Cognitive-Educational Treatment of Fibromyalgia: A Randomized Clinical Trial. II. Economic Evaluation

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ABSTRACT. ***Objective.*** In this 3 year randomized clinical trial the cost effectiveness of a 6 week educational/cognitive intervention (ECO) is compared with an educational discussion intervention (EDI) and a waiting list condition (WLC).

Methods. A total of 131 patients with fibromyalgia were randomly allocated to the ECO, EDI, or WLC intervention. The ECO and EDI groups were followed for 12 months, whereas the WLC group was followed for 6 weeks. Direct health care and nonhealth care costs, and the indirect costs associated with lost production due to illness, were calculated. The effects were measured in terms of utilities, using rating scale and standard gamble methods.

Results. Treatment costs were estimated to be US $980 per patient for both ECO and EDI. The total direct health care costs of ECO treatment were US $1623 higher than those for EDI. This difference was significant. Indirect costs for the 2 groups were not significantly different. At 6 weeks there was a significant difference in rating scale utilities between the 3 groups, caused by a significantly greater improvement in the EDI group compared to the WLC group. However, no significant differences in either rating scale or standard gamble utilities were found between the ECO and EDI groups immediately after treatment, or at the 6 or 12 month followups.

Conclusion. The economic evaluation showed that the addition of a cognitive component to the educational intervention led to significantly higher health care costs and no additional improvement in quality of life compared to the educational intervention alone. This conclusion is robust through a range of plausible values used in a sensitivity analysis. (*J Rheumatol 1996;***23:1246–54**)

Key Indexing Terms:
FIBROMYALGIA COSTS COGNITIVE-BEHAVIORAL TREATMENT
ECONOMIC EVAULATION UTILITIES QALY

Fibromyalgia (FM) is a chronic pain syndrome associated with symptoms of stiffness and fatigue. It has a significant effect on quality of life[1]. Patients frequently have pain, depression, anxiety, decreased participation and pleasure in leisure activities, impaired function in daily life or at work, and increased dependence on family and friends[2–4]. Although there are no detailed cost of illness studies for FM, it is associated with extensive health care utilization due to the absence of a clear etiology or effective therapies. A study of the health service utilization of 81 patients with FM[2] showed that their use of outpatient medical services was higher than outpatient services use of both the control subjects and the national averages. However, the health care utilization was similar to that of the patients with other chronic pain disorders such as osteoarthritis and low back pain. This study also found very high hospitalization rates before FM was diagnosed. Several studies have shown that job limitations are associated with FM[1,2,5,6]. A study of disability claims paid by a large Canadian insurance company shows that over 50% of patients with FM who receive such a benefit are disabled for more than 2 years[5]. These longterm disability payments and compensation arising from litigation reflect the considerable loss of potentially productive years from FM. However, these studies all report on work disability, which may be an underestimate of the total indirect costs, since in most studies more than 85% of the patients are women without a paid job.

Despite the considerable burden and costs associated with FM and the increasing need to use resources efficiently, only one economic evaluation of treatments for FM was found. This study[7] investigated the treatment of patients with FM with Lyme disease using intravenous antibiotics. The drug was directed at the Lyme disease. Therapy costs, including the costs of treating side effects, were more than US $80,000 for every case of Lyme disease that was treated effectively. The cost calculations in this study were limited to the costs of health care utilization, which is not sufficient to economically evaluate a chronic disease. In a chronic ill-

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ness such as FM, the costs borne by patients and their families and the costs of lost productivity are likely to be substantial and should not be excluded. Full economic evaluations compare alternative treatments with respect to all relevant costs and effects. Since there are not sufficient resources to support every new intervention, the results of such full economic evaluations can be used to inform decision makers about the most efficient use of the scarce resources, so that the total health gains from the use of these resources can be maximized.

The main question we address is whether a combined educational/cognitive therapy is effective, and cost effective compared to educational therapy alone. To assess the short term effect of both therapies, a control group of patients on the waiting list was also followed. To our knowledge this is the first full economic evaluation of a treatment modality for FM. The societal perspective has been adopted in this study because of the wide array of social and economic consequences of FM, as described.

MATERIALS AND METHODS

Study design. In a 3 year randomized controlled clinical trial, 131 patients aged 18–65 who met the American College of Rheumatology criteria for FM were randomly assigned to an educational cognitive group (ECO, 49 patients), an educational discussion group (EDI, 39 patients), and a waiting list condition (WCL, 43 patients). The ECO and EDI treatments were structured so that groups of 6 patients participated in a 6 week program of 12 half-day treatment sessions at the outpatient clinic of a rehabilitation center. The group discussion component of the EDI program was intended as an attention control for possible aspecific effects of the cognitive treatment. Details regarding the content of the treatment programs are published[13].

All patients were seen at the outpatient clinic of the rehabilitation center 2 weeks before the start of the treatment (PRE1), at the start of treatment (PRE2), after completion of the 6 week (POST) treatment program, and 6 (FU1) and 12 months (FU2) after termination of treatment. Patients in the WLC group were followed for 6 weeks after randomization. This group was included only to measure the short term effects of ECO and EDI treatments.

Clinical effects were expressed in terms of 5 primary measures (pain control, pain coping, knowledge, tension, and relaxation), 4 secondary measures (catastrophizing, pain intensity, pain behavior, activities), and 3 affective measures (fear, depression, and obsessive-compulsiveness), as described[13]. We focus here on the outcomes, in terms of costs and utilities (where utilities are values assigned to the patient's quality of life). The economic evaluation specifically addresses the question whether the addition of cognitive therapy to educational therapy is cost effective compared to educational therapy alone.

Costs. To evaluate the economic consequences, the direct health care and nonhealth care costs were considered, as well as the indirect costs. The direct health care costs included the costs of the ECO and EDI treatment programs and of all other pain related health care utilization, which includes GP contacts, outpatient specialist contacts, physiotherapy, alternative health care, hospitalizations, home help, prescribed medications, and over the counter medications. Direct nonhealth care costs include costs of paid and unpaid help, transportation costs, out of pocket expenses for pain related activities and purchases. Indirect costs refer to the value of the production lost due to illness related absence from work or days lost from housekeeping. The costs in 1993 Dutch guilders have been converted into US dollars ($) at the 1993 Purchasing Power Parities rate* of 2.134:1 (OECD Health Data File, 1995). Table 1 provides an overview of the unit prices of important cost components.

Program costs. The calculation of total costs per patient of the ECO and EDI programs was based on the volumes in the program protocols, the time schedules of therapists, and detailed cost accounting studies in the rehabilitation center using the direct allocation method to allocate service department costs to production departments.

Direct health care costs. Data on pain related health care utilization was obtained from patients using a weekly cost diary that was specifically developed for this study. It covered visits to the GP, outpatient specialist, and physiotherapist, hospitalizations, alternative health care, over the counter medications, and prescribed medications. The prescribed medication was later subdivided into antirheumatics, analgesics, sleep inducers and tranquilizers, antipsychotics, and antidepressants. Patients were asked to complete this diary for the entire study period. It was left to the judgment of the patient whether particular items of health care utilization were related to their FM.

*Purchasing Power Parities (PPP) are rates of currency conversion that equalize the purchasing power of different currencies. The PPP conversion rate eliminates the differences in price levels between countries.

Table 1. Unit prices used in calculations of direct health care and nonhealth care costs (US dollars).

	Unit Price/Contact (US$)		Unit Price/Contact (US$)
General practitioner	28.68	Alternative health care	
Outpatient specialist		Homeopath	90.00
Rheumatologist	32.06	Acupuncturist	180.00
Neurologist	37.07	Natural therapy	42.50
Orthopedist	25.48	Manual physician	74.01
Gynecologist	26.06	Orthomanual physician	87.31
Internal medicine	26.54	Reflexologist, magnetizer,	
Psychiatrist	44.57	hypnotizer, paranormal healer, etc.	30.00
Rehabilitation physician	24.54	Home help (per hour)	30.00
Urologist	25.47	Unpaid help from family, friends (per hour)	15.00
Cardiologist	23.63	Transportation	
Physiotherapy		Taxi (per km)	1.33
Regular	30.37	Own car (per km)	0.57
Manual therapy	58.61	Public transport (per km)	0.19
Caesar/Mensendieck	33.38		
Ultrasound	34.63		
Hospitalization (per day)	536.00		

The costs of GP contacts (US $13.44/consultation), outpatient specialist contacts (ranging from US $11.07 to 20.89/consultation), contacts with a physiotherapist (ranging from US $14.23 to 27.46/consultation), hospitalizations (US $251.17/day), and home help (US $14.06/h) were based on charges. A population weighted average of the charges paid by socially insured and privately insured patients was used. The costs of drugs were based on Dutch pharmacy prices. Costs of alternative health care (ranging from US $19.92 to 84.35/consultation) were based on the guidelines of the professional associations for alternative medicine.

Direct nonhealth care costs. Data on direct nonhealth care costs related to FM were also collected using the weekly cost diary. Patients were asked to report the following: type of transportation, distance travelled, hours of unpaid help from family or friends, housekeeper expenses, out of pocket expenses for activities such as swimming, physical exercise, etc., and out of pocket expenses for equipment, aids, modifications to the home, clothing, etc., necessary to participate in the program or for self-management. Costs of unpaid help by family or friends were valued using the shadow price for professional help (US $7.03/hour). For the other direct nonhealth care costs, the prices reported by the patient in the weekly cost diary were used.

Indirect costs. To calculate indirect costs, patients were asked to report in the weekly cost diary how many days they were absent from their paid employment and how many days they were unable to perform their usual daily activities.

The indirect cost calculation was based on the human capital approach, which estimates the value of potential production lost during the entire period of absenteeism using, for both sexes, the national average gross hourly wage of US $10.78. The human capital approach measures the full potential loss of production but is likely to overestimate the actual loss, because in reality missing workers may be replaced by others, or the absentee may make up the lost production once he or she returns to work. To calculate the actual production loss, it is more realistic to assume that losses occur only during the time needed to replace the sick worker, or to reorganize the production process. This is called the friction time. In the sensitivity analysis we estimate the value of the production loss assuming that no production is lost after this friction time. An estimation of the length of the friction period in the Netherlands, as of our study period, was obtained from Koopmanschap, *et al*[8], who developed the Friction Cost Approach and calculated that 3 months was necesssary, on average, to fill vacancies.

Utilities. The effects are measured in terms of utilities. A utility is a single comprehensive outcome measure that reflects the value or preference that respondents assign to a particular health state. This value is expressed on a scale ranging from 1 (perfect health) to 0 (death) and takes into account both the positive treatment effects and the negative side effects. We elicited utilities from patients participating in the trial by means of the Maastricht Utility Measurement Questionnaire. The instrument is a slightly adapted Dutch version of the McMaster Utility Measurement Questionnaire[9,10]. It is administered as an interview. Utility measurement using this instrument consists of 2 parts: first, patients are asked to describe their own health state of the past 2 weeks. They are requested to rate their current functional level using a 5 point scale (1 = best level, 5 = worst level) for 6 domains: physical state and mobility, self-care, emotions, leisure activities, pain and other complaints, and side effects of treatment. Second, patients are asked to value both an hypothetical reference state and their own health state by means of rating scale and standard gamble techniques. The hypothetical reference state is a description of a state with medium impaired quality of life, described in terms of the above 6 domains. This state serves as a reference point when patients value their own health state. The rating scale is visualized as a thermometer, with perfect health (100) and death (0) on the extremes. By means of the rating scale, utilities are measured directly by asking the patients to place the health states on the thermometer. By means of the standard gamble method, utilities are derived from the patients' responses to decision situations under risk. In the standard gamble, patients are offered a choice between 2 alternatives: alternative A is a gamble with chance P of gaining perfect health and chance 1–P of dying immediately. Alternative B is the certainty of living in the health state being evaluated (either the patient's own current health state or the reference state) for the remainder of one's life. Probability P is varied in steps of 10% until the patient is indifferent between the 2 alternatives. According to the axioms of expected utility theory, the value of P at the indifference point is the expected value of this gamble, and thus the utility assigned to the health state being evaluated[11]. To facilitate the standard gamble questions, a chance board with a probability wheel was used as a visual aid.

Quality adjusted life years. The quality adjusted life years (QALY) is an effect measure that includes both the effects in terms of quality of life and effects in terms of survival[12]. To calculate QALY, utilities are used as correction factors to adjust years of life to allow for differences in the quality of life. For example, if the quality of life of a patient with a remaining life expectancy of 20 years improves by 0.5 of a utility because of a treatment, then this treatment results in 10 (20 × 0.5) QALY gained. QALY can be related to costs, resulting in a cost per QALY gained ratio. This ratio makes it possible to compare the cost effectiveness of the current intervention with other programs of all kinds. For our study the QALY gained by the ECO and EDI interventions will be calculated for illustrative reasons only.

Statistical analysis. To analyze the differences in direct, indirect, and total costs between the ECO and the EDI groups, costs per patient-year were calculated[13]. This means that the observed costs of the patients with one or more missing weekly cost diaries were extrapolated to a one year period. Since the distribution of costs was skewed to the right, the nonparametric Mann-Whitney test was used to assess the statistical significance of cost differences between the ECO and EDI groups. Analyses of variance on log transformed costs per patient-year confirmed the results of the Mann-Whitney test; the p values of both tests were virtually the same.

The differences in the changes in utilities for the ECO, EDI, and WLC groups were analyzed using covariance analysis (ANCOVA), with the treatment group used as a factor and the baseline scores and a measure of social desirability as covariates.

RESULTS

Patient characteristics. One hundred thirty-one patients with FM were randomly assigned to one of the 3 different groups. There were no statistical differences between the groups in clinical and sociodemographic characteristics[14]. Most patients were women (88%) with a mean age of 44 years and pain duration of 10 years[14]. At baseline, the patients were asked if they had had contact with an outpatient specialist or a physiotherapist or had had alternative health care contacts in the last 12 months.There was no difference in health care utilization among the groups in the year before the trial. Of the whole sample, 98% had at least one outpatient specialist contact, 72% had used physiotherapy at least once, and 30% had at least one alternative health care contact in that year. Utilities did not differ between groups at baseline. The values (divided by 100) were ECO 0.46 (SD 0.12), EDI 0.45 (SD 0.15), WLC 0.47 (SD 0.13) for rating scale utilities and ECO 0.83 (SD 0.15), EDI 0.80 (SD 0.18), WLC 0.78 (SD 0.16) for standard gamble utilities. On the 6 domains of health, the average scores for all patients were 3.1 (SD 0.67) on physical state and mobility, 1.9 (SD 0.71) on self care, 3.2 (SD 0.73) on emotions, 3.3 (SD 0.64) on leisure activities, 3.9 (SD 0.60) on pain and other complaints, and 1.6 (SD 0.75) on side effects from treatment. The classification of the domains of health did

not differ between the groups except for the domain "physical state and mobility." For this domain there was a difference between the ECO and the EDI groups, the latter reporting a more favorable health state ($p = 0.035$).

Twenty-six patients did not complete the treatment to followup at one year (for ECO and EDI patients) or 6 weeks (for WLC patients). As reported[14], there were no differences in demographic and clinical baseline characteristics between the dropouts and those who completed the study. The dropouts were included in the analyses until the moment of dropout.

Costs. Program costs. Using the standard therapy protocols, the costs of the ECO and EDI programs were estimated to be US $980 per patient (Table 2). Although the ECO program is more demanding, since the program component given by the psychologist requires more active participation from the patient, there is no difference in costs between the 2 programs because the number of therapy hours given by the various therapists are equal.

Other direct health care costs. As noted, the other direct costs have been measured by means of the patients' weekly cost diaries. During the entire followup period, patients in the ECO and EDI groups completed and returned 84 and 80%, respectively, of the weekly cost diaries. Table 3 shows the annual volumes per patient for the various categories of health care use. Although not all categories show significant differences between the 2 groups, there is a clear pattern in the direction of the differences. All categories reflect higher health care use in the ECO group compared to the EDI group. It can also be seen that many of the patients in both groups received physiotherapy and called on unpaid help. Of the patients in the ECO and EDI groups, 49 and 36%, respectively, received physiotherapy at least once, and 29 and 13%, respectively, received physiotherapy once or more than once per week during the entire year. Sixty percent and 52% of patients in the ECO and EDI groups, respectively, received unpaid help from family or friends.

The mean total direct costs per patient-year, including

Table 2. Program costs of the ECO and EDI treatments per patient (US dollars).

Program Components	No. of 30 min Therapy Sessions	Cost of 30 min Therapy	No. of Patients in Group	Total Cost/Patient
Rehabilitation specialist (group therapy)	8	57.51	6	76.68
Rehabilitation specialist (individual therapy)	2	57.51	1	115.02
Welfare work	4	43.05	6	28.70
Psychology	36	50.81	6	304.86
Physiotherapy	12	16.42	6	32.85
Sports and games	14	19.50	6	45.50
Treatment program manager	6	16.42	6	16.42
Ergotherapy	7	25.07	6	29.25
Rehabilitation day treatment (days)	12	27.56	1	330.76
Total program costs				980.04

Table 3. Mean (SD) health care use and mean (SD) use of other health care services per patient-year by cost category and treatment group.

	ECO (n = 35)	EDI (n = 31)	p*
Number of			
General practitioner contacts	6.7 (7.2)	5.6 (7.2)	0.131
Outpatient specialist care contacts	6.9 (8.1)	3.3 (4.0)	0.121
Physiotherapy contacts	25.1 (30.4)	11.1 (20.3)	0.037
Alternative health care contacts	4.6 (12.6)	1.3 (4.4)	0.025
Hospitalizations	1.8 (8.87)	0.5 (2.8)	0.376
Different medicines prescribed	6.0 (5.3)	5.7 (9.6)	0.162
Different OTC medications bought	9.2 (17.2)	1.3 (2.9)	0.179
Hours of professional home help	20.6 (70.1)	17.9 (68.8)	0.579
Hours of paid housekeeping help	76.5 (105.5)	34.8 (56.8)	0.137
Hours of unpaid help from family or friends	165.8 (267.8)	84.6 (133.0)	0.324
Health activities	55.8 (37.4)	48.1 (34.8)	0.275
Expenses for equipment, clothing, etc.	0.9 (1.4)	0.3 (0.8)	0.012

* Mann-Whitney test, OTC: over the counter medications.

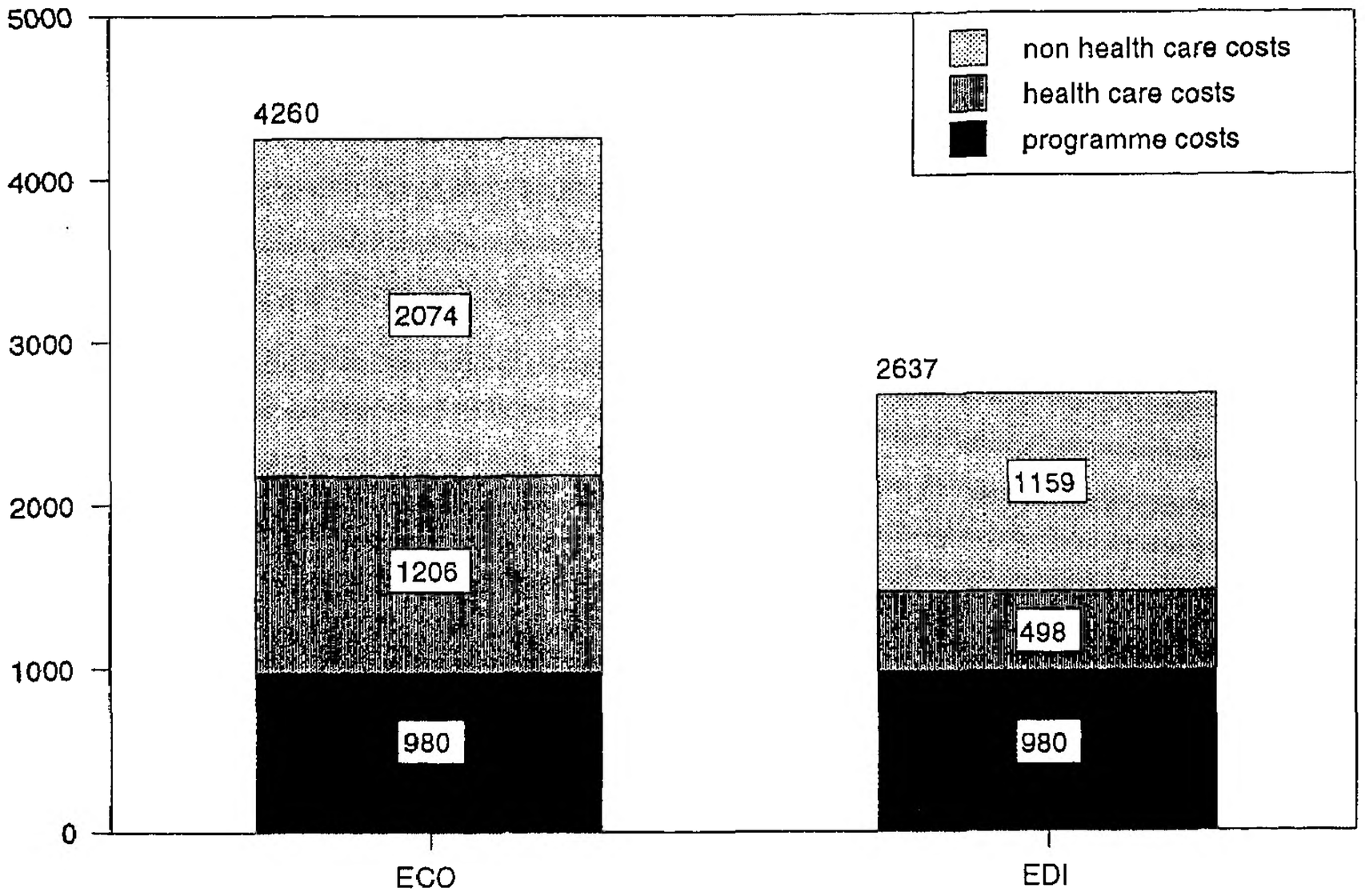

Figure 1. Estimated total costs per patient-year per treatment program (US dollars).

program costs, were estimated to be US $4260 (SD 6510) for the ECO group and US $2637 (SD 4649) in the EDI group. Figure 1 shows that both the direct health care costs ($p = 0.003$), the direct nonhealth care costs ($p = 0.028$), and the total direct costs ($p = 0.001$) per patient-year were significantly lower in the EDI group than in the ECO group.

Table 4 shows the various components of direct costs measured by the patient-year approach. Although not all differences in the subcategories of direct costs reach conventional levels of statistical significance, direct costs were higher in the ECO group than in the EDI group in all categories. The differences in the costs for alternative health care, travel expenses, and expenses for equipment, clothing etc., reach statistical significance. The cumulative distribution of direct costs per patient over time shows that the costs in the ECO group increase faster than in the EDI group over the entire period.

Indirect costs. Patients in the ECO group reported a mean of 42 (SD 82) days of pain related absence from work and a mean of 50 (SD 56) days on which they were not able to perform their usual daily activities. The EDI group reported 34 (SD 71) and 44 (SD 55) days of absenteeism and inactivity, respectively. However, the differences between the 2 groups were not statistically significant on either measure. Consequently, although the estimated indirect costs based on the Human Capital Approach were also somewhat high-

Table 4. Mean (SD) direct costs per patient-year by cost category and treatment group (US dollars).

Cost Category	ECO (n = 35)	EDI (n - 31)	p*
Health care costs			
General practitioner	90 (206)	75 (311)	0.131
Outpatient specialist care	114 (351)	55 (151)	0.133
Physiotherapy	373 (1135)	154 (609)	0.083
Alternative health care	145 (905)	19 (126)	0.023
Hospitalizations	330 (3327)	127 (1502)	0.376
Prescribed medications	119 (296)	63 (170)	0.071
OTC medications	35 (160)	5 (27)	0.218
Non-health care costs			
Home help	289 (2104)	252 (2036)	0.579
Paid housekeeping help	353 (1165)	191 (700)	0.279
Unpaid help from family or friends	1165 (4016)	595 (1995)	0.324
Expenses for health activities	65 (203)	51 (190)	0.491
Travel expenses	92 (296)	52 (78)	0.047
Expenses for equipment, clothing, etc.	110 (639)	55 (111)	0.017

* Mann-Whitney test. OTC: over the counter medications.

er for the ECO group (US $6379, SD 15,569) than the EDI group (US $5817, SD 14,303), they were not significantly different (p = 0.872).

Sensitivity analysis of the cost calculations. The analysis of the costs is based on several assumptions. The effect on the results of changing these assumptions can be assessed in a sensitivity analysis. A number of alternatives to the cost calculations presented in the previous section are discussed below.

Including or excluding the group discussion component. The estimated program costs of US $980 per patient were based on a detailed cost accounting study, which showed these costs to be equal for the ECO and EDI programs. It could be argued that the presence of a psychologist during group discussion therapy (which is expensive) is not necessary, and that someone with training in leading groups could also lead the sessions. The EDI program costs would then probably be lower. However, the group discussion component in the EDI program was initially intended only as an attention control for possible aspecific effects of the cognitive treatment. Cancelling this entire component reduces the costs of the EDI program by US $305 per patient.

Cost accounting versus charges. Another assumption was that the program costs were best estimated by an institutional cost accounting study. However, from the rehabilitation center's perspective, costs are better reflected by charges. Based on the charge for outpatient rehabilitation care, US $106 per day, the program costs would be 12 × US $106 = US $1272 per patient. This is US $292 more per patient than was calculated initially. Because there is only one charge for outpatient rehabilitation care, irrespective of its content, there is again no difference between the costs of the ECO and EDI programs, whether the cognitive component is included or not.

Excluding high cost events. The difference in direct health care costs between the ECO and EDI programs was heavily influenced by differences in the costs associated with physiotherapy, unpaid help, and hospitalizations. In the ECO group, 29% of patients had physiotherapy on average once or more than once per week for the entire year, compared to 13% in the EDI group. Excluding the costs of physiotherapy decreases the difference in direct health care costs from US $707 to US $561, still in favor of EDI. Excluding the costs of unpaid help for the patients with more than 10 hours of unpaid help a week (11% in ECO and 3% in EDI) reduces the difference in direct nonhealth care costs from US $916 to 522, again in favor of the EDI program. The differences in hospitalization costs are due to there being 3 hospitalized patients in the ECO group in comparison with one hospitalized patient in the EDI group. Excluding the hospitalization costs reduces the difference in direct health care costs from US $707 to 504, still in favor of EDI. Even if all 3 high cost components are excluded, the difference in total direct health care costs between the 2 groups is still significant.

Mean costs versus median costs. The calculations of total direct costs associated with both programs were based on the assumption that the costs are best estimated using mean costs. Estimating the incremental costs using median costs affects the cost differences between the 2 programs. The direct cost per patient of the ECO treatment is then US $421 higher than for the EDI program.

Human capital approach versus friction cost approach. Using the main assumptions of the friction cost approach, instead of the human capital approach, reduced the indirect costs in both groups. During the whole research period 11 patients were absent from paid employment or unable to perform housekeeping functions for more than 3 months. But because the number of patients who were absent for longer periods was comparable in both groups the friction cost approach does not change the finding that indirect costs are not significantly different between the EDI and the ECO group.

Overall, no matter what changes in cost assumptions were made, the cost differences between the ECO group and the EDI group were always in favor of the EDI group. This means that the sensitivity analyses strongly support the results found in the baseline analysis.

Utilities. The results of the clinical effect measures are described in detail elsewhere[14]. In the first part of the Maastricht Utility Measurement Questionnaire the patients had to classify themselves on 6 domains of health. In general, there was no change over time and no difference between the groups on these domains, except for significant differences during the treatment in the domain "leisure activities" in favor of the ECO condition compared to WLC (p = 0.039), and in the domain of "self-care" in favor of EDI compared to WLC.

As for the utilities after 6 weeks of treatment, there was a significant difference in rating scale utilities between the 3 groups (p = 0.037) (Table 5). This difference was due to a statistically significant greater improvement in the EDI group compared to the WLC group (p = 0.012).

Figure 2 shows greater improvement in rating scale utilities in the EDI group at the POST measurement (EDI 0.108 vs ECO 0.070; p = 0.304) and FU1 (EDI 0.107 vs ECO 0.057; p = 0.338), though this trend is not significant. At FU2 the improvement is greater in the ECO group (ECO 0.093 vs EDI 0.067; p = 0.590). Again, this difference is not significant. The change in standard gamble utilities was not significantly different at either POST, FU1, or FU2.

QALY. The changes in rating scale utilities and standard gamble utilities from baseline at measurement were used to calculate the QALY gained by the alternative programs. Based on rating scale results, Figure 2 shows that the EDI treatment produced a gain of 0.027 QALY per patient per

Table 5. Differences in changes in utilities after 6 weeks between ECO, EDI, and WLC groups.

	ECO (n = 32)	EDI (n = 24)	WLC (n = 33)	p*
Rating scale**, Mean (SD†)	+0.070 (0.13)	+0.108 (0.13)	+0.018 (0.13)	0.037
Standard gamble, Mean (SD)	+0.003 (0.12)	+0.005 (0.12)	−0.028 (0.12)	0.473

* From ANCOVA: utilities are adjusted for baseline and social desirability.

** Rating scale utilities were divided by 100.

† Standard deviations (SD) equal the root mean square residual and were divided by 100.

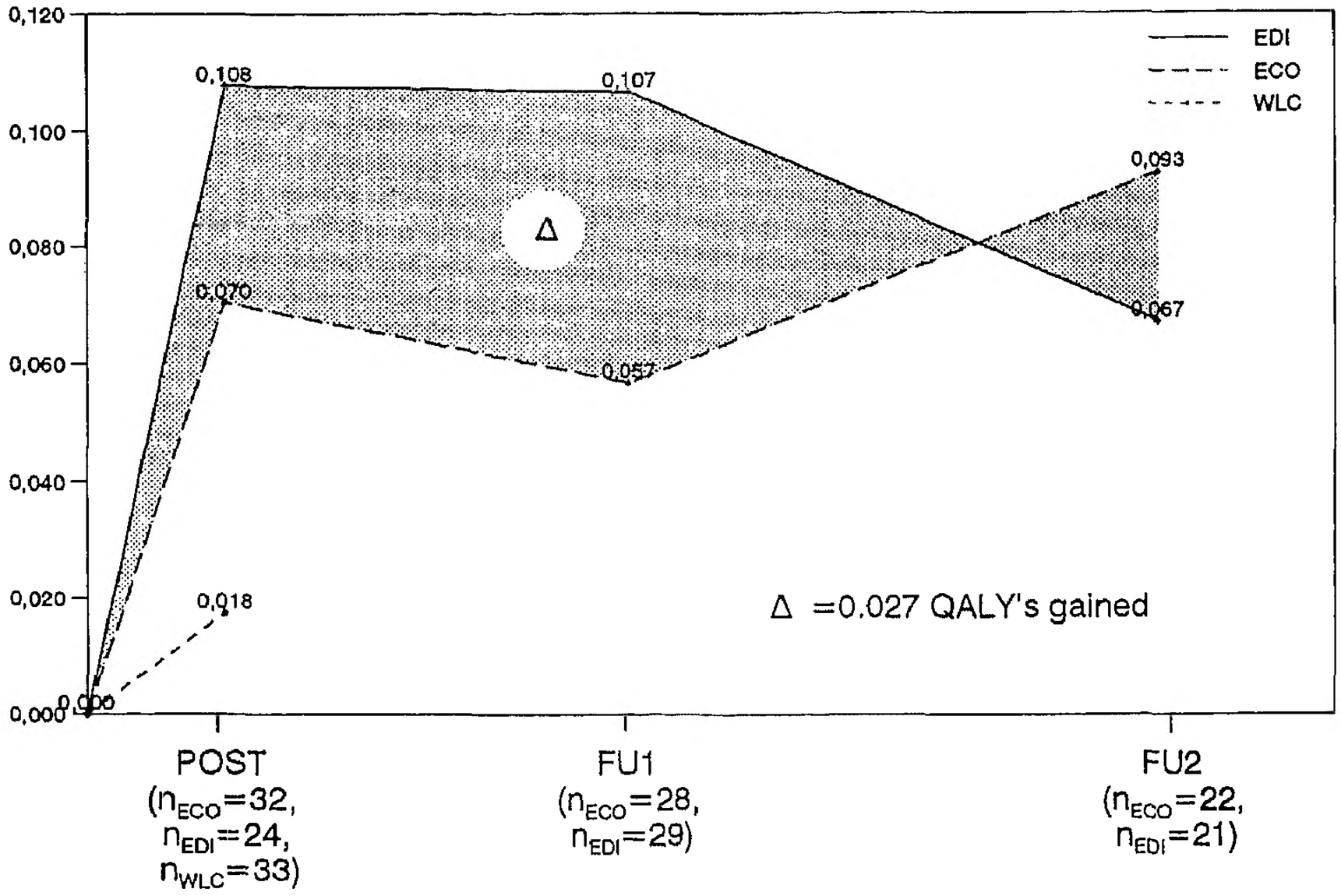

Figure 2. Change in rating scale utilities, adjusted for baseline differences and social desirability. Rating scale utilities were divided by 100.

year compared to the ECO treatment. Standard gamble utility measurements showed that the EDI treatment yielded a gain of 0.022 QALY compared to the ECO treatment. Because these figures combine the results from different numbers of patients at different moments, the statistical significance of this gain could not be tested. However, the differences when the patients who did not complete the entire year to FU2 were excluded were not significant (p = 0.245 and p = 0.220 for changes in rating scale and standard gamble utilities, respectively).

DISCUSSION

This economic evaluation study showed that the intervention combining group education and group discussion (EDI) is preferred over the intervention that combined group education and group cognitive therapy (ECO), because the program costs of both interventions were equivalent, but both the direct health care and nonhealth care costs were significantly lower for patients participating in the EDI program. All subcategories of direct costs differed in the same direction as the total costs, though not all these differences reached statistical significance. This is also true for the indirect costs. The cost differentials found are robust through a range of plausible values used in sensitivity analysis.

Despite the lower costs of the EDI program, no significant differences in utilities were found, except for the significantly greater improvement in rating scale utilities in the EDI group compared to the WLC group at the posttreatment measurement. At best, the rating scale utilities suggest a short term trend toward greater improvement in quality of life in the EDI group compared to the ECO group, a trend that seems to disappear in the long run. Overall, using the rating scale method to measure utilities, this results in a nonsignificant estimate of 0.027 QALY gained due to the EDI program. Such a small increase in QALY indicates that the EDI program has little advantage over the ECO program, except that it is less costly.

The observation that direct medical and nonmedical costs

were lower for the EDI program than the ECO program is not in accordance with pretrial expectations. The overall goal of the cognitive component of the ECO program was to increase patients' pain control using techniques such as diverting attention, reinterpreting pain sensations, coping self-statements, etc. As a result, health care resource use was expected to be lower rather than higher in the ECO group compared to the EDI group. One possible explanation may be that cognitive group therapy increases the patient's awareness of the illness and the problems and weaknesses associated with it. This, in turn, may have increased the demand for both professional and paraprofessional help. A broader and more intense cognitive program that also addresses individual patients' needs might have prevented the increase in health care use. Another explanation would be that the group discussion component of the EDI program, which was intended only as an attention placebo, may have given the patients support and understanding. This resulted in less demand for help in the EDI group from professional care givers, family members, or friends, compared to the ECO group. In that case, the group discussions can no longer be seen as a placebo but rather as an active, though not very effective, treatment.

Of note, because we did not measure health care resource use in the year preceding the trial, it can be questioned whether there was a difference in health care resource use between the groups at baseline. We have several arguments that this was not the case. First, there was no difference in clinical characteristics between the groups. In addition, there was no difference between the groups' proportionate use of outpatient specialist care, physiotherapy, and alternative health care contacts in the last 12 months. Although we had no information about the frequency or content of the contacts, we have no reason to believe that health care use was different between the groups before the trial.

Previous FM studies involving costs have been restricted to calculations of changes in health care resource use. In our study, efforts were made to take into account all relevant categories of costs, including the nonmedical costs borne by patients and their families. Because of the patients' role in reporting, the identification and measurement of these nonmedical costs is somewhat arbitrary. However, in the sensitivity analysis we have shown that different assumptions regarding these costs or even excluding these costs would not have altered the overall conclusion.

Adding utility measures to the battery of pain specific and domain specific outcome measures described in Part I[14] allowed us to assess whether the changes in these outcome measures have any effect on the patient's valuation of his or her overall health state. Utilities are meant to express the net effect of the treatment programs, because both the positive and negative effects of the programs are integrated in the overall value a patient assigns to his health state. However, the large difference between the rating scale and standard gamble methods reflects the methodological problems underlying utility measurement. Numerous publications, some using the same instrument we did, have reported that rating scale values are lower than standard gamble values[15–20]. We found differences of between 25 and 35%, depending on the moment of measurement. Several phenomena might explain this difference, the most important being a patient's risk attitude, which plays a role in the standard gamble technique but not in the rating scale technique. Risk-averse behavior is probably reinforced in this study because our patients with FM have tried numerous and usually not very effective treatments before. This might have caused a reluctance to try a new (although hypothetical) treatment that gives them chance P to gain perfect health. Furthermore, in our study as in other studies, P was varied in steps of 10%[10,17,19]. For patients with FM these steps are probably too large. In the first step, patients have either to claim that they are in full health or accept a therapy with a 10% risk of dying; more than 40% of the patients were not prepared to take this risk on at least one measurement. Thus, these large steps produce an upward bias in the standard gamble utilities. Smaller changes might have produced a greater variance in utilities. Due to this large ceiling effect, the standard gamble utilities were already so high at baseline that there was little likelihood of recording an improvement. Therefore, it appears justified to conclude that the standard gamble measurement protocol used here is not suitable for eliciting utilities from certain types of chronic patients, such as those with FM.

For decision making purposes, with regard to the wide adoption of the programs, both the ECO and EDI programs should have been compared to the usual care alternative. However, considering the enormous variety of treatments for FM, it was not possible to define an average form of medical management. Evaluating the available treatments would require extra studies. "Usual care" also could not be derived from the health care use pattern of patients on the waiting list, because patients stayed on this list for only a relatively short time and are likely to receive minimal or no care in anticipation of future treatment. Furthermore, the treatment given patients in the rehabilitation center does not represent "usual care" for FM in the Netherlands. As a consequence it was not possible to calculate the incremental cost effectiveness ratios of the ECO and EDI programs compared to usual care.

In summary, we found that the addition of a group discussion component to an educational program was more cost effective than the addition of a cognitive component. The first led to considerable savings compared to the latter in both direct medical and nonmedical costs, whereas the clinical outcome measures showed no clear differences between the 2 groups. From a cost–utility perspective, the EDI program is preferable to the ECO program. Because neither intervention produced significant improvements in

quality of life, the search for effective therapy for FM must go on.

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REFERENCES

1. Wolfe F: Fibromyalgia: The clinical syndrome. *Rheum Dis Clin North Am 1990;*3:681–97.
2. Cathey BSN, Wolfe F, Kleinheksel SM, Hawley DJ: Socioeconomic impact of fibrositis. A study of 81 patients with primary fibrositis (abstr). *Am J Med 1986;*81:S3A.
3. Hawley DJ, Wolfe F, Cathey MA: Pain, functional disability and psychological status: A 12 month study of severity in fibromyalgia. *J Rheumatol 1988;*15:1551–6.
4. Wolfe F, Smythe HA, Yunus MB, *et al:* The American College of Rheumatology 1990 criteria for the classification of fibromyalgia. *Arthritis Rheum 1990;*33:160–72.
5. McCain GA, Cameron R, Kennedy C: The problem of longterm disability payments and litigation in primary fibromyalgia: The Canadian perspective. *J Rheumatol 1989;*(suppl 19)16:174–6.
6. de Girolamo G: Epidemiology and social costs of low back pain and fibromyalgia. *Clin J Pain 1991;*(suppl 1)7:S1–S7.
7. Lightfoot RW, Luft BJ, Rahn DW, *et al:* Empiric parenteral antibiotic treatment of patients with fibromyalgia and fatigue and a positive serologic result for Lyme disease. A cost-effectiveness analysis. *Ann Intern Med 1993;*119:503–9.
8. Koopmanschap MA, Rutten FFH: Indirect costs in economic studies: Confronting the confusion. *Pharmacoeconomics 1993;*4:446–54.
9. Bennett K, Torrance GR, Tugwell P: Methodologic challenges in the development of utility measures of Health-related Quality of Life in Rheumatoid Arthritis. *Control Clin Trials 1991;*(suppl)12:118–28.
10. Bakker CH, Rutten-van Mölken MPMH, van Doorslaer EKA, Bennet K, van der Linden S: Health related utility assessment by rating scale and standard gamble in patients with ankylosing spondylitis or fibromyalgia. *Patient Education and Counseling 1993;*20:145–52.
11. Torrance GW, Feeny D: Utilities and Quality-Adjusted Life Years. *Int J Technol Assessment 1989;*5:559–75.
12. Drummond MF, Stoddard GC, Torrance GW: *Methods for the Evaluation of Health Care Programmes.* Oxford: Oxford University Press, 1987.
13. Rutten-van Mölken MPMH, van Doorslaer EKA, van Vliet RCJA: Statistical analysis of cost outcomes in a randomized controlled clinical trial. *Health Econ 1994;*3:333–45.
14. Vlaeyen JWS, Teeken-Gruben NJC, Goossens MEJB, *et al:* Cognitive-educational treatment of fibromyalgia: A randomized clinical trial. I. Clinical effects. *J Rheumatol 1996;*23:1237–45.
15. Read JL, Quinn RJ, Berwick DM, *et al:* Preferences for health outcomes: Comparisons of assessment methods. *Med Decis Making 1984;*4:315–29.
16. Bleichrodt H: Testing the validity of expected utility theory in health state valuation: Some experimental results. Institute for Medical Technology Assessment paper no. 93.23. Rotterdam: Erasmus University of Rotterdam, 1993.
17. Rutten-van Mölken MPMH, Bakker CH, van Doorslaer EKA, *et al:* Methodological issues of patient utility measurement: Experience from two clinical trials. *Med Care 1995;*33:922–37.
18. Bakker CH, Rutten-van Mölken MPMH, van Doorslaer EKA, *et al:* Feasibility of utility assessment by rating scale and standard gamble in patients with ankylosing spondylitis or fibromyalgia. *J Rheumatol 1994;*21:269–74.
19. Bakker CH, Rutten-van Mölken MPMH, Hidding A, *et al:* Patient utilities in ankylosing spondylitis and the association with other outcome measures. *J Rheumatol 1994;*21:1298–304.
20. Mulley AG: Assessing patients' utilities. Can the ends justify the means? *Med Care 1989;*27:S269–81.