Resource Use and Costs in a Swedish Cohort of Patients with Parkinson’s Disease

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Abstract: We estimated resource use and costs in patients with Parkinson’s disease (PD), thereby providing baseline data for future economic evaluations of therapeutic interventions. Data were collected from medical records of a South Swedish cohort of 127 PD patients during 1 year (1996) and a mailed questionnaire inquiring about cost-related consequences and resource use in 1996 and in 2000. Annual costs were calculated based on prevalence and expressed in SEK (monetary value of the year 2000). Direct health care costs averaged approximately SEK 29,000 (≈USD 2,900; EUR 3,200) per patient per year, of which drugs were the most costly component. Nonmedical direct costs were higher than direct health care costs, averaging approximately SEK 43,000 (≈USD 4,300; EUR 4,800) per patient per year, and costs due to lost production were approximately SEK 52,000 (≈USD 5,200; EUR 5,800) per patient per year. The mean total annual cost for PD in our sample approximated SEK 124,000 (≈USD 12,400; EUR 13,800) per patient. These findings are roughly within the same range as estimates from other countries and show that PD causes a considerable societal burden. In addition to other outcomes, evaluations of the economic implications of new therapeutic interventions are highly warranted. In this perspective, the present study provides valuable baseline data. © 2002 Movement Disorder Society

Key words: Parkinson’s disease; costs; resource use

Research in Parkinson’s disease (PD) has traditionally focused on consequences of disease from the clinician’s point of view. During recent years, increased interest has been directed toward the impact of PD from the patients’ perspective.1 Another important aspect, not only for health care decision-makers, providers, and professionals, but ultimately also for the patients, is the economic impact of the disease. This aspect is increasingly evident as new and potentially costly therapeutic interventions are developed and in the face of escalating health care expenditures, shrinking resources, and rising life expectancy.2,3 To evaluate the economical implications of new interventions, it is important to consider the current economical impact of the disease.

PD is a chronic and common neurological disease that can be expected to be associated with significant costs. Knowledge on costs in PD is so far relatively sparse and largely related to direct health-related expenditures.1–6 However, economic consequences of illness include not only direct (e.g., drugs, ambulatory and hospital care) but also indirect (e.g., the value of production loss) costs.

We investigated resource use and costs for treatment, social services, and lost production in patients with PD in order to provide baseline data for future studies of health economic implications of various novel interventions in the management of PD.

SUBJECTS AND METHODS

The study was approved by the Research Ethics Committee, Lund University, Sweden. A sample of 127 patients was randomly selected from a total of 280 PD patients treated at the Department of Neurology, Lund
University Hospital, Sweden, and residing within the hospital’s primary catchment area (i.e., excluding patients for whom the hospital provides tertiary care) during 1996.

First, all 127 medical records from 1996 were reviewed, and patients were classified according to the Hoehn and Yahr stage of disease (H&Y). In addition, demographic data, drug treatment, number of outpatient visits, number of occasions and days admitted as inpatients, contacts (including telephone counseling) with different health care providers (e.g., neurologist, nurse, physiotherapist, and occupational therapist), diagnostic investigations, and referrals, were recorded. All interventions deemed as being due to PD, primarily or secondarily (such as drug treatment of orthostatic hypotension or visual hallucinosis), were included.

Second, in 2000, a questionnaire was mailed to surviving patients, and their carers. The questionnaire asked about employment status, housing, and use of home care and home help in 1996 and 2000. Current (i.e., the year 2000) use of non-neurological PD-related care, means of transportation to clinic visits, distance between patients’ homes and the neurology clinic, and satisfaction with the amount of health care received for PD were also inquired. Costs were estimated according to data referring to 1996, unless otherwise is stated. Questionnaire response was interpreted as consent to participate.

Costs were calculated based on prevalence as the cost of PD during 1 year. Costs are expressed according to the monetary value of the year 2000 and presented per patient for the five stages of H&Y. PD-related costs considered in this study are outpatient care, inpatient care, drugs, diagnostic investigations (radiographic and laboratory investigations), transportation, professional home care (home help service and care provided by the local authorities in patients’ own homes and special accommodations, including nursing homes), and production loss due to long-term sick-leave and early retirement on disability pension. Unit costs were derived from the Southern Health Care Region Sweden’s tariff for 2000, FASS 2000 (annual listing of all licensed drugs in Sweden, including prices), local taxi and public transportation fares, national guidelines for car mileage reimbursement, and the local tariff for home care and home help service provided by the local authority. Indirect costs were estimated using the human capital approach. Estimates of production loss due to long-term sick-leave and early retirement were based on the national average annual income (including social costs) for 1996, upgraded to the levels of the year 2000, according to consumer price index (i.e., by 5.3%). Loss of production related to death was not considered because mortality was very similar in our sample and the general population. For health care costs, only PD-related resource use was recorded. However, for home care and production loss, we estimated the resource use regardless of whether all costs were attributed to PD or other age-related diseases.

Monetary values are expressed as SEK. For reference, as of the year 2000, EUR 1 = SEK 9.0, USD 1 = SEK 10.0, DM 1 = SEK 5.0, and GBP 1 = SEK 14.5.

Statistics

Resource use was subjected to statistical inference. Variables were tested for normal distribution by means of the one-sample Kolmogorov-Smirnov test and were, with the exception of patient age, found not to be normally distributed. Hence, nonparametric statistics were used for these variables. Because of the highly skewed data, median values often equaled zero. Therefore, mean values and ranges are given instead. Age is presented as mean ± S.D. For comparisons across H&Y stages, Kruskal-Wallis analysis of variance was computed. Statistical computations were performed using SPSS v. 10.1 for Windows (SPSS, Chicago, IL).

RESULTS

Sample Characteristics

Table 1 summarizes the sample characteristics. The initial sample consisted of 127 patients, of whom 61% were men. The average time since diagnosis was 8.2 years (range, 1–31 years). Most patients (56%) were in

<table>
<thead>
<tr>
<th>TABLE 1. Sample characteristics</th>
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<tr>
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<tr>
<td>No. of patients (M:F)</td>
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<tr>
<td>At medical records review</td>
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<td>Postal survey respondents</td>
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<tr>
<td>Age* (yr)</td>
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<td>At medical records review</td>
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<tr>
<td>Postal survey respondents</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>H&amp;Y, Hoehn and Yahr stage of disease.</th>
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<tbody>
<tr>
<td>*Data refer to the initial time point (1996) and are expressed as mean ± S.D.</td>
</tr>
</tbody>
</table>
H&Y stages II and III, with approximately 15% in each of stages I, IV, and V. At the time of the postal survey, 24 (19%) of the cases selected from the 1996 database had died. Mortality increased by advancing H&Y stages, ranging from 1% in H&Y I to 8% in H&Y V. Annual mortality increased also by age, and this rate was similar to that of the general Swedish population (Table 2). The postal survey yielded a response rate of 79% (81 responses from 103 mailings). Nonresponders were significantly older than responders (74.6 ± 7.0 vs. 68.4 ± 8.7 years, respectively; \( P = 0.001 \), unpaired \( t \) test).

### Resource Use

#### Neurological Care.

**Inpatient and outpatient care.** Use of neurological care in 1996 is summarized in Table 3. The average number of outpatient contacts with the Department of Neurology was 3.2 per patient. Telephone counseling was the single most frequent form of contact, accounting for 44% of all contacts. Statistical differences across H&Y stages were evident for multidisciplinary care and telephone counseling. Overall, there was a trend (\( P = 0.054 \)) toward increasing outpatient care across H&Y stages. Thus, the total number of contacts increased from H&Y stage I through stage IV but decreased thereafter. During the year, 22 patients were admitted for neurological care on a total of 32 occasions (range, 0–3 per patient, where 2 patients, in H&Y stages IV and V, were admitted 3 times), accounting for 256 hospital days. Length of hospital stay ranged between 1 and 42 days. Inpatient hospital care differed significantly across H&Y stages, with stages IV and V contrasting to earlier stages of the disease.

**Diagnostic investigations and referrals.** An average of 0.5 (range, 0–6) laboratory tests and 0.3 (range, 0–3) radiographic investigations per patient were ordered during the year. The number of laboratory and radiographic investigations increased by advancing H&Y stages (\( P = 0.011 \) and 0.01, respectively; data not shown). A total of 62 referrals, on average 0.3 (range, 0–5) per patient, were made to other specialists and care providers. The most common was physiotherapy (26 referrals) and others included occupational therapy, dietician, psychiatrist, and general practitioner. Five patients were referred for neurosurgical assessment, of whom 2 underwent stereotactic surgery for their PD. Four patients were referred to a rehabilitation center, where they spent between 3 and 24 days. Number of referrals did not differ across H&Y stages (\( P = 0.596 \); data not shown).

#### Drug Use.

All patients but 2 (H&Y stages I and II) received antiparkinsonian drug treatment. The mean number of drugs per patient was 2.4 for the whole sample, ranging from 2.0 in H&Y stage I to 2.9 in H&Y stage IV (\( P = 0.231 \)). The single most used compound was levodopa (used by 96% of the patients). The overall mean daily levodopa dose was 681 mg, being highest among stage IV and lowest among stage I patients (983 mg and 378 mg, respectively). Patients in H&Y stages II and III used similar daily amounts of levodopa (673 mg and 640 mg, respectively), and stage V patients used 764 mg per day. Dopamine agonists were used by 31%, selegiline by 38%, anticholinergics by 6%, and amantadine by 1% of the sample. Almost half of the patients (49%) received other drugs related to their PD. For example, 32% used tranquilizers and/or neuroleptics, and 21% used antidepressants.

#### Transportation and Non-neurological Care.

The mailed questionnaire asked how patients traveled to their appointments at the Department of Neurology and whether they received health care due to their PD from additional providers. Data from 81 patients in 2000 are available.

**Transportation.** Forty percent used transportation services for disabled persons, and 40% used private cars to get to their appointments at the neurology clinic. Public transportation and taxi were used by 10% and 9%, respectively. One patient used a bicycle, and one did not respond.

All 18 patients living in special accommodations in 2000 were accompanied by a staff member and/or family member to their appointments at the neurology clinic. Two thirds of those living in their own homes were accompanied to their appointments at the neurology clinic, either by family members or, in one case, by home care personnel.

**Non-neurological care.** Most respondents (62%) only used PD-related health care provided by the Department of Neurology. Other health care providers were general practitioners (\( n = 15 \)), physiotherapists (\( n = 14 \)), nurses (\( n = 4 \)), occupational therapists (\( n = 2 \)), and dietician (\( n = 1 \)).
Housing and Home Care.

The mailed questionnaire inquired about living conditions and home care for both 1996 and 2000. In 1996, 95% of patients were living in their own homes, either alone or with a spouse. By the year 2000, this proportion had decreased to 78%. Twenty-two percent of those living in their own homes required home care in 1996. Four years later, this proportion had increased to 38%. If those requiring help from family members are included, the figures for 1996 and 2000 were 49% and 67%, respectively. On average, in 1996, each respondent was provided 3.8 hours of professional home care and 7.6 hours of help from family members per week.

Loss of Production.

Twenty-four (30%) of the 81 questionnaire respondents were of working age, i.e., under the age of 65, in 1996. Nine of these worked at least half-time in 1996, others were either on long-term sick-leave or received half- to full-time disablement pension. Four years later, 16 people were of working age, among whom 4 were working at least half-time.

Satisfaction with Access to Care.

Fifty-nine percent of the questionnaire respondents were satisfied and 36% were dissatisfied with the amount of care they received for PD. Five percent did not respond. Eleven of the 29 dissatisfied responders wanted more frequent appointments at the neurology clinic; 4 wanted more rehabilitation, occupational- and/or physiotherapy; other requested speech therapy, social worker, and home care.

Costs

Annual direct and indirect costs are summarized in Table 4 and described in more detail below.

<table>
<thead>
<tr>
<th>TABLE 4. PD-related costs (SEK) per patient during 1 year</th>
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<tbody>
<tr>
<td>H&amp;Y I</td>
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<tr>
<td>Direct health care costs</td>
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<tr>
<td>Outpatient costs</td>
</tr>
<tr>
<td>Inpatient costs</td>
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<tr>
<td>Diagnostic investigations</td>
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<td>Drugs</td>
</tr>
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</table>

Other direct costs

Transportation | 509 | 578 | 796 | 620 | 671 | 640 |

Home care | 1,216 | 10,968 | 97,645 | 21,879 | 93,112 | 41,886 |

Subtotal | 1,725 | 11,546 | 98,441 | 22,499 | 93,783 | 42,526 |

Indirect costs

Loss of production | 37,298 | 59,677 | 54,704 | 59,677 | 39,785 | 52,310 |

Overall mean total costs | 55,093 | 91,423 | 180,409 | 125,274 | 180,611 | 123,566 |

Data are calculated from the situation in 1996, using the price levels of 2000, and expressed as mean annual costs per patient.

PD, Parkinson’s disease; SEK, Swedish kroner (monetary value for the year 2000); H&Y, Hoehn and Yahr stage of disease.
Direct Health Care Costs.

Outpatient care. PD-related costs generated by outpatient care include clinic visits (neurologist or multidisciplinary care), telephone counseling, and referrals to other outpatient care providers. The overall mean annual cost per patient was SEK 7,080 (Table 4). Patients classified as H&Y stage II generated the highest cost, whereas the lowest were seen for stages I and V patients.

Inpatient care. Costs generated by inpatient care include admittance to a neurological ward, consultations from other specialties while at the neurological ward, neurological consultation for patients admitted to other departments, and referrals to other hospital departments. The overall mean annual inpatient cost (Table 4) was substantially higher among more advanced patients. The highest mean annual cost per patient was observed in H&Y stage IV, whereas the lowest costs were seen in stage I, with an approximately 20-fold difference between the two.

Diagnostic investigations. The mean annual cost for diagnostic investigations (laboratory tests and radiographic investigations) was SEK 935 per patient, with an ascending trend across H&Y stages.

Drugs. Annual drug costs averaged SEK 12,733 per patient (Table 4). The highest costs were observed for H&Y stage V, whereas the lowest were seen in stage II. Antiparkinsonian agents accounted for 89% of the total drug costs.

Other Direct Costs.

Transportation. In 2000, respondents travelled an average of 16 km to the neurology clinic. Costs for the various means of transportation have been calculated based on the mean distance for each mode of transportation (private car, 23 km; taxi, 17 km; public transportation, 11 km). The mean annual number of trips related to neurological care was 3.4, and the mean annual cost for these trips was SEK 640 per patient (Table 4).

Home care. In 1996, 18 patients received regular home care or home help service provided by the local authority. The mean annual home care cost was SEK 41,886 per patient (Table 4).

Indirect Costs.

Loss of production. Twenty of the 24 patients who were below 65 years of age in 1996 received either sick-leave compensation or disablement pension. The value of lost production was estimated to SEK 52,310 per patient when averaged across the whole sample (Table 4). Four years later, 14 of 16 respondents below 65 years of age received sick-leave compensation or disablement pension and the corresponding value for lost production was SEK 39,000 per patient.

Total Costs.

The greatest single costs, accounting for 42% of the mean annual cost, related to loss of production. This finding was followed by home care and direct health care costs, contributing 34% and 23%, respectively, of the total cost. The dominating health care cost was drug therapy, which accounted for 44% of the direct medical costs and 10% of the total costs.

DISCUSSION

Parkinson’s disease places a significant financial burden on the society. Direct health care costs averaged approximately SEK 29,000 (∼USD 2,900; EUR 3,200) per year per patient, of which drugs was the single most costly component. Nonmedical direct costs were higher than direct health care costs, averaging approximately SEK 43,000 (∼USD 4,300; EUR 4,800) per patient per year, and costs due to loss of productivity averaged approximately SEK 52,000 (∼USD 5,200; EUR 5,800) per patient per year. Taken together, the overall mean annual cost for PD in our sample approximated SEK 124,000 (∼USD 12,400; EUR 13,800) per patient, ranging from SEK 55,000 (∼USD 5,500; EUR 6,100) in H&Y stage I to SEK 181,000 (∼USD 18,100; EUR 20,100) for patients in H&Y stage V.

Costs related to loss of production and home care could be somewhat overestimated in this study because all registered resource utilisations may not be due to PD but, in part, also to general age-related needs. When considering data for corresponding age groups of the general population, as estimated from the ratios of the proportions in the two, it can be estimated that roughly 80% of costs related to loss of production and home care could be directly caused by PD. Another potential source for an overestimation of the costs is the fact that this study was conducted in an area served by a large and highly specialized hospital. It could thus be argued that direct health care costs are higher here than in other areas with poorer availability of specialized health care resources. For example, LePen and colleagues found that the mean medical cost was approximately twice as high among French PD patients followed by neurologists compared with those followed by general practitioners.11 This difference may, however, also be attributed to more advanced stages of the disease among the latter patients. It could also be hypothesized that other cost driving sources, e.g., production loss, might be kept down by relatively good access to neurological care.4
Several factors may also contribute to a probable underestimation of the actual costs in this study. First, costs for home care are underestimated because the use among those who died and did not respond to the questionnaire could not be accounted for because these costs were estimated from questionnaire responses. Furthermore, help provided by family members were not included in cost calculations due to difficulties assigning monetary values to such efforts. The time spent by family members providing help to the PD patient exceeded professional help provided by local authorities by a factor of two. It should be noted that the number of hours of informal care in this study is considerably lower compared with that reported by other authors. For example, Whetten-Goldstein and coworkers\textsuperscript{12} estimated this to 22 hours per week, compared to 7.6 hours in our study. This discrepancy may, for example, be explained by different definitions of home care, as well as variations in management patterns and cultural differences between various countries.

Second, production loss due to early death is commonly included in cost-of-illness analyses. However, because mortality in our PD sample was similar to that of the general population (Table 2) and only 1 of our patients died before the age of 65, loss of productivity related to death was not considered here. Finally, because valid information on the use of non-neurological PD-related care in 1996 was not available (except for referrals made from the neurology clinic), this component could not be fully accounted for. Taken together, it thus seems reasonable to expect that our results reflect an overall underestimation, rather than an overestimation, of the actual resource utilization and costs related to PD in this cohort of patients.

Lund University Hospital’s primary catchment area, from which our sample was drawn, has a population of approximately 275,000. The prevalence of PD has not been studied in this part of Sweden. A prevalence study undertaken in another area of Sweden gave an age-adjusted prevalence of 76 per 100,000.\textsuperscript{13} However, because previous studies have indicated that this particular region probably has a lower prevalence of PD than other parts of the country,\textsuperscript{14} it might well be an underestimation to assume the 76/100,000 prevalence to be valid elsewhere in Sweden. The adjusted prevalence in other Nordic countries during the past decade has ranged between 98 and 166 per 100,000.\textsuperscript{15-17} Calculating with the mean adjusted prevalence reported in these four Nordic studies (110/100,000), it can be estimated that approximately 300 PD patients should reside within our hospital’s primary catchment area. This figure is very close to the total number of 280 PD patients treated at the Department of Neurology in 1996, from which we sampled 127 cases. This finding is also in accordance with the policy of the Department of Neurology in Lund that all PD patients within the primary catchment area should access neurological care.\textsuperscript{18} We believe that our sample is representative of the target population, which strengthens the external validity of our findings.

This study was conducted to estimate resource use and costs in patients with PD, including common comorbidities and complications such as depression, cognitive decline, confusion, and dysautonomia. We did not attempt to identify cost-driving factors or risk factors for certain needs. Although warranted, such issues need to be addressed in larger samples and, preferably, using a prospective design. In one such study, LePen and associates\textsuperscript{11} found that the most important cost-driving factors in their cohort of 294 French PD patients were increasing ADL disabilities, falls, and disease progression, hence, broadly covering the determinants of the H&Y staging system used in our study. However, among patients with motor fluctuations, the number of daily off episodes had the most significant impact on costs, and it was estimated that for every 10% reduction in off time, medical costs would decline by 5%.\textsuperscript{11}

In addition to methodological discrepancies, differences in disease management traditions, health care organization, costs, and reimbursement policies between various countries prohibit firm cross-national comparisons of cost estimates. Nevertheless, some comparisons related to direct health care costs between our and German,\textsuperscript{19} French,\textsuperscript{11} British,\textsuperscript{20} and North American\textsuperscript{12} studies are considered (Table 5).

The highest health care costs of PD among the studies were found in a prospective study of 40 patients over 3 months by Dodel and colleagues in Germany.\textsuperscript{19} In that study, drugs accounted for 42% of the health care costs, which is very close to the shares of 44% and 42% found in our and the British\textsuperscript{20} studies, respectively, but approximately twice that found by investigators in France (23%)\textsuperscript{11} and the USA (22%),\textsuperscript{12} In comparison, the actual drug costs in our study is lower than the German estimates and approximately the same as in the other three countries (Table 5). The overall national Swedish pharmaceutical expenditures approximate 15% of the total annual health care costs.\textsuperscript{21} Based on our observations, it can be estimated that the drug costs associated with PD are approximately three times those of the general population.

The second largest cost in our study was inpatient care (28%), whereas this is the lowest share and cost per patient when compared to estimates from other countries (Table 5). When considering the total annual direct
health care costs, our study also suggests lower costs than the other four estimates. The cost of home-care service was higher than the direct health care costs in our study and also higher than that estimated in any of the other studies. In contrast, informal care was approximately three times higher in the USA study than in ours. Our estimates of costs due to loss of production fall between those from the UK and USA.

Recent Swedish studies in other chronic diseases have, for example, found mean annual direct health care costs per patient of SEK 10,000 (~USD 1,000; EUR 1,100) for chronic heart failure in primary care,22 approximately SEK 11,000 (~USD 1,100; EUR 1,200) in rheumatoid arthritis,23 SEK 25,000 (~USD 2,500; EUR 2,800) in type-2 diabetes mellitus,24 and approximately SEK 37,000 (~USD 3,700; EUR 4,100) in multiple sclerosis.25 The mean annual direct health care cost per patient in PD found in this study was approximately SEK 29,000 (~USD 2,900; EUR 3,200), which thus is a relatively high figure. Considering the rising life expectancy and that PD typically has its onset between 50 and 60 years of age, with an increasing prevalence thereafter, the cumulative cost and societal burden of the disease is considerable.

At the time of our cost estimates in 1996, available therapeutic interventions for PD at our hospital included levodopa (controlled and immediate release, with benserazide or carbidopa), bromocriptine, apomorphine, amantadine, selegiline, and various anticholinergic drugs, as well as thalamic deep brain stimulation (DBS). DBS of the globus pallidus and subthalamic nucleus were being introduced during this year. Since then, COMT-inhibitors and several new dopamine agonists have been licensed, DBS is more widely considered, and SPECT-scan brain imaging has become accessible as a diagnostic tool for routine clinical use in basal ganglia disorders. All of these components may have boosted the costs since 1996. The economic impact of these new therapeutic and diagnostic tools are, so far, sparsely reported. However, evaluations from the USA indicate higher costs, but also better effectiveness, of pramipexole compared with baseline treatment in early as well as advanced PD,26,27 whereas pallidotomy would reach the same cost effectiveness only if procedure costs were reduced by two thirds or if the postoperative utility is equivalent to being restored to normal health.27 In another study, the cost effectiveness of DBS of the globus pallidus and subthalamic nucleus compared to best medical management was found to be uncertain unless it provided at least 30% clinical improvement.28 This illustrates the importance of such cost-effectiveness evaluations of new therapeutic interventions, as well as nonmedical approaches related to the management of PD.6,19 Our study, which refers to the situation before many of the now available therapeutic and diagnostic options were readily available in Sweden, can serve as a basis and frame of reference for future cost-related evaluations.

**CONCLUSIONS**

We have shown that PD poses a considerable burden on those who suffer from it, the health care system, and society at large, with an annual cost per patient averaging SEK 124,000 (~USD 12,400; EUR 13,800). Almost half

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**TABLE 5. Comparison of estimated annual costs per patient between various countries**

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<tbody>
<tr>
<td>Direct health care costs</td>
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<tr>
<td>Outpatient costs</td>
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<td>26,400</td>
<td>16,600</td>
<td>14,700</td>
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<tr>
<td>Drugs</td>
<td>12,700</td>
<td>31,600</td>
<td>9,200</td>
<td>14,300</td>
<td>10,600</td>
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<td>Other expenses</td>
<td>900</td>
<td>17,200</td>
<td>n.r.</td>
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<td>n.r.</td>
</tr>
<tr>
<td>Subtotal</td>
<td>28,700</td>
<td>76,000</td>
<td>40,500</td>
<td>33,600</td>
<td>47,900</td>
</tr>
<tr>
<td>Other direct costs</td>
<td></td>
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<tr>
<td>Transportation and special equipment, etc.</td>
<td>600</td>
<td>n.r.</td>
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<td>n.r.</td>
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<tr>
<td>Home care</td>
<td>41,900</td>
<td>28,200</td>
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<td>Informal care (8 hr/wk)</td>
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<td>n.r.</td>
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<td>n.r.</td>
<td>(22 hr/wk)</td>
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<tr>
<td>Subtotal</td>
<td>42,500</td>
<td>104,200</td>
<td>42,500</td>
<td>63,300</td>
<td>56,800</td>
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<tr>
<td>Total direct costs</td>
<td>71,200</td>
<td>104,200</td>
<td>42,500</td>
<td>86,700</td>
<td>198,500</td>
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<tr>
<td>Indirect costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of production</td>
<td>52,300</td>
<td>n.r.</td>
<td>n.r.</td>
<td>23,400</td>
<td>141,700</td>
</tr>
<tr>
<td>Overall mean costs</td>
<td>123,600</td>
<td>104,200</td>
<td>42,500</td>
<td>86,700</td>
<td>198,500</td>
</tr>
</tbody>
</table>

Expressed in SEK (see Subjects and Methods for conversion).
*Excluding copayment of SEK 22,200.
**Excluding private expenses of SEK 24,100.
n.r., not reported.
of this cost is due to production loss, a third is due to home care, and a fourth to direct health care costs, where drugs are the most costly component. With few exceptions, direct, but not indirect, costs ascend by advancing disease stages. Based on an average of recent prevalence estimates (see above), it can be estimated that approximately 11,000 people suffer from PD in Sweden. Extrapolation of our results then yields a total societal PD-related cost of approximately SEK 1.4 billion per annum (≈USD 1.4 million; EUR 1.6 million). This finding suggests that further development and evaluation of novel interventions with potential for long-term clinical and economic effectiveness is highly warranted. For informed and comprehensive assessment of such interventions, economic evaluations should accompany clinical and patient-oriented outcomes.

Acknowledgments: This study was supported by Meditelli AB, the Skane County Council’s Research and Development Foundation, the Swedish Medical Research Council, the Kock, Söderberg, and King Gustav V and Queen Victoria Foundations, and the Medical Faculty, Lund University and the Department of Neurology, University Hospital, Lund, Sweden. We thank Elisabeth Rasmusson for secretarial assistance.

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