

Treating alcoholism reduces financial burden on care-givers and increases quality-adjusted life years

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ABSTRACT

Aims The study assessed the alcoholism-related financial burden borne by informal care-givers and relatives of German alcoholic patients. **Design** By using an exploratory approach, care-giver burden was assessed both prior to and 12 months after detoxification and withdrawal. Quality-of-life data for care-givers collected during follow-up were used to calculate the number of quality-adjusted life years (QALYs) gained by alcoholics' family members while their relatives are undergoing treatment. **Participants** Forty-eight informal care-givers and relatives of alcoholic patients. **Setting** In-patient and out-patient departments of three psychiatric university hospitals in Germany. **Measurements** Expenditures of families related directly to the addiction disorder of alcoholic patients, quality of life of care-givers, relapses of patients. **Findings** Families' expenditures related directly to their addicted member's alcoholism decreased from an average of €676.44 per month (or 20.2% of the total pre-tax family income) at baseline to an average of €145.40 per month at 12 months after the beginning of treatment. The average time spent caring for the affected family member was reduced from 32.3 hours per month to 8.2 hours per month ($P = 0.0109$), and quality-of-life total scores increased from 60.6 to 68.0. The total gain in QALYs for family members was 0.108. When weighed against the average cost of the alcoholism treatment, the cost of one QALY for care-giving family members was €20 398 on average. **Conclusions** Among the families of German alcoholics who receive detoxification, there is a substantial reduction in family expenditures, time spent caring and an increase in quality of life at 1 year. These are important but often neglected additional measures of the burden on family members and also treatment benefits.

Keywords Alcoholism, care-giver burden, cost per QALY, financial burden, QALY, quality of life.

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INTRODUCTION

There is general agreement that the effects of alcoholism on the partners and family members of addicts are enormous [1]. The psychosocial pressure on relatives and informal care-givers of the mentally ill was first addressed in research during the 1980s. The problem soon came to be conceptualized as 'family or caregiver burden' [2], following from earlier work that differentiated two components of that burden: an objective or measurable financial burden and a subjective or psychosocial burden—the latter of which represents the psychological effects or reactions experienced by relatives that were caused by the affected family member's mental disorder (fear of loss, depressed states, shame, experiences of stigmatization,

etc.) [2,3]. The concept was later elaborated further [4–6] when researchers began conducting empirical studies on the families of patients suffering from schizophrenia or affective disorders [7–13]. Apart from rare attempts, such as one doctoral dissertation that studied the burden placed on family members of alcohol or drug users, addiction disorders were addressed only as comorbidity in these studies, if they were addressed at all [14,15].

When they do include the effects on families, addiction studies focus most often only on certain, specific problems such as domestic violence, not on the financial burden [16–21]. Only some cost-of-illness studies in the United States suggested that in families that included a member who was an addict, the non-addict relatives' long-term health-care expenditures were higher than in families

without addicts. This difference became less pronounced after the beginning of addiction treatment [22,23]. Other studies found declining health-care expenditures only for those affected families whose non-addict members were treated for their psychological or mental problems [24]. The high risk of informal care-givers for mental problems and problematic drinking was confirmed in a recent study on 998 family members in Chicago [1].

Our study aimed to quantify the family financial burdens on care-giving relatives of patients suffering from alcoholism, both prior to and 12 months after the patient began treatment. Additionally, care-givers' quality of life was assessed over time to identify changes associated with the treatment of their alcoholic family members. The care-givers' quality-of-life data were used to calculate quality-adjusted life years (QALYs), which were compared to the cost of treating patients as a means of measuring the secondary economic effects of treating alcoholism.

METHODS

Sampling procedure

Our study was conducted alongside a multicentre study (the 'Predict study') [25] carried out by the Baden-Württemberg Addiction Research Consortium located in south-west Germany. The collaborating centres included the Department of Psychiatry and Psychotherapy at the University of Freiburg, the Department of Psychiatry and Psychotherapy at the University of Tübingen and the Department of Addictive Behaviour and Addiction Medicine at the Central Institute of Mental Health (CIMH) in Mannheim. The original Predict study had in-patients starting alcoholism treatment as their subjects. The relatives and informal care-givers of the Predict study patients were recruited to take part in the present study. In order to enlarge the study sample, the family members of CIMH patients who were just about to begin out-patient addiction treatment were also recruited.

In order to be eligible for inclusion in the study, relatives and family members had to be living together with the patient in a common household for at least 18 months prior to the beginning of the study, and to be 18 years of age or older. In cases of two or more eligible relatives they were included in the following order: (i) spouses and partners, (ii) parents, (iii) of-age offspring, (iv) siblings and (v) other relatives. No specific order of priority regarding the gender of parents, children or siblings was considered. Patients were informed about the study and asked for their family members' contact details, who were then asked to collaborate. Written informed consent was required of all study participants. Inclusion lasted from June 2005 to January 2008. The final

interviews were conducted in January 2009. Each participant received two €20 expense allowances at baseline and the follow-up assessment.

Study sample

A total of 71 family members were included and assessed at baseline. Two were excluded after the baseline assessment because they did not fulfil the criterion of living in close contact with the patient. The number of patients or relatives who declined to be included in the study was not recorded, and their reasons for so doing are unknown. It is estimated that, on average, for every family that agreed to participate in the study, there were two to three more that declined. When a family member had declined, no different family relative was asked to participate in place of the ones who declined. The 12-month follow-up assessment included 48 family members. Family members' reasons for dropping out of the study or failing to participate in the follow-up interview included: patient had relapsed ($n = 5$), patient was maintaining abstinence ($n = 3$), divorce or separation from patient since baseline measurement ($n = 3$), no justification ($n = 3$) and death of patient ($n = 1$). In four cases, the family member participating at the baseline measurement had died during the follow-up. In two cases, we were unable to track the relatives and contact them again.

According to the in- or out-patient treatment of patients, the distribution of the family members was as follows: baseline: in-patient $n = 30$, out-patient $n = 39$; follow-up: in-patient $n = 24$, out-patient $n = 24$. The Freiburg centre contributed 11 family members, the Tübingen centre nine and the Mannheim centre 49 (10 in-patients and 39 out-patients).

Scales and methods

All instruments were applied at baseline (t_0) and again after 12 months (t_1). Family members' psychosocial and financial burdens were assessed using an adapted version of the 'Consequences of Mental Illness for the Family' interview [26]. This interview was developed in the Netherlands and quantifies the adverse effects on family life caused by disorder-related patients' behaviour (e.g. care-giving, sick leaves of family members, loss of career opportunities, stress, grief, etc.).

We recorded patients' financial situations and any additional family expenditures related to patients' alcoholism with an adapted version of the 'Client Sociodemographic and Service Receipt Inventory' (CSSRI) [27], which covered expenditures during the 4 weeks prior to application of the instrument at baseline and at follow-up. All financial information derived from these data for use in the analyses was transformed to monthly estimates. Relatives' quality of life was assessed using the

short version of the World Health Organization Quality of Life Interview (WHOQOL-BREF) [28], which provides a total quality-of-life score as well as subscores for physical health (domain 1), psychological wellbeing (domain 2), social relationships (domain 3) and environment (domain 4). The difference between the total scores at t0 and t1 was used to measure the gain of quality-adjusted life years (QALYs) during the 12 months of the study.

Total scores were translated onto a scale from 0 to 100, according to algorithm provided in the WHO QOL-BREF manual. This scale was treated as a preference measure, as it has increasingly been derived for calculating QALY estimates for use in health-care economic studies [29–33]. The score differential between t1 and t0 was weighted with the individual days between the two measurements to yield an individual QALY measure for each family member. Family members' QALY gains or losses were used as a standardized (secondary) measure of the effects of alcoholic patients' treatment. Using this additional estimate gave us the opportunity to compare relatives' QALY gains or losses to the cost of treating patients, and thereby to calculate the cost per QALY. Costs of treatment had to be considered separately for in- and out-patients, as the direct costs of treatment differ substantially between these two groups.

The average 2007 daily rate for an in-patient stay at the addiction department of the CIMH, as paid by health insurance, was taken as a cost estimate for in-patient treatment. This daily rate was multiplied by the 2007 mean stay duration in the department (€240.65 per day, 15.65 days on average), resulting in an average cost of €3766.18 per case. This estimate was also used for those few in-patients treated at the Freiburg and Tübingen centres, although the daily rates and mean stay lengths at those centres were slightly different. A cost estimate for out-patient treatment was calculated to be €723.64 per case per year, and was based on the average health-insurance reimbursement amount for the addiction out-patient department at the CIMH. These estimates were not extended to Freiburg or Tübingen, as no out-patients from these centres were included.

Alcoholic patients' relapses between baseline and follow-up assessment were assessed based on family members' subjective reports of their daily alcohol intake. Patients who had consumed no alcohol during the follow-up in addition to those who had consumed a maximum of one to two drinks during a 3-month period were considered not to have relapsed. Any larger alcohol intake led a patient to be considered relapsed.

Statistical analyses

All statistical analyses were conducted using SAS version 9.2. The differences between baseline and follow-up were

tested using paired *t*-tests in cases where variables were distributed normally. Abnormally distributed variables were analysed using non-parametric Wilcoxon tests. No adjustment was made to allow for multiple statistical testing because we assumed that care-givers' finances and health would be affected by their charges' treatment.

RESULTS

Socio-demographic data

For each case, the same family member was assessed at both t0 and t1. Of these family members, 70.8% were the alcoholic patients' spouses, 10.4% were patients' children, 8.4% were parents and 10.4% were unmarried partners. Partners were, by a small margin, the most likely to drop out of the study before t1. Family members' socio-demographic data as well as their financial and living situations are shown in Table 1.

Baseline data (socio-demographic characteristic, time spent caring for the patient, additional expenditures, general quality of life) for relatives who declined to take part in the follow-up assessment did not differ significantly from the baseline data for completers. These data were also similar at baseline for both in- and out-patients—except for baseline quality of life (total score and domains 2, 3 and 4), which was significantly different for in- and out-patients (see Table 3). Because the end-point used in the final analyses was the difference between baseline and follow-up quality-of-life data on an individual level, the baseline difference between groups was neglected and similar samples were assumed. Patients whose families completed the study were distributed evenly into the two treatment settings: 50% were treated as in-patients and 50% as out-patients. The average length of the period between baseline and follow-up (t0 and t1) was 356 days.

Relapses between baseline and follow-up

Of those whose families completed the study, 13 addicts (27.1%) relapsed between baseline and follow-up assessments, while 35 (72.9%) managed to remain abstinent.

Financial burden due to addiction

Prior to treatment, families' non-medical expenditures that were related directly to their family member's alcoholism averaged €627.78 per month, or 19.8% of total pre-tax family income. In two cases, outstanding debts, in one case due to business insolvency (€750 000) and in the other to a personal bankruptcy related to the family member's alcoholism (€27 000), were excluded from the analyses, as they would have distorted the data excessively. The largest expenditures were for alcoholic

Table 1 Socio-demographic and financial data for study sample (family members of alcoholic patients).

		Baseline <i>n</i> = 69		Follow-up <i>n</i> = 48		Study dropouts <i>n</i> = 21	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Age	Mean (SD)	52.1	(13.5)	52.2	(12.6)	53.9	(15.5)
Gender	Female	56	81.2	40	83.3	16	76.2
Nationality	German	67	97.1	46	95.8	21	100.0
	Other	2	2.9	2	4.2	0	0
Education	Primary school did not finish	4	5.8	6	12.5	1	4.8
	Primary school	23	33.3	16	33.3	6	28.6
	Secondary school	21	30.4	15	31.3	6	28.6
	High school graduation	5	7.3	7	14.6	3	14.3
	Technical college	6	8.7	2	4.2	2	9.5
	University degree	8	11.6	2	4.2	3	14.3
Marital status	Other	2	2.9	0	0	0	0
	Single	4	5.8	3	6.3	1	4.8
	Married	59	85.5	43	89.6	16	76.2
	Divorced	5	7.3	1	2.1	4	19.0
Number of biological children	Widowed	1	1.5	1	2.1	0	0
	Mean (SD)	1.7	(1.4)	1.6	(1.2)	1.7	(1.7)
Relation to patient	Spouse	46	66.7	34	70.8	12	57.1
	Child	7	10.2	5	10.4	2	9.5
	Parent	5	7.3	4	8.4	1	4.8
	Unmarried partner	11	15.9	5	10.4	6	28.6
Number of people in household	Mean (SD)	2.9	(1.0)	2.9	(1.0)	2.6	(0.9)
Monthly family income, before taxes (in €)	Mean (SD)	3162	(1412)	3356	(1950)	2752	(1322)
Living situation	Flat, rented	29	42.0	18	37.5	11	52.4
	Flat, owned	10	14.5	6	12.5	3	14.3
	House, rented	2	2.9	1	2.1	1	4.8
	House, owned	27	39.1	23	47.9	5	23.8
	Others	1	1.5	0	0	1	4.8
Living space in m ²	Mean (SD)	122.0	(54.0)	122.0	(48.0)	115.0	(60.0)

SD: standard deviation.

beverages (of all kinds, €254.57 monthly on average) or smoking (€105.26 monthly on average) (see Table 2).

Families completing the follow-up had only a slightly higher alcohol-related financial burden at baseline (€676.44 per month, or 20.2% of the total family income) compared to the total baseline sample ($n = 69$). After 1 year, the expenditures of those families that completed the study were reduced to €145.40 on average. The difference between this figure and the baseline burden was significant ($P = 0.0032$). Additionally, the expenditures on alcoholic beverages and cigarettes decreased significantly between baseline and follow-up (alcohol: €252.13 versus €70.63, smoking: €92.98 versus €64.21 on average; see Table 2).

Time and money spent on informal care-giving

The average time spent caring for, assisting and supervising the addicted family member was 32.3 hours per month at baseline and 8.2 hours per month at follow-up.

This difference was significant ($P = 0.0109$). Assuming a wage equal to the minimum being discussed currently in Germany for employees in the nursing profession (€8.50 per hour)—which is similar to the amount being discussed as an overall minimum wage across all industries—the informal care of family members may be valued as an additional financial burden of €274.30 per month at baseline and €69.79 per month at the follow-up assessment.

Quality of life

Family members who completed the study had a WHO QOL-BREF total score of 60.6 at baseline and 68.0 after 12 months (see Table 3). On a scale from 0 to 100, that implies an average increase of 7.4 points in quality of life, which was statistically significant. This included a significant score increase in domains 1, 2, 3 and 4 (physical health, psychological health, social relationships and environment, respectively).

Table 2 Average monthly family financial burden related to a family member's alcoholism (in €).

	<i>t0</i>	<i>t0</i>	<i>t1</i>	<i>t0-t1</i>	<i>P</i>	<i>Relapse</i>	<i>No relapse</i>	<i>P</i>
	<i>n</i> = 69	<i>n</i> = 48	<i>n</i> = 48	<i>n</i> = 48		<i>t0-t1</i>	<i>0-t1</i>	
Pharmaceutical drugs (out-of-pocket payment not covered by insurance)	1.88	1.77	2.19	0.42	NS	0.77	-0.86	NS
Hospital (additional out-of-pocket payment)	8.99	4.58	0	4.58	NS	16.92	0	0.0208
Other health-care services (additional out-of-pocket payment)	48.12	63.33	0	63.33	NS	0	86.86	NS
In-home assistance	5.80	0	0	0	NS	0	0	NS
Travel to health-care provider	3.04	0	0	0	NS	0	0	NS
Expenditures for alcoholic beverages	254.57	252.13	70.63	181.50	0.0001	-5.38	250.91	0.0016
Expenditures for cigarettes	105.26	92.98	64.21	28.77	0.0290	30.38	28.17	NS
Expenditures for illegal drugs	43.48	62.50	4.17	58.33	NS	0	80.00	NS
Damage to people or property	95.94	137.92	0	137.92	NS	0	189.14	NS
Others	60.71	61.23	4.21	57.02	NS	22.92	69.69	NS
Total	627.78	676.44	145.40	531.04	0.0032	65.22	703.91	0.0062
Informal care-giving (€)	276.25	274.30	69.79	204.51	0.0109	79.73	250.83	NS
Time spent on informal care-giving (hours/month)	32.50	32.27	8.21	24.06	0.0109	9.38	29.51	NS

NS: not significant; *n* = 69 refers to total sample including non-completers, *n* = 48 are those family members who contributed data for baseline and follow-up assessment.

Table 3 Quality of life of alcoholic patients' family members (WHO QOL-BREF).

	<i>t0</i>	<i>t0</i>	<i>t1</i>	<i>t1-t0</i>	<i>P</i>	<i>Family members of patients with</i>		<i>Family members of</i>		<i>P</i>	
						<i>Relapse</i>	<i>No relapse</i>	<i>In-patients</i>	<i>Out-patients</i>		
	<i>n</i> = 69	<i>n</i> = 48	<i>n</i> = 48	<i>n</i> = 48		<i>n</i> = 13	<i>n</i> = 35	<i>n</i> = 24	<i>n</i> = 24		
Total score	59.6	60.6	68.0	7.4	0.0010	4.1	8.7	NS	7.4	12.1	NS
Domain 1	51.5	52.5	59.8	7.2	0.0010	4.9	8.1	NS	11.1	22.0	NS
Domain 2	60.3	61.0	67.3	6.3	0.0190	-0.4	8.7	NS	3.4	9.1	NS
Domain 3	51.1	52.4	65.5	13.2	0.0002	4.8	16.2	NS	15.7	10.7	NS
Domain 4	75.6	76.4	82.3	5.9	0.0235	11.7	3.7	NS	2.6	9.2	NS

n = 69 refers to total sample including non-completers, *n* = 48 are those family members who contributed data for baseline and follow-up assessment. NS: not significant. WHO QOL-BREF: short version of the World Health Organization Quality of Life Interview.

Changes in family members' quality-of-life total scores were not found to be associated with whether or not the addicts were treated as in- or out-patients. The increase was 4.6 points higher for care-givers from families with no relapses than for families who had experienced a relapse, but as there were only 13 relapse cases, this difference was also not statistically significant (see Table 3).

Family burden and relapse

The reduction between baseline and follow-up in the financial burden on families whose addict member relapsed was significantly lower than the burden on families whose addict member remained abstinent. Alcoholism-related expenditures decreased by €65.22

per month on average in families where a member relapsed, compared to a decrease of €703.91 per month for families without a relapse. The difference was due primarily to expenditures on alcoholic beverages (see Table 2).

QALYs

After translating the total scores on the WHO QOL-BREF at baseline and follow-up to QALYs, as described above, the total gain for the entire sample (*n* = 48) was 0.108 QALYs (see Table 4). As with the quality-of-life scores, this increase differed across the various WHO QOL-BREF domains. The overall QALY gain between baseline and follow-up was not associated significantly with whether patients were treated as in- or out-patients.

Table 4 Family members' quality-adjusted life year (QALY) gain between baseline and follow-up (t1–t0).

	Total group n = 48	Family members of		P
		In-patients n = 24	Out-patients n = 24	
QALY total score	0.108	0.100	0.117	NS
Domain 1	0.201	0.158	0.245	0.0508
Domain 2	0.054	0.042	0.065	NS
Domain 3	0.148	0.206	0.090	NS
Domain 4	0.063	0.032	0.094	NS

NS: not significant.

Cost per QALY

When comparing the QALY gain in relatives to the cost of treatment of their addict family member, the average cost of a quality-adjusted life year for the entire group was €20 398. Due to the considerable difference in the cost of alcoholism treatment for in- and out-patients, the cost of a QALY of family members differed between these subgroups: €5470 on average for relatives of out-patients, compared to €37 661 on average for in-patients' relatives.

DISCUSSION

Limitations of the study

The sample was recruited from the in- and out-patients of three psychiatric university hospitals in Germany. A selection bias cannot be ruled out, as the in-patients were drawn from the PREDICT study [25], and thus had to adhere to this study's inclusion criteria and were treated according to its protocol, while out-patients did not follow this regime exactly, but were instead treated under similar conditions in one of the three university hospitals.

As we could not collect information from patients or family members who declined to participate, the question remains open as to what extent the study sample was representative of the participating centres' patients. That said, a *post-hoc* comparison of the families of in- and out-patients does not suggest that there was a selection bias between the two. Additionally, the participating families' gross family income (€3162 per month on average) differed very little from the total 2008 average for Germany (€3561), suggesting that the study participants' socio-economic status was more or less typical for Germany [34]. Finally, the fact that the difference between the alcoholism-related family burdens at baseline for study completers and for dropouts was very small does not suggest any systematic cause responsible for participants' dropping out. The study was restricted to patients who

were living together with spouses or families. Its findings should not be generalized to alcoholic patients who live alone, but who also receive some informal care.

Finally, it should be noted that the study did not include a control group, meaning that the findings suggest an influence, but cannot be interpreted as simply the effect of alcoholism treatment. The quasi-control group (family members of treated and non-relapsing patients) was not large enough for proper assessment. Further studies should adopt a controlled design as well as a large enough sample size to guarantee statistical power. Being part of the larger PREDICT study, the economic analyses did not include a separate statistical power analysis. Therefore, all results and conclusions must be considered as exploratory.

The lack of a control group also means that we were unable to draw conclusions about or compare our findings to the burden imposed on families of alcoholics who have not undergone treatment or who were sober for a significant period but then began drinking again due to some significant life event and had to return for treatment ('regression to the mean'). However, our results for the subgroup for relapsing patients—although perhaps not representative of alcoholics who have never been treated—may provide some insights into this tendency towards regression to the mean.

Cost estimates

Alcoholic patients' actual health-service consumption levels may, in some cases, have differed from the levels indicated by the utilization data used in the study. In particular, some of the in-patients received an unknown amount of additional psychotherapeutic treatment, which was not represented in the cost estimates used in our analyses. For this reason, treatment costs may be slightly underestimated in cases that included hospital treatment.

Our study's major findings can be summarized as follows:

- The addiction-related financial burden on family members of patients suffering from alcoholism is very large, amounting to approximately 20% of family income before taxes.
- The financial burden decreases significantly when the addict receives treatment. When the patient manages to remain abstinent for a 12-month period, the financial burden may be reduced significantly more sharply than in cases of relapse. However, these savings—as is the case for all financial effects analysed in this study—cannot be considered as offsetting the costs of treatment.
- Family members' quality of life increases significantly during the 12-month period after treatment is initiated.
- The cost per QALY can be estimated for family members and relatives using the overall cost of treating the patients. Costs per QALY range between €5470 in cases of out-patient treatment and € 37 661 in cases of in-patient treatment.

This study represents an innovative methodological approach. Per-QALY cost estimates for family members of alcoholic patients associated to treatment costs have not yet been published in international addiction research journals. Our findings demonstrate that the financial and the psychosocial burdens on families (in terms of relatives' quality of life) can be ameliorated by the treatment of the affected family member. Sustaining abstinence for 1 year is likely to reduce the families' alcoholism-related expenditures to zero. The underlying assumption of our analysis is that any observed change in families' expenditures occurs immediately following treatment initiation and persists for the entire follow-up period. In those cases where the family member did not relapse, these expenditures were reasonably considered to have been reduced to zero immediately after treatment initiation and to have stayed at zero thereafter. In the case of relapses, however, it is unclear when and for how long disorder-related expenditures rose again. In these cases, we estimated the level of expenditures recorded for the month immediately preceding their follow-up to have been the level for the entire period between treatment initiation and follow-up. It should be noted that this may slightly overestimate the actual increase, as there were probably also some periods of zero additional expenditures during the months before the relapse.

Whether our method over- or underestimates gains in quality of life, and therefore the cost per QALY, depends on exactly when and for how long the improvement in quality of life actually occurred. For example, if it were to emerge that quality of life improved linearly from baseline to follow-up, then our method of taking the difference between quality-of-life levels at baseline and follow-up would overestimate the actual increase by a factor of two. Conversely, our method may also under-

estimate quality-of-life increases by including only one of the patients' family members in the analyses. If it were to come to light that the other household members also experienced a comparable increase in quality of life, then our estimates would need to be multiplied by a factor of 1.9 to account for the average household size of 2.9 persons.

The fact that there was an overall increase in quality of life suggests that the effect may be attributable to the simple fact that the subject has begun treatment—without regard for the outcome. However, the possibility that the increase in quality of life may not be attributable to treatment at all, but is due instead to an independent upwards trend in quality of life, as has been shown in other studies, cannot be ruled out [35,36]. Similarly, regression to the mean may also be responsible for the quality-of-life increases.

Although the QALY concept is controversial [37], calculating the cost per QALY allowed us in this study to assess the relative value for money of addiction treatment in terms of its indirect effects on patients' families. As the findings show, treatment yields substantial benefits additional to the effect on the patient.

What the threshold QALY value should be, below which medical treatment should be considered affordable, is a source of ongoing debate. In the United Kingdom in 2007, the National Institute for Health and Clinical Excellence (NICE) set £20 000 (approximately €29 500 at 2007 exchange rates) for one QALY gained as the upper limit above which treatment would not be considered cost-effective [38]. Such limits are not fixed, however. In 2008, for example, NICE deemed a cost of £30 000 (approximately €37 500 at 2008 exchange rates) per QALY as acceptable for pharmaceutical treatment in terminal stages of cancer [39]. In the context of preventive measures, thresholds as high as €40 000 have also been discussed.

Our findings lie within this range. It should be noted, however, that relatives' QALY gains are a secondary, although additional, effect of addiction treatment. If we used the aforementioned QALY values thresholds as benchmarks, the QALY gains for alcoholics' relatives—if they were to be confirmed in larger studies—must be added to the QALY gains generated for the patients themselves by their treatment (which we did not assess here). The sum of these two QALY gains is then what should be compared to the actual cost of treatment, which would substantially increase the cost-effectiveness ratio of alcoholism treatment.

A recent Australian study calculated the cost per QALY gained through treating alcoholism at AU\$12 966, or approximately €8065 in 2005 prices, a figure that is more or less comparable to those we applied in this study [40,41]. Such findings give an impression of

the added value that may be generated when putting secondary effects on family members into the equation.

Until now, these effects have generally been neglected in health-care economic addiction research. This perspective is, however, a necessary one if we are to achieve a realistic understanding of the economic and psychosocial strain caused by alcoholism and its treatment.

Declarations of interest

HJS received financial support for oral presentations and advisory board membership from Eli Lilly, Pfizer and Janssen-Cilag, but not for this study. MF received financial support and sponsoring for oral presentations and symposia from Lundbeck, Janssen-Cilag, Novartis, Lilly, AstraZeneca, Pfizer, Servier, Bristol-Myers Squibb and GlaxoSmithKline, but not for this study.

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