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MOTIVATED PATIENTS ARE MORE COST-EFFECTIVELY REHABILITATED

A Two-year Prospective Controlled Study of Patients with Prolonged Musculoskeletal Disorders Diagnosed in Primary Care

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Abstract

Objectives: To compare the cost-effectiveness of a multidisciplinary rehabilitation program with traditional treatment within primary care in terms of the health-related quality of life (HRQOL) in patients with prolonged musculoskeletal disorders (MSD) on the one hand and the costs to society on the other. Predictors of total costs, such as motivation, socio-economic level, age, pain, and working environment, were investigated.
Methods: A prospective, matched, controlled 2-year follow-up study was designed. The main outcome measures were HRQOL using the Nottingham Health Profile (NHP) and patient-specific total costs due to society. The cost-effectiveness was expressed as a quotient of the total costs to society/NHP global score difference value.
Results: Patients with prolonged MSD generate substantial total costs to society, chiefly in the area of indirect costs. Multidisciplinary rehabilitation improved HRQOL more cost-effectively. Motivation was revealed as a predictor of total costs. The relationship in savings in terms of indirect costs between the highly-motivated and the less-motivated patients was calculated at 4:1.
Conclusions: The large group of patients with prolonged MSD generate substantial total costs, and even small reductions in direct and indirect costs could be of importance to society. The multidisciplinary rehabilitation program applied here was more cost-effective as compared with conventional treatment within primary care when it came to improving the patients' perceived HRQOL. Motivation could be a predictor of total costs, which has to be addressed in the process of identifying the patient as a partner in the rehabilitation process.

Keywords: Musculoskeletal diseases, Motivation, Quality of life, Primary health care, Cost-effectiveness analysis

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Prolonged musculoskeletal disorders (MSDs) (6;25;51) are the most common causes of absence from work and represent a growing challenge for the healthcare and insurance systems in developed countries (25;33;37;48;49;51). Patients with prolonged MSDs contribute substantially to the workload of primary care (9;38). Sickness certification is the single activity within primary care that generates the most expense for society. Furthermore, sickness certifications due to MSDs have increased exponentially (50). The total direct and indirect costs due to back problems in Sweden in 1991 were estimated at more than £1,700 million per year for a population of about 8 million (36). Furthermore, the cost of MSDs increased by 65% between 1980 and 1991 (28). A great deal of pressure has been exerted on the social insurance system to reduce the payments for sickness benefits, and cuts in sickness benefits have been made. Substantial attention has focused on rehabilitation to facilitate a return to work (3;29). The process of giving the patient energy and direction relates to motivation (39). In the rehabilitation process of most patient groups, motivation appears to be a vital issue (14;21;41). To improve the return-to-work rate, the importance of dealing with the patient's total situation within comprehensive multidisciplinary programs has been emphasized (10;24;52). Hitherto, patient-specific, prospective, controlled economic evaluations of multidisciplinary rehabilitation programs for prolonged MSD patients are rare (16;17).

Interest in assessing patients' perceived health-related quality of life (HRQOL) has increased, and HRQOL is now accepted as an important endpoint in clinical studies (42). Investigations of patients with chronic diseases have shown that emotional and social factors, as well as physical ability, are associated with HRQOL (19). Patients with prolonged MSD have previously been shown to perceive a decrease in HRQOL, and full-time sick leave for more than 6 months has been shown to be a predictor of decreased HRQOL (19). Our study has previously revealed changes in physical and psychosomatic function and perceived physical and psychosocial working environment in a 2-year perspective (20).

In the present study, the aim was to compare the costs and outcomes of a multidisciplinary rehabilitation program with traditional treatment within primary care in terms of the HRQOL of patients with prolonged MSD on the one hand and the cost to society on the other. Predictors of total costs in terms of rehabilitation were investigated.

METHODS

Patients

In 1994 and the first 6 months of 1995, all patients referred consecutively to the Kronoberg Occupational Rehabilitation Service and who fulfilled the inclusion criteria were invited to participate. The inclusion criteria were prolonged MSD as the main diagnosis (such as cervico-brachial myalgia, chronic lumbago with/without sciatica, general ache syndrome), problems with long and/or repeated short periods of sick leave during the past year, and a rehabilitation period in 1994 and/or 1995. The exclusion criteria were temporary/permanent complete disability pension, known substance abuse, serious mental illness, or being a non-Swedish speaker. In all, 129 patients were invited to take part in the study and 122 agreed. A control group matched with respect to prolonged MSD, sex, age, cultural background, employment/unemployment, and the extent of sick leave was identified by the Regional Social Insurance Office. The invitation was accepted by 114 control patients. All the patients were diagnosed by their own general practitioner. The general practitioners followed the Swedish version of the *International Classifications of Diseases* (ICD, 9th revision). The baseline data are summarized in Table 1. There were no significant differences between the rehabilitation group and the control group, apart from higher indirect costs in the control group 6 months prior to the study. A detailed baseline report has been presented elsewhere

Table 1. Demographic Data and Baseline Characteristics of Patients in the Rehabilitation Group and in the Control Group

	Rehabilitation group (n = 122)				Control group (n = 114)				
	n	%	Mean	SD	n	%	Mean	SD	*p* Value
Female	100	82.0			94	82.5			.922
Age, years			44.3	9.1			44.8	9.2	.662
Civil status									
Married/cohabiting	97	79.5			88	77.2			.449
Cultural background									
Swedish	103	84.4			99	86.8			.829
Education									
9-year compulsory school only	81	66.4			72	63.2			.065
Socioeconomic classification									
Nonprofessional workers	85	69.7			83	72.8			.332
Employed/ self-employed (yes)	98	80.3			95	83.3			.550
Annual income, including employers' costs, £[a]			15,235.5	3,802.2			15,971.7	4,394.5	.169
Motivation for change									.954
Highly motivated	36	30.0			24	30.4			
Less motivated	84	70.0			55	69.6			
Disorders related to:									.892
Cervical spine/shoulder	44	36.1			37	32.5			
Arm	12	9.8			9	7.9			
Cervical and lumbar spine	12	9.8			15	13.2			
Lumbar spine and/or leg	32	26.2			31	27.2			
General ache syndrome	22	18.0			22	19.3			
Pain related to movements (VAS)			45.5	24.3			43.6	24.6	.557
Time since onset (years)			5.7	6.1			5.6	5.5	.916
Sick leave at baseline									.065
No sick leave	23	18.9			16	14.0			
Partial sick leave	30	24.6			44	38.6			
Total sick leave	69	56.6			54	47.4			
Working days lost 6 months prior to the study			105.7	63.6			125.3	45.9	.051
Indirect costs 6 months prior to the study, £[a]			4,419.1	2,943.4			5,367.3	2,315.9	.012

[a] £1.00 = SEK 13.17 (1988).

(19). At the 2-year follow-up, 113 (93%) of the patients in the rehabilitation group and 102 (89%) in the control group participated (20). However, 18 patients in the rehabilitation group and 5 patients in the control group did not complete the rehabilitation diary (see Direct Costs). Accordingly, the economic evaluation comprised 95 and 97 patients in the rehabilitation group and the control group, respectively. There were no significant differences in sociodemographic data between these patients and the original groups.

Concept of Motivation

Motivation is the process that energizes and focuses an individual (39). The concept in this study arose from Maslow's hierarchy of needs (30;41). The subsequent development of the concept included cognitions and emotions (39). Cognitions relate to goal-setting motivation (39), and emotions vitalize and direct behavior as well (35;39). The structure incorporated

the patients' working conditions and social and professional networks (4;27;30;54). The purposefulness of human activity may deteriorate without continuing social relationships (26). The concept also comprised the subject's line of reasoning in the use of personal resources in terms of coping skills (5;26;46).

Intervention

The 4-week, full-time multidisciplinary rehabilitation aimed to return the patient to an active, independent life and to facilitate his/her return to work. The inpatient program relied on a bio-psychosocial approach (10;24) and focused on Body Awareness Therapy (BAT), i.e., identity activating and focusing on the health resources of the patient (31;32), and cognitive and relaxation treatment. Within physiotherapy, patients with prolonged MSD often improve from BAT, which focuses on the whole person and is designed to normalize muscular tension, coordination, postural control, and breathing. Vital features of BAT include the interaction between mental awareness and psychomotor function (31;32;40;43). The program also included pain management, stress management, physical training, and ergonomics, accompanied by visits to the patient's workplace. Furthermore, the program comprised creative and cultural activities. The patients were actively involved in the goal setting of the rehabilitation efforts relating to work, leisure, and social pursuits. The rehabilitation team comprised a senior physician, consultant specialists in orthopedics and psychiatry, a physiotherapist, occupational therapist, social adviser, and assistant nurse. The program has previously been presented and was shown successfully to increase HRQOL in a 6-month follow-up (18). An active 1-year follow-up was made. At least three follow-ups, at which further advice was given, were scheduled during this period.

Standard Treatment

Treatment for the patients in the control group within primary care consisted of a medical examination, advice, prescription of medicine, standpoint on the need for sickness certification, and generally a referral for physiotherapy such as heat, massage, mobility and strength training, stretching of tight muscles, and home-training recommendation. During the time period of this study, BAT was not available within conventional physiotherapeutic treatment in the region. The content of standard treatment was verified by general practitioners and district physiotherapists working in the region.

Motivation Analysis

Studies of motivation deal with the internal process that gives the subject's behavior its vigor and direction (39). At baseline, all the subjects were required to perform a semi-structured written interview designed to define the subjects' motivation for change. The original interview was designed by the physiotherapist Roxendal, who based the concept on descriptions by the Hungarian psychoanalyst Sandor Rado (21;41). The method has been additionally improved for today's health care (21;43). The analysis included three steps: a) utopian description of the everyday life the patient would like to attain; b) an adaptation to reality covering subgoals that were feasible to achieve in the near future; and c) work on self-motivation consisting of efforts and support necessary to realize the subgoals. Furthermore, the patient was asked to describe how a normal day would be from early morning to late at night, when the desired goal was achieved, at both the utopian and subgoal level (20;21;41). The assessment was dichotomous. Patients presenting goals, subgoals, their own efforts, and necessary support from others were regarded as highly motivated patients. Patients who had difficulty presenting goals and who expected the medical care to reduce most of their problems or could only see impediments were regarded as less motivated. All the interviews were classified independently by a physiotherapist and

an independent psychologist. A simple interrater test revealed more than 85% agreement, which was regarded as satisfactory for the purpose.

Costs

Direct Costs. Direct costs have been calculated from rehabilitation diaries completed by the patients. The number of consultations with the healthcare service and the Regional Social Insurance Office were reported. In both groups the diary collection started at baseline. The diaries were checked in connection with the standard follow-ups in both groups after 6, 12, and 24 months. Recorded costs were related to the prolonged MSD. The direct costs were calculated from the unit costs of health care determined by the cooperation committee of the southern region of the medical service in Sweden. The following patient-specific cost data were included: visits within primary care in terms of general practioner, physiotherapy, and occupational therapy; visits within open specialist care in terms of x-ray, specialist doctors and psychological and/or psychosocial therapy; additional multidisciplinary rehabilitation programs during the follow-up; institutional care in terms of orthopedic operations and inpatient care; and contact with the Regional Social Insurance Office. The unit cost included all costs associated with the treatment occasion (staff costs including employers' costs, peripheral staff costs, building costs, inpatient costs, medical equipment, drugs, and consumables). The rehabilitation cost for the rehabilitation group at the Kronoberg Occupational Rehabilitation Service was calculated in a similar manner and included the extra cost of the investigation. The Regional Social Insurance Office costs covered staff costs, including employers' costs, peripheral staff, building costs, and office accessories (Table 2). Direct non-healthcare costs were not included in the present study.

Indirect Costs. Indirect costs were calculated according to the human capital approach (11). Information relating to patient-specific lost production 6 months prior to the study and during the follow-up was provided by the patients and the Regional Social Insurance Office, together with the patients' annual income. Partial working days lost have been computed into whole days. The indirect costs were recorded as whole working days lost within each follow-up period (income including employers' costs/lost working day). Nonlabor activities were not included in the present study.

Outcome Measures and Economic Evaluation

HRQOL was measured using the Nottingham Health Profile (NHP). This generic instrument was created to estimate significant dimensions influenced by disease (53). It has been translated into Swedish and its reliability and validity for different patient groups has been shown to be good (53). Part I measures discomfort or distress in six areas: emotional reactions, sleep, energy, pain, physical mobility, and social isolation, range 0–100 (0 = absence of all problems, 100 = maximum problems). From the values for the six areas, a mean value (i.e., global score) was calculated (53).

An economic evaluation in line with the cost-effectiveness design was performed (11). The cost analyses were undertaken from the perspective of society. Costs were calculated on the basis of Swedish prices in 1998 and were converted to British pounds (£) at the mean 1998 exchange rate (£1.00 = SEK 13.17) approved by the Bank of Sweden. The cost-effectiveness was expressed as the quotient of total costs/NHP global score difference value per patient. The stability of the main results of the 2-year follow-up was examined using one-way sensitivity analyses (11). The following four analyses were conducted: a) a 25% decrease in indirect costs in the control group on account of higher indirect costs at baseline; b) a 25% increase in indirect costs in the rehabilitation group on account of lower indirect costs at baseline; c) a 25% decrease in direct costs in the rehabilitation group on account of higher total direct costs at the 2-year follow-up; and d) a 25% increase in direct costs in the

Table 2. Total Direct and Indirect Costs due to Musculoskeletal Disorders in the Rehabilitation Group and in the Control Group (in British pounds[a]); A 2-Year Follow-up

	Rehabilitation group n = 95				Control group n = 97					
	Mean	SD	Mean cost per patient	SD	Mean	SD	Mean cost per patient	SD	Mean (95% CI) Diff[b]	*p* Value[c]
Multidisciplinary rehabilitation at Kronoberg Occupational Rehabilitation Service, unit cost £205/day	24.0	0.0	4,927	30	0.0	0.0	0	0	4,927 (4,921 to 4,933)	.000
Primary health care, £11-48/visit	42.3	36.1	827	620	39.0	43.3	936	1,460	−109 (−429 to 212)	.450
Open specialist care, £36-344/visit	2.2	3.2	201	300	3.8	4.9	361	433	−160 (−266 to −55)	.040
Additional multidisciplinary rehabilitation, £93-205/day	2.7	8.4	276	857	5.3	10.4	868	1,794	−592 (−992 to −192)	.012
Inpatient care, £175-1,382/visit	0.3	2.0	154	592	1.4	5.1	579	1,452	−425 (−740 to −109)	.027
Regional Social Insurance Office, visit £22/hour	7.8	8.5	235	271	8.9	10.2	265	324	−30 (−115 to 55)	.506
Total direct costs			6,620	1,504			3,009	2,956	3,611 (2,944 to 4,278)	.000
Total indirect costs[d]	336.5	240.0	13,857	10,593	371.4	257.4	16,066	12,222	−2,209 (−5,468 to 1,049)	.265
Total costs			20,477	11,264			19,075	13,584	1,402 (−2,148 to 4,952)	.255

[a] £1.00 = SEK 13.17 (1998).
[b] Negative cost differences indicate cost savings in favor of the rehabilitation group.
[c] Significant calculations have been made for the monetary measures.
[d] Mean value indicates total days of production lost during the follow-up.

control group on account of lower total direct costs at the 2-year follow-up. The subgroups of highly motivated and less motivated patients were analyzed in line with the standard analysis, i.e., the quotient of total costs/NHP global score difference value per patient.

Ethics

The investigation was approved by the Medical Ethics Committee at the University of Lund (No. LU 393-93), and the necessary permission was obtained from the Regional Social Insurance Office. All subjects in both groups were informed about their role in the study. The subjects in both groups had full access to primary care, and the participation in the investigation did not limit the subject's admission to medical examinations, treatments, or rehabilitation in other respects during the study period.

Statistical Methods

Proportions were compared using the chi-square test. However, when the total number of subjects was fewer than five, the Fisher exact test was applied. The *t* test was applied when groups were compared in terms of continuous variables, provided that they were more or less normally distributed. Wilcoxon's rank-sum test was applied to other continuous and ordinal variables. Accordingly, the paired *t* test or Wilcoxon's signed rank test was applied to compare baseline data with 2-year follow-up data. A significance level of $p < .05$ was chosen. To analyze the effects of potential predictors on the dependent variable, multiple linear regression was employed. Predictors were selected from sociodemographic, HRQOL, physical, psychosomatic, and working environment factors (15). Predictors were selected using a stepwise procedure with $p < .10$ as the inclusion criterion and $p > .20$ as the removal (of already included predictors) criterion. In the first selection procedure, missing values were imputed by means of the available data for corresponding variables. To produce the final model, significant predictors were then provided from a stepwise procedure with $p < .05$ as the inclusion criterion. In this case, two approaches were used: a) individuals with missing values were excluded; and b) missing values were imputed as described above. Model assumptions were checked by means of residual analysis (1).

RESULTS

Rehabilitation Outcome

At the 2-year follow-up, the rehabilitation group had generated significantly higher direct costs compared with the control group, median £6,106 and £1,959, respectively, mainly on account of the cost of the multidisciplinary rehabilitation program. Most of the utilization of health care took place within primary care in both groups (Table 2). Patients in the rehabilitation group had a median of five consultations with a general practitioner, 11 individual consultations with a physiotherapist, eight group training sessions with a physiotherapist, and no consultation with an occupational therapist, while in the control group the corresponding figures were 5, 14, 0, and 0, respectively. Within the rehabilitation group, 43 (45%) of the patients worked full-time, 29 (30%) worked part-time, and 23 (24%) were on total sick leave, while the corresponding figures for the control group were 36 (37%), 32 (33%), and 29 (30%), respectively ($p = .487$). There was no difference between the groups in terms of the indirect costs, median £12,946 and £15,390 in the rehabilitation group and the control group, respectively. No difference in total costs was revealed (Table 2). The total savings per patient in terms of indirect costs during the whole study were £3,520 (SD = 10,168) and £4,469 (SD = 9,133) in the rehabilitation group and the control group, respectively ($p = .427$), compared with the 6 months prior to the study. The global NHP score improved from 39.2 (SD = 15.7) to 29.4 (SD = 20.7) in the rehabilitation

Table 3. Sensitivity Analysis of the 2-Year Follow-up Data[a]

	Rehabilitation group		Control group	
	n	Mean cost per patient	n	Mean cost per patient
All patients included, standard analysis	95	2,089	97	2,935
25% decrease in indirect costs in the control group	95	2,089	97	2,317
25% increase in indirect costs in the rehabilitation group	95	2,443	97	2,935
25% decrease in direct costs in the rehabilitation group	95	1,921	97	2,935
25% increase in direct costs in the control group	95	2,089	97	3,050
Highly motivated patients, standard analysis	32	978	24	2,009
Less motivated patients, standard analysis	62	3,362	49	5,081

[a] Mean total costs per improved Nottingham Health Profile global score unit within the rehabilitation group and the control group expressed in British pounds; £1.00 = SEK 13.17 (1998).

group and from 37.0 (SD = 18.2) to 30.5 (SD = 21.6) in the control group ($p < .001$ within both groups). When the difference values recorded within the groups were compared, a tendency toward improvement in favor of the rehabilitation group was found ($p = .08$). The rehabilitation group's improvement in global NHP score units was more cost-effective, and the results of the sensitivity analysis indicated that the basic findings were stable in favor of the rehabilitation group (Table 3).

Motivation as a Predictor of Costs

A multiple regression analysis including all the patients was performed to reveal predictors of total costs over a 2-year period. In the model (n = 167), R^2 (adjusted) = 43% of the variance was explained by five variables: a) working days lost 6 months prior to baseline; b) income; c) motivation; d) pain related to movements; and e) referral for multidisciplinary rehabilitation. Even when missing values were replaced (n = 192), the same predictors were revealed, with one additional predictor in terms of perceived muscle tension, R^2 (adjusted) = 44% (Table 4).

In terms of direct costs, 22 and 6 of the less motivated patients in the rehabilitation group and the control group, respectively, did not complete the rehabilitation diaries. In terms of indirect costs, there were no significant differences when these patients were included (n = 84), £17,756 (SD = 11,270) compared with (n = 62), £17,038 (SD = 10,949) in the rehabilitation group and (n = 55), £18,803 (SD = 12,036) compared with (n = 49), £19,072 (SD = 12,296) in the control group.

In the subsequent analyses, the patients who had completed the NHP, the written motivation analysis, and the rehabilitation diaries were included (i.e., 94 and 73 patients in the rehabilitation group and the control group, respectively). The total costs for the highly motivated patients in the rehabilitation group (n = 32) and the control group (n = 24) were £14,283 (SD = 7,558) and £13,262 (SD = 11,569), respectively ($p = .380$). There was no difference in the total savings per patient in terms of indirect costs during the study between the rehabilitation group, £8,373 (SD = 10,476) and the control group, £7,578 (SD = 8,747; $p = .679$) (Figure 1). The total costs for the less motivated patients were £23,874 (SD = 11,494) and £22,356 (SD = 13,507), respectively ($p = .557$), in the rehabilitation group (n = 62) and the control group (n = 49). There was no difference in the total savings per patient in terms of indirect costs between the rehabilitation group, £738 (SD = 8,861), and the control group, £3,831 (SD = 8,895; $p = .157$) (Figure 1). However, when all the patients were included (n = 167), the relationship in savings in terms of indirect costs between the highly motivated and the less motivated patients was calculated at 4:1 in favor of the highly motivated patients.

Table 4. Results of the Multiple Regression Analysis of the Dependent Variable Total Costs[a] on Given Potential Predictors; n = 167 Individuals with Complete Data Contributed to the Final Model, R^2(Adjusted) = 43%[b]

Variable	Coding	B[c]	SE(B)[d]	*p* Value
Sick leave history	Total days of sick leave during the 6-month period prior to baseline, range 0–183	94	13	<.001
Patient income	Income/day, range £6–86	25	5	<.001
Motivation for change	0 = highly motivated, 1 = less motivated	6,647	1,580	<.001
Pain estimation after movements	Visual Analogue Scale 0–100, 0 = no pain, 100 = worst conceivable pain	125	31	<.001
Group affiliation	0 = rehabilitation group, 1 = control group	−3,905	1,481	.009

[a] £1.00 = SEK 13.17 (1998).
[b] Even when missing values were replaced with the means of the available data for corresponding covariates, the same predictors were included, with one additional predictor in terms of perceived muscle tension *p* value = .04, in the final model (n = 192; R^2[adjusted] = 44%).
[c] Estimate of the regression coefficient (which reflects the change in the dependent variable when the value of the predictors at issue increases by one unit).
[d] Standard error of the estimate.
Examined potential predictors: rehabilitation group/control group, motivation for change, days of sick leave 6 months prior to baseline, age, sex, cultural background, civil status, income, socioeconomic level, employed/unemployed, smoker, physical exercise, problems with social life, problems with sexual life, general feeling of sickness, body image, movement ability, perceived muscle tension, postural control, right arm muscle endurance, aerobic capacity, analgesic medicine consumption, problems with physical working environment, psychosocial working environment, social support at work, psychosomatic symptoms, health-related quality of life.

A tendency toward an improvement in favor of the rehabilitation group, in terms of the global NHP score mean difference value of 14.6 (SD = 20.1) compared with 6.6 (SD = 12.5) for the control group, was found in the highly motivated subjects ($p = .093$). In the less motivated patients, no such tendency was found, with 7.1 (SD = 17.7) for the rehabilitation group compared with 4.4 (SD = 18.6) for the control group ($p = .195$). The rehabilitation group improved its global NHP score unit more cost-effectively (Table 3).

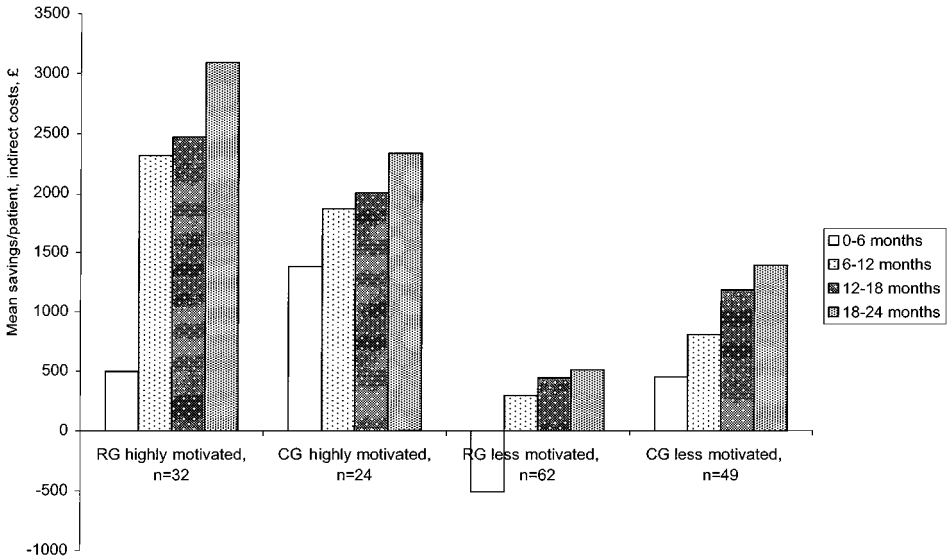

Figure 1. Cost savings in terms of indirect costs in 6-month periods, with the patients' motivation as the starting point in the rehabilitation group and the control group (diff = 6 months prior to the study minus 6, 12, 18, and 24 months, respectively, within the groups). £1.00 = SEK 13.17.

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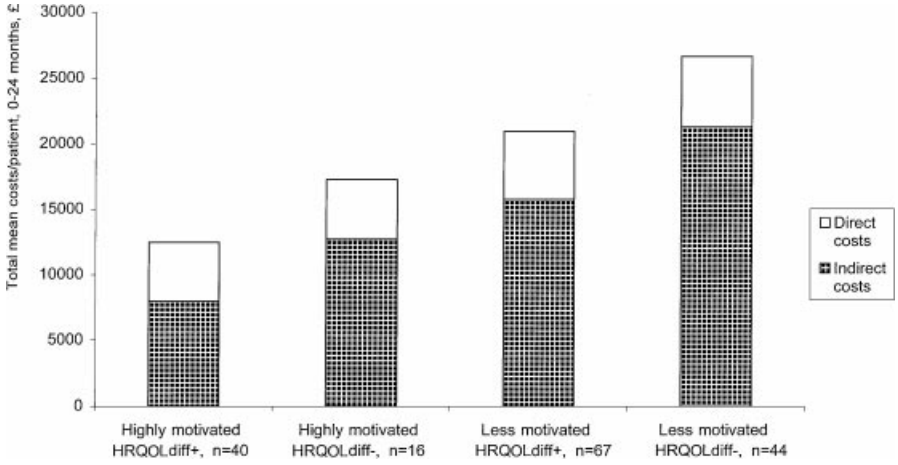

Figure 2. Total costs for four subgroups of patients, taking account of motivation and changes in health-related quality of life at the 2-year follow-up. £1.00 = SEK 13.17.

When all the patients were distributed into four groups, defined by their motivation level at baseline and positive or negative changes in HRQOL, no significant differences in direct costs were revealed. The total costs were significantly higher ($p < .001$) in the two groups of less motivated patients compared with the highly motivated patients with an improved HRQOL (Figure 2).

DISCUSSION

The results indicate that multidisciplinary rehabilitation improves HRQOL more cost-effectively. Motivation could substantially influence the total cost to society for patients with prolonged MSD, and this underlines the importance of taking account of the interaction between the patient and the healthcare service.

To our knowledge, prolonged studies of patient-specific total costs for prolonged MSD are rare. A small number of studies of MSD patients comparing the effectiveness of behavioral rehabilitation with an educational discussion intervention on the one hand (16) and an operant program (17) and waiting list conditions (16;17) on the other have been presented. Furthermore, studies comparing the effectiveness of physiotherapy with chiropractic (8;45) to medical exercise therapy (50) and self-exercise (34;50) have been reported. Nevertheless, in a previous review of a number of studies focusing on the management of back pain, cost-effectiveness was discussed without including costs (44). The present study confirms that patients with prolonged MSD demand substantial resources from society (50), which highlights the importance of these studies. The costs recorded in this study are patient-specific and have been determined along with clinical outcomes, thereby enabling us to investigate the relationship between motivation, HRQOL, and costs (2). The study was undertaken during 1994–97, a period of high unemployment in Sweden, sweeping changes in the labor market (19), and heavy demands on the Social Insurance Offices to cut sickness benefits (29). No discounting of the costs (11) has taken place, due to the study period's almost nonexistent rate of inflation approved by the Bank of Sweden.

The dominance of indirect costs was similar to that previously shown in studies of patients with prolonged MSD (16;28). Furthermore, as in a previous study, the costs were not normally distributed (16), thereby indicating the need to present the median cost values. In spite of this, when it comes to the cost data, even when the distribution is skewed, the

crucial information is the arithmetic mean, because policy makers, purchasers, and providers need to know the total cost of implementing the treatment (2). The difference between the direct mean costs per patient in the rehabilitation group and the control group was mainly explained by the cost of the multidisciplinary rehabilitation program. However, the program failed to reduce the rehabilitation group's demand for further health care during the 2-year follow-up compared with the control group (Table 2). When it came to the subgroups of highly motivated and less motivated patients, no difference in the degree of resource utilization in terms of health care and the Regional Social Insurance Office were revealed, irrespective of positive or negative changes in HRQOL (Figure 2).

Sickness certifications related to prolonged MSD have substantial economic consequences for society (36;37;48;49). From this economic angle, even small reductions in cost could be of importance. The indirect costs were reduced in both groups. Efforts to prevent patients entering a role of sickness behavior and inactivity in terms of sick leave might be as successful in primary care, which is familiar with the patient and his/her everyday life, as compared with specialist clinics. Effective primary care with expertise and an interest in patients and their social context has unique qualifications and potential for supporting patients in returning to an active life, including a return to work. However, in terms of indirect costs, several factors outside medical care play a vital role, such as working environment (12), political, labor market, and social insurance factors (19;23;36;37). Furthermore, a complex array of physical, psychological, and sociodemographic factors affects working ability (5;15;27).

The benefit of the bio-psychosocial approach to patients with prolonged MSD has been emphasized (7;10;29;52). The rehabilitation group improved its HRQOL to a somewhat greater extent than the control group. However, the difference in favor of the rehabilitation group was 3.3 global NHP score units. The clinical relevance of this improvement in relation to the additional direct costs could be questioned. However, in highly motivated patients, the additional improvement in favor of the rehabilitation group was eight global NHP score units, and the direct costs could be more acceptable. Furthermore, the highly motivated patients accounted for the largest total savings in indirect costs, indicating the strength of this predictor (20). Nevertheless, the less motivated patients should not be regarded as unmotivated. Their motivation ought to be interpreted as latent, and they need assistance to bring their motivation to the surface (21). However, the multidisciplinary rehabilitation program was more cost-effective in terms of costs to society when it came to improving the patients' perceived HRQOL, independent of the motivation level of the patient.

Being referred to multidisciplinary rehabilitation was shown to be a predictor of increased total costs (Table 2). However, when these costs were related to the improvement in HRQOL, the multidisciplinary program was the most cost-effective alternative. The result was emphasized by the sensitivity analyses (Table 3), which indicated that the basic findings were stable. Even so, when indirect costs were decreased by 25% in the control group or increased by 25% in the rehabilitation group, as well as when direct costs were decreased by 25% in the rehabilitation group or increased 25% in the control group, the direction of the findings was similar. The basic findings were emphasized by the standard analyses within the highly motivated and less motivated patients as well. The result of the present study encourages further studies, since earlier investigations have failed to support the cost-effectiveness of comprehensive rehabilitation programs in prolonged MSDs compared with less comprehensive approaches (16;17).

Sick leave history (20;23) and pain related to movements (15;20) have previously been reported to influence working ability, and this is in line with our findings that these predictors also influence total costs. Patients with higher incomes influence total costs to a greater degree than patients with lower incomes. However, it should be noted that most of the patients in the study fall into a low socioeconomic category (19).

A randomized study design would have been preferable; however, this was not possible for organizational and ethical reasons. This has been compensated for, to some extent, by matching the rehabilitation group and the control group. The selection of matching criteria accounted for factors known to be predictors of rehabilitation outcome (3;13;15;22;23). In the 2-year follow-up, 91% of the patients participated, evenly distributed between the two groups (20). However, 25 patients did not respond to the motivation test (20), and another 23 patients did not complete the rehabilitation diary. It was therefore within the specific targets requiring sufficient linguistic ability and structural endurance that the patients failed. When it came to the motivation test, the patients may have had difficulty putting inner wishes and feelings into words and writing. Indications of alexithymia in terms of poor language and difficulties expressing emotions (31) were found in the written motivation interviews. Compared with the rehabilitation group who were entering the multidisciplinary rehabilitation program, it was probably easier for the control group to refrain from participating in this demanding task at baseline. Oral motivation interviews might have led to a higher rate of completion for the test; however, this was not possible due to the large patient sample ($n = 236$) and limited staff resources within the study. Furthermore, the motivation analysis employed here was elementary and was suggested as being applicable to physiotherapists (41). Similar simple ways of assessing motivation in terms of goal setting have been proposed and have been reported as easy for healthcare providers to learn (47).

We are aware of the difference in indirect costs 6 months prior to the study and that this might have influenced the results. However, since no difference was found in terms of being on total sick leave for more than 6 months (18;23), the duration of time since onset (Table 1), previous periods of disability related to MSDs (19), perceived HRQOL, pain, working environment at baseline (18), and the indication that the basic findings at the 2-year follow-up were stable in the sensitivity analysis (Table 3), we are inclined to believe that the difference in indirect costs prior to the study did not play any major role in the conclusions that were drawn. When it came to the patients' motivation level and other sociodemographic data, there were no significant differences between the groups (Table 1).

The comparison between the groups included all the patients in the original rehabilitation group and control group who had completed the rehabilitation diaries, known as an intention-to-treat analysis (1). The objective of the study was, however, to examine potential predictors of total costs as well. Motivation appeared to be one of the significant predictors. Since motivation had previously been revealed as a predictor of changes in HRQOL and working ability (20), additional analyses of the subgroups of highly motivated and less motivated patients in terms of total costs were desirable. The missing patients, chiefly within the subgroup of less motivated patients in the rehabilitation group, might have influenced these results, and interpretations should be made with caution. However, we are inclined to believe that the results of these additional analyses are relevant, since there were no differences between the rehabilitation group and the control group in terms of either the patients' motivation level or other sociodemographic data, nor were there any differences in sociodemographic data between the patients who had completed the rehabilitation diaries and the original groups. When it came to the less motivated patients who had not completed the rehabilitation diaries, there were no significant differences in terms of indirect mean costs per patient when these patients were included. Furthermore, the results of the sensitivity analysis were stable in favor of the rehabilitation group (Table 3). In spite of this, these economic calculations constituted a first attempt to estimate the impact of motivation as a predictor of total costs in rehabilitation and need to be further elucidated in future studies.

The direct cost calculations in this study were limited to the cost of health care and Regional Social Insurance Office utilization. In prolonged MSDs, the costs borne by patients and their families are likely to be substantial. The inclusion of direct non-healthcare costs, such as traveling, unpaid help from family and/or friends, and housekeeper and childcare

expenses, would have additionally improved the study. Furthermore, the largest percentage of the patients were women, indicating that calculations of non-labor activities ought to have been considered as well. These direct and indirect costs need to be highlighted still further in future full economic evaluations (17).

POLICY IMPLICATIONS

The large group of patients with prolonged MSD generates substantial total costs, and even small reductions in direct and indirect costs could be of importance to society. The multidisciplinary rehabilitation program applied here was more cost-effective in terms of costs to society compared with conventional treatment within primary care when it came to improving the patients' perceived HRQOL. Motivation was revealed as a predictor of total cost in rehabilitation, thereby highlighting the importance of taking account of the interaction process between the patient and the healthcare providers. A simple motivation analysis by healthcare personnel within the clinical examination may add important knowledge to the process of rehabilitation in patients with prolonged MSD. The motivation analysis might also indicate the costs of the forthcoming rehabilitation, chiefly within the area of indirect costs.

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