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Trends in resource utilization and prescription of anticonvulsants for patients with active epilepsy in Germany

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ABSTRACT

This study evaluated trends in the resource use of patients with active epilepsy over a 5-year period at an outpatient clinic of a German epilepsy center. Two cross-sectional cohorts of consecutive adults with active epilepsy were evaluated over a 3-month period in 2003 and 2008. Data on socioeconomic status, course of epilepsy, as well as direct and indirect costs were recorded using validated patient questionnaires.

We enrolled 101 patients in 2003 and 151 patients in 2008. In both cohorts, 76% of the patients suffered from focal epilepsy, and the majority was on antiepileptic drug (AED) polytherapy (mean AED number: 1.7 (2003), 1.8 (2008)). We calculated epilepsy-specific costs of €2955 in 2003 and €3532 in 2008 per 3 months per patient. Direct medical costs were mainly due to anticonvulsants in 2003 (59.4% of total direct costs, 34.0% in 2008) and to hospitalization in 2008 (46.9% of total direct costs, 27.7% in 2003). The proportion of enzyme-inducing anticonvulsants and 'old' AEDs decreased between 2003 and 2008. Indirect costs of €1689 and €1847 were mainly due to early retirement (48.4%; 46.0% of total indirect costs in 2003; 2008), unemployment (26.1%; 24.2%), and days off due to seizures (25.5%; 29.8%).

This study showed a shift in distribution of direct cost components with increased hospital costs as well as a cost-neutral increase in the prescription of 'newer' AEDs. The amount and distribution of indirect cost components remained unchanged.

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1. Introduction

Epilepsy is a common and chronic neurological disorder that imposes a substantial burden on individuals and society as a whole. The majority of patients require an anticonvulsant treatment for an extended period of time, and seizures in up to 30% of patients are refractory to medical treatment [1]. Economic evaluations are particularly important in patients with active epilepsy as they account for a high proportion of total costs [2–5]. Given the growing resource utilization and limited amount of health-care resources, it has become essential to gather reliable cost estimates as a scientific basis for resource allocation and health policy decision making. In fact, this has become even more important as the introduction of new antiepileptic drugs, the use of generic medication, the marketing of brain stimulation devices, and the resurgence of new surgical treatment options can result in a considerable increase in costs or a shift in the distribution of cost components [6–10]. Furthermore, epilepsy is still strongly associated with social stigma, reduced employment opportunities, and impaired quality of life for patients and their caregivers, resulting in increased indirect costs [11–15].

Comparisons between cost-of-illness (COI) studies are difficult because of the differences in methods of cost evaluation and the recruited populations [7,16]. To date, no studies have evaluated trends in resource utilization over a long period of time. In 2003, we performed a COI study [3] in patients with active epilepsy attending the outpatient clinic of a tertiary epilepsy center. This was the first German study to provide a comprehensive set of data on direct and indirect costs. Previous German COI studies focused on certain aspects such as seizure frequency [17] or medication costs [18]. We demonstrated that indirect costs outweighed direct costs, while early retirement was the main cost factor for indirect costs and anticonvulsant medication for direct costs [3].

Thus, the objective of this study was to determine the trends in the utilization of health-care resources in active epilepsy over a 5-year period. We used the same inclusion criteria and methods of cost evaluation for a second cohort of patients with active epilepsy evaluated in 2008.

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2. Patients and methods

2.1. Study setting and design

The study was performed at the epilepsy outpatient clinic of the University Hospital of Marburg. The University Hospital of Marburg is a large multispecialty tertiary care hospital in the state of Hesse that provides health care to a population of over 1,000,000 patients. Marburg lies within the postal code area 35 used previously for a population-based estimation of the incidence of status epilepticus [19].

The study population consisted of two cohorts of outpatients with an established diagnosis of epilepsy and at least one seizure during the previous 12 months. The first cohort was recruited in 2003, and the relevant data have already been published [3,20]. The second cohort was recruited in 2008; cost data of 44 patients were used for a population-based study in the German district of Marburg-Biedenkopf [21]. The studies had the approval of the local ethics committee.

2.2. Patients

After receiving written informed consent, all patients 18 years of age or older with epilepsy were eligible. The diagnosis was based on the definitions proposed by the International League Against Epilepsy and the International Bureau for Epilepsy [22]. Patients were excluded when the diagnosis of epilepsy could not be determined without doubt. The treating physician provided information on the epilepsy syndrome, concomitant diseases, and current antiepileptic drugs (AEDs) taken.

2.3. Cost assessment

Costs of hospitalization, outpatient treatment, and medication, and further direct as well as indirect costs were assessed based on a patient questionnaire examining a 3-month period. The questionnaire was validated in the 2003 cohort [3]. Direct costs including inpatient and outpatient care, drug costs, ancillary therapy, special equipment, and transportation as well as indirect costs were evaluated according to German recommendations for performing health economic evaluations [23–25]. The aim of this study was to calculate the genuine costs due to epilepsy and not the costs that may be triggered by other diseases not related to epilepsy. Therefore, patients and physicians were asked in detail whether or not the medication, service, or resource were used specifically for epilepsy. The evaluation of costs was performed by means of a bottom-up approach from the perspective of the statutory health insurance (Gesetzliche Krankenversicherung, GKV). Drug costs were obtained from the official German price list of drugs "Rote Liste" [26]. Costs for inpatient care (hospitalization and rehabilitation) were calculated based on daily charges (2003) and the German Diagnosis Related Groups (2008, G-DRG; www.g-drg.de). The charges for outpatient care, including specialists' consultations, ambulatory diagnostics, and physical therapy, were obtained from the official German doctor's fee scale (Einheitlicher Bewertungsmaßstab, EBM) [27]. Costs for home and special equipment, e.g., assistive or protective devices, were derived from providers' price lists.

Indirect costs for lost productivity due to days off, unemployment, or early retirement were evaluated using the human capital approach for patients younger than 65 years. According to the Federal Statistical Office (www.destatis.de), the mean gross income was €32,609 in 2003 and €34,209 in 2008, i.e., €89.3 vs. €93.7 per calendar day. The productivity losses attributable to epilepsy were determined using calendar days of the remaining study period prior to the official retirement age (65 years).

All costs were calculated for the 3-month evaluation periods and are provided in 2003 or in 2008 Euro (€). To allow a comparison between both cohorts, costs of the first cohort (year 2003) were adjusted for inflation and increase in mean gross income to 2008. Data on inflation of health expenditures and changes in the mean gross income were retrieved from the Federal Statistical Office (www.destatis.de), and calculations were performed according to previously described methods [7]. For further details of the cost calculations, see previous studies [3,28].

2.4. Data entry and statistical analysis

Data entry was performed using the File Maker Pro 8.5 database (Filemaker Inc., Santa Clara, CA, USA). A double-entry procedure was employed to assure a high level of data accuracy. Statistical analyses were performed using IBM SPSS Statistics 20 (SPSS Inc., Chicago, IL, USA) and BiAS. für Windows Version 10.01 (epsilon-Verlag, Frankfurt/Main, Germany). Cost data are presented as mean ± standard deviation (SD), minimum, maximum, and median or percentages where appropriate. In addition, 95% confidence intervals (CI) are provided using the bootstrap method according to the bias-corrected accelerated (bca) approach, considering the fact that most cost variables are right-skewed [29–31]. Comparisons between groups were performed using the appropriate parametric and nonparametric tests.

3. Results

3.1. Patient groups

We enrolled 101 patients with active epilepsy in 2003 and 151 patients in 2008. There were no differences in age or sex distribution or disease duration between the two groups. An equal percentage (76%) suffered from focal epilepsy, and the majority of the patients were on antiepileptic drug (AED) polytherapy. Table 1 shows the sociodemographic and clinical characteristics of both cohorts. We surveyed the 2008 cohort in more detail in terms of marital status, education, job qualification, employment status, and epilepsy syndrome. These data are presented in Table 2. None of the surveyed patients died during the study period.

Table 1
Sociodemographic and clinical characteristics of the cohorts.

		2003 cohort n = 101	2008 cohort n = 151	p-Value
Age in years[a]		40.7 ± 15.7 range: 18–78	41.0 ± 14.9 range: 18–82	0.63
Disease duration in years[a]		18.1 ± 15.4 range: 0.1–52	19.4 ± 15.2 range: 0.1–68	0.09
Anticonvulsants	Mean number of AEDs[a]	1.7 ± 0.9	1.8 ± 0.8	0.62
		% (n)	% (n)	
	No AEDs	4.0 (4)	5.3 (8)	
	Monotherapy	39.6 (40)	30.5 (46)	
	2 AEDs	33.6 (34)	48.3 (73)	
	>3 AEDs	22.8 (23)	15.9 (24)	
Sex		% (n)	% (n)	0.97
Male		46.5 (47)	46.4 (70)	
Female		53.5 (54)	53.6 (81)	
Epilepsy syndrome		% (n)	% (n)	0.38
Focal epilepsy		76.2 (77)	76.8 (116)	
With simple partial seizures only		5.9 (6)	0.7 (1)	
With complex partial seizures		27.7 (28)	18.5 (28)	
With secondarily generalized tonic–clonic seizures		43.6 (43)	57.6 (87)	
Idiopathic generalized epilepsy		19.8 (20)	13.9 (21)	
Unclassified		4.0 (4)	9.3 (14)	

[a] Mean ± standard deviation.

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