symptoms, or all who are treated in one way or another. Since the latter figure is not readily available, the cost per patient will be based on 1-year prevalence figures from population studies. Assuming a 1-year prevalence of 10% between 0–18 years of age and 40% for people 19 years of age and older, the cost per person with low back pain at some time during the year 2001 was 632 EUR. The cost per person in the total Swedish population (8 909 128) was about 211 EUR.

Discussion

Comparison with previous studies

Our findings are hardly surprising. Earlier studies in Sweden and other countries have also found that the indirect costs are much greater than the direct costs. According to a recent Swedish report on back and neck pain (SBU 2000), the total costs to society for back pain (including low back pain) in Sweden amounted to 3.2 billion EUR in 1995 (3.4 billion EUR in 2001 prices). The predominant costs are the indirect costs for sick leave and early retirement, which amounted to 2.9 billion EUR, or 92% of the total cost. A Dutch study estimated the total cost of back pain in the Netherlands in 1991 to be 5.0 billion US dollars (5.2 billion EUR according to exchange rates in 2001), 93% of which concerned indirect costs (van Tulder et al. 1995). A British study estimated the total cost of back pain in the UK in 1998 to 12.3 billion pounds (20.4 billion EUR; 2001 rates), 87% of which concerned indirect costs (Maniadakis and Gray 2000). While these sums differ as a result of the different population sizes in the three countries, the costs per capita are very similar: 380 EUR in Sweden, 350 EUR in Holland, and 350 EUR in Britain

(2001 rates). Figures on population and inflation (based on consumer prices) have been taken from the web pages of Statistics Sweden (www.scb.se), National Statistics, UK (www.statistics.gov.uk), and the Central Bureau of Statistics, NL (www.cbs.nl).

The proportion of indirect costs in our study was 84%, which is slightly lower than in earlier Swedish studies. One problem, however, is that it is difficult to apply the same classification of diagnoses to physician visits, inpatient care and pharmaceuticals in a consistent way. Unless all costs are systematically broken down according to ICD-10 codes, it is hard to get the same selection of diagnoses for all cost items. We have tried as far as possible to match the back-pain diagnoses included in the direct costs and in the indirect costs, but a slightly broader range of diagnoses may be included for some cost items than for others. This is an almost unavoidable disadvantage of using the top-down approach to the cost of illness.

Completeness and validity of data

The present cost-of-illness study is far from complete. For example, the following direct cost items were excluded in the present estimate of the costs for low back pain because of lack of data: medical equipment, devices, and orthopedic aids; OTC pharmaceuticals for self-medication (pain relief); adaptations of house, kitchen, or bathroom; transportation to and from clinics and hospitals; community social services, such as back-pain related home help; private services; and time spent on informal care by relatives and friends.

Most of these cost items are unavailable with the present top-down approach to the cost of illness, but could have been considered by using the bottom-up approach, i.e. by distributing a patient questionnaire to a sample population and then extrapolating the results to the national level. Since a bottom-up study is often more complete, estimates of the cost of illness are generally higher if this method is chosen (see, e.g., Henriksson et al. 2001). Some of the cost items listed above can be quite expensive, which means that the present cost-of-illness estimate is an underestimate of the direct costs.

The proportion of back pain patients in outpatient care is somewhat uncertain, since no figures

are available at the national level in Sweden. Given the existing evidence in previous studies, however, 2.5% seems to be a reasonable estimate. The cost of physiotherapy in 1995 was estimated at 103 million EUR in 1995 prices (SBU 2000), or 152 million EUR in 2001 prices, compared to 170 million EUR in our study. The costs have thus gone up by 11% in real terms since 1995. However, between 1987 and 1995 the costs for back-pain physiotherapy doubled (SBU 2000), so an increase of 11% is moderate by comparison.

In general, national registers such as the inpatient register or the national insurance registers are reliable data sources, with coverage close to 100% and very good validity of diagnoses. Some data sources are less reliable, e.g. the “Diagnosis and Therapy Survey” of Apoteket (the Swedish pharmacy chain), which was used for the pharmaceutical costs. The response rate is typically about 50% in this survey. The costs for physiotherapy were also quite unreliable, since they were partly based on a local study.

There are at least two ways of estimating the indirect costs of production losses caused by short-term absence from work due to low back pain. The method we pursued was to look directly at the expenditure in the Swedish National Social Insurance system. The disadvantage of this method is that these figures are not directly relevant as a measure of the production loss, since only the amount paid out from the national sickness insurance is included. We compensated for this by taking reimbursement level and payroll taxes into account. It is difficult to do this in a completely rigorous way. For example, we disregarded the qualifying period before different benefits are paid out, and the fact that beyond a certain income level, no further benefits are paid out by the national insurance (even though there may be further private insurance coverage). Another way of estimating the value of lost production would be to look at the number of days of sickness, and combine this with the average labor cost per hour in Sweden. However, the latest available figures at the national level concerning the number of days of sickness absence specifically due to low back pain appear to be from as far back as 1990. Since these figures are not necessarily representative of conditions in 2001, the latter approach was not pursued here.

Apart from indirect costs for short-term absence and early retirement, cost-of-illness studies usually consider the loss of production that is caused by premature mortality in a disease. However, there does not seem to be any data on premature mortality due to low back pain in Sweden.

Estimation of indirect costs

The indirect costs in this study are lower than in the previous studies performed by the Swedish Council on Technology Assessment in Health Care (SBU 1991, 2000). The indirect costs for back pain in 1995 were 2.9 billion EUR, which amounts to 3.1 billion EUR in 2001 prices, i.e. more than 1 billion EUR more than the indirect costs for low back pain in 2001. One obvious reason for the difference is that the 1995 figures include pain in neck and shoulders, which increases the costs by about 30–50% (SBU 2000). Even so, the difference is slightly greater than expected, which may imply that the indirect costs for low back pain decreased between 1995 and 2001. However, it is difficult to determine whether the greater than expected difference is caused by real changes in costs over time, or whether it is due to the methodological differences in data sources, the diagnoses included, or the principles of calculation.

Intangible costs

As mentioned in the Methods section, the intangible costs of a disease are physical and emotional pain, and other effects on the patient's quality of life. Some would argue that cost-of-illness studies that do not take account of the intangible costs underestimate the contribution of the disease to the total burden of disease in society. For illustrative purposes, we will calculate an estimate of the intangible costs and discuss the implications of the result. An estimate of the intangible burden of low back pain can be obtained by comparing the quality of life of patients with the disease with the quality of life of the general population, and then assigning a monetary value to the loss in health in terms of QALYs (Henriksson et al. 2001). The QALY (Quality-Adjusted Life Year) combines—in one measure—the length of life and the quality of life of patients by assigning to each time period (e.g., a month or a year) a quality-of-life weighting ranging from 0 to 1, where 0 represents death and 1

perfect health. The quality of life weighting for low back pain is 0.66 on a scale from 0 to 1, according to the EQ-5D index value (EQ-5D (EuroQoL-5Dimensional) is a standardized quality of life form with five questions. Health states defined by answers to the EQ-5D form can be converted into a weighted health state index between 0 and 1 by applying results from general population samples (Dolan 1997)).

The corresponding value for middle-aged people (i.e. aged 40–49 years) is 0.86 (Burström et al. 2001). The difference between these values cannot be used directly, since there may be co-morbidities, differences in age and income, and other confounding factors. Instead, the regression coefficient for low back pain can be used. The regression coefficient states that, all else being equal, individuals with low back pain have an EQ-5D index value that is 0.1154 units lower than average. The prevalence of low back pain in the study by Burström et al. (2001) was 15.7% (481/3069), which corresponds well with point-prevalence figures in the literature (SBU 2000). The loss of QALYs can be calculated according to the formula (population of country) \times (prevalence) \times (difference in QALYs between person with and without low back pain). Assuming a constant point prevalence of 15.7% in the Swedish population, this would imply a loss of 8 909 128 \times 0.157 \times 0.1154 = 161 400 QALYs per year. With a value per QALY of 56 000 EUR (Newhouse 1998, Ekman 2002), the intangible cost would be 9.0 billion EUR. This is almost five times greater than the total cost of illness figure reported in this study. It should be mentioned, however, that there are several ways of calculating the monetary value of a QALY, and different methods tend to give different results. The method that generally results in the lowest valuation per QALY gained is the human capital method. In a survey by Hirth et al. (2000), the median value of a QALY was 24 777 US dollars for studies using the human capital method, or 27 700 EUR in 2001 prices (USD1 = EUR1.12). By using this lower value of a QALY, an intangible cost of 4.5 billion EUR would be obtained, which is still a considerable amount.

These results appear to indicate that the intangible costs of pain and suffering are considerably greater than the sum of the direct costs of treatment and the indirect costs of production loss. The

problem is that the intangible costs are not costs in the usual sense, as they will not show up as a monetary sum on anyone's balance sheet. Unlike direct treatment costs and production losses, intangible costs do not represent resources that could have had alternative uses in healthcare or in society as a whole. What the intangible costs represent is rather the potential value of eradicating the disease, which is a measure of health benefits rather than costs. The concept of intangible costs may therefore be somewhat misleading, and should not be included in an estimate of the cost of illness. However, the exercise presented here was far from meaningless; the same type of calculation can be used to estimate the value of health changes (Burstrom et al. 2003).

Concluding remarks

The direct costs for low back pain constitute 1.7% of the total healthcare costs, and the indirect costs for short-term illness due to low back pain constitute 10.7% of the costs for short-term absence. The indirect costs for low back pain as part of the costs for early retirement are more difficult to calculate, but probably amount to somewhere between 6–11%. In terms of costs, low back pain is primarily a problem for the health insurance system. The conclusions for policy decisions that can be drawn from this study are rather limited, but it is plausible to assume that even if new treatments for low back pain increase the direct healthcare costs, they may still be worthwhile if they can contribute to lower rates of short-term illness, long-term disability, or both—especially if improvements in quality of life are taken into account.

Cost-of-illness studies have raised much criticism both on methodological grounds and for being of doubtful value for policy-making purposes (see, for example, Shiell et al. 1987 and Koopmanschap 1998). In particular, the fact that a certain disease costs a certain amount does not in itself tell us whether more or less resources should be spent on treating the disease. What we need for policy-making purposes is rather economic evaluations that assess both costs and health effects of single medical interventions or healthcare programmes (Byford et al. 2000). However, a cost-of-illness study can be an important step in generating ideas for further research, and can act as a building block

in a subsequent economic evaluation. In such an evaluation, the change in direct and indirect costs of an intervention or a programme would be weighed against the change in health effects (Drummond et al. 1997).

To conclude, the cost of illness for low back pain is substantial, but does not appear to have risen with time during the past 10–15 years. The indirect costs have probably even decreased a little since the 1990s, but it is difficult to say by how much, since there are methodological differences compared to previous studies. The direct costs seem to have increased slightly. The intangible costs, or rather the potential (and probably unattainable) benefits of eradicating low back pain, have also been calculated for comparison, even though this figure should not be included in the cost-of-illness estimate.

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