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ORIGINAL REPORT

HIGH COST-BENEFIT OF EARLY TEAM-BASED BIOMEDICAL AND COGNITIVE-BEHAVIOUR INTERVENTION FOR LONG-TERM PAIN-RELATED SICKNESS ABSENCE

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Objective: **To report the results from a prospective, cognitive-behavioural team-based, individually geared, low-intensity, rehabilitation programme, randomly assigned to care-seekers in primary care physiotherapy with new pain-related sick leave, and to examine a possible reduction in social security expenditure.**

Methods: **A total of 194 care-seekers were included in a stepwise procedure from November 2000 to February 2002. Control group *n* = 381.**

Results: **The median number of days of sick leave in the intervention group was 22 during the first 6-month period. After 180 days 5.2% were still on sick leave and after 360 days 4.2%. The comparable figures in the control group were 30 days, 9.7% and 7.2%, respectively. Reductions in social security expenditure were statistically significant from the fourth month. As predicted, clinically relevant subgroups contributed differently to this reduction, both early and later on. The overall problem for one-third of the subgroups was insufficient co-ordination from the employer and the social security executive.**

Conclusion: **It was possible to reduce the social security expenditure in this setting. The intervention costs were balanced out during the first year. A large potential for further cost reductions was identified in increased implementation of workplace-based return-to-work interventions.**

Key words: musculoskeletal pain, sick leave, early intervention, primary care, cost-benefit, randomized control study.

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INTRODUCTION

Sick leave due to long-term musculoskeletal pain leads to suffering for individuals, frustration among healthcare professionals, and high costs for social insurance systems (e.g. 1).

This particular area of research shows clearly that, despite the size of the problem, knowledge of the effects and cost-effectiveness of the various interventions used is limited (2–4). It has been shown that there is a poor match between interventions offered and modifiable risk factors for long-term sick leave (5). The importance of organizational aspects of the healthcare system and of interaction with the social security system have been dealt with in recent studies reporting that return-to-work rehabilitation is effective only when administered within 3–6 months of commencing sick leave (6, 7). An uncomplicated process of disability pensioning with no appeals from the insured would alone reduce healthcare consumption of by a factor of 3 (8). Thus, there are very heavy demands on the effects of functional evaluation programmes, including a thorough examination of care-seekers who can no longer hold a permanent job (8).

Although it is not possible to distinguish entirely between the following 2 strategies, there is scientific evidence for the effectiveness of both workplace-based return-to-work interventions and multimodal rehabilitation strategies for taking care of people on sick leave due to musculoskeletal problems (9–17). These different approaches reflect much more the theory about the causes of the problem and its solution than the various national traditions and legislation.

Workplace-based interventions focus on factors at, or in close connection with, the workplace, whereas issues concerning the individual, family, social security or the healthcare system as well as dysfunctional consequences of the interaction between the individual and the environment, i.e. psychosocial risk factors (18, 19), are not taken into consideration.

There is evidence that the important components that make the workplace-based approach cost-effective, are: early workplace contact with employees on sick leave, a work accommodation offer, contact between healthcare provider and workplace, ergonomic work-site visits, possibility of supernumerary replacements, and the presence of a return-to-work co-ordinator (9). The advantage of this approach is that the employers could offer this kind of service in co-operation with industrial health service providers.

In the multimodal rehabilitation approach, it is also recognized that factors outside the workplace could contribute to work absenteeism. Evidence exists that the multimodal rehabilitation programmes should include a physical component for being cost-effective, e.g. graded activity training, as well as a psychological component based on cognitive behavioural theory (CBT) (10–17).

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Although examples exist of this kind of intervention organized in primary care, the distribution in most countries is very limited. Funding and staff tend to be unstable outside specialized care units (departments of medical rehabilitation, departments of occupational and environmental medicine and pain clinics). As a consequence most care-seekers in the need of a more comprehensive multimodal intervention will never be taken into consideration for this kind of care with proven effectiveness regarding daily functioning and return-to-work. In order to improve the situation, the intervention methods also need further development (2–4). Criteria for selection of the right care-seeker at the right point in time should be established. Furthermore, routines for a systematic identification of care-seekers thus characterized need to be implemented in the healthcare and social security systems.

The method of functional behaviour analysis described by Baer et al. in 1968 (20) and validated by Iwata et al. in 1982 (21), is a very promising "candidate" for fulfilling the role as the common "tool" of the CBT team. The 3-response mode model of the individuals' reaction, cognitions, behaviour and psychophysiology, as proposed by Lang (22) and conceptually modified by Rachman & Wilson (23) is implemented in this method.

In order to improve the efficacy of CBT interventions, Turk (24) recommended that an interdisciplinary team should customize the treatment subgroups of care-seekers with well-defined characteristics and needs. In line with this idea we took a further step in the development of methods, suggesting that team-based functional behaviour analysis should be the basis of the process of customizing a return-to-work rehabilitation plan to the individual care-seeker. The use of functional behaviour analysis together with a medical examination for establishment of the care-seekers condition, individual needs and potential for change make the evaluation strictly theory-driven, as suggested by Vlaeyen & Morley (25).

The present study comprises a prospective, combined biomedical and CBT team-based, individually geared, low-intensity, rehabilitation programme, randomly assigned to new care-seekers in primary care physiotherapy with a new episode of musculoskeletal pain-related sick leave. The high prevalence of such care-seekers, and the fact that no previous primary healthcare study has shown any additional effect by intervention beyond standard medical treatment, make intervention studies in this setting of special interest due to the strong impact musculoskeletal pain has on workability and health insurance expenses (4).

We hypothesized that it is possible to achieve significant reductions in social security expenses by additional CBT intervention compared with standard medical treatment. However, it is not known if such intervention will be cost-effective and if so, at what point in time the savings will balance out the cost. Based on the theoretical considerations referred to above, we hypothesized that a stepwise inclusion of cases based on evidence-based criteria, a structured CBT team-based evaluation of the care-seekers' individual needs, and low-intensity individually geared interventions would all contribute to the cost-effectiveness. Finally, our clinical impression and preliminary reports have suggested an unevenly distributed predictable reduction in sickness absence costs among clinically relevant subgroups. It will be most important to recognize these subgroups when large-scale intervention programmes for musculoskeletal pain are implemented.

MATERIAL AND METHODS

Population

The population of the south-western healthcare region of Sweden is approximately 350,000, the majority in the city of Malmö. They were the target population for a primary care quality improvement project that took place during a 16-month period from November 2000 to February 2002. The project focused on prevention of pain-related long-term sick leave among newly sick-listed care-seekers at one of the 54 public sector primary healthcare physiotherapists, located at 17 outpatient clinics that serve this population.

Design

Inclusion criteria for allocation of care-seekers to the present study were: being of working age (18–65 years), having adequate Swedish language skills to complete a screening questionnaire for psychosocial risk factors (the Örebro Musculoskeletal Pain Questionnaire, OMPQ-r, 26) without assistance. Additional criteria were: sick-listed at the time of care-seeking and no more than 3 months of pain-related sick leave during the previous year. The sick leave information was screened by self-report and subsequently verified in the database of the National Social Insurance Board. The final criterion was a signed consent permitting the researchers to exchange information with the social insurance office.

At the care-seekers' first visit, the primary healthcare physiotherapist conducted a structured interview, distributed the OMPQ-r to be filled in immediately and completed a standard local quality control form. The questionnaire was checked for missing data by the physiotherapist on site, and completed if necessary before the consultation was ended. A co-ordinator at each outpatient clinic posted the forms and questionnaire weekly to the project leader, who made a second quality control check for missing data. Missing data identified at this stage were completed by telephone. If data completion was not successful after 6 attempts on different working days during 2 weeks, the subject was classified as dropped out. The answers to the screening questionnaire did not influence the participation in the local quality improvement project. By drawing lots, the subjects were randomized to the intervention and control group, respectively.

Methods

Physiotherapists' quality control form. Following an ongoing routine, all physiotherapists in primary healthcare completed a quality control form for all care-seeker contacts, which was used in the present study for obtaining the date of identification, the care-seekers name, civic registration number (indicating age and sex), telephone number, working status (sick-listed or not) and a diagnosis confirmed by the physiotherapist. If a care-seeker was sick-listed, the first day of absence, the medical diagnosis and the sickness-certifying physician were recorded. The care-seeker also gave his or her informed consent on this form for co-operation with the social insurance office. Finally, the physiotherapist made an overall assessment of the probability of the care-seeker regaining his or her workability by receiving a specific treatment. The assessment was rated on an 11-point ordinal scale ranging from 0 to 10, with the endpoint markings 0 = non-existent and 10 = very good. As the number of eligible care-seekers not being screened was considerable (Fig. 1), the ability of the physiotherapists to predict long-term sick leave (90 and 180 days, respectively) was evaluated and found to be non-existent (27). In the control group of 381 sick-listed care-seekers, the physiotherapists' global assessment of

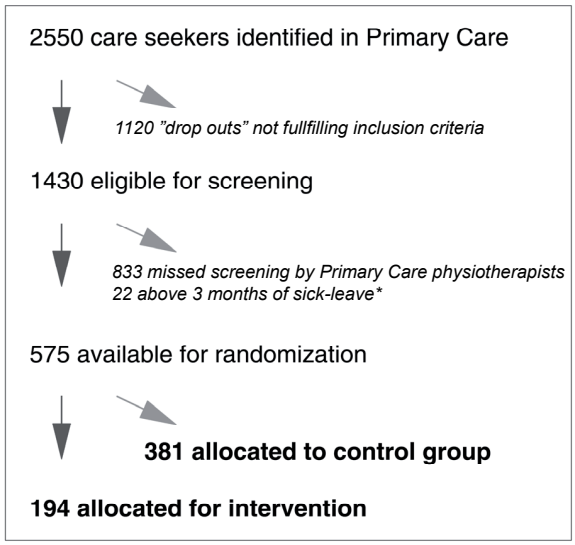

Fig. 1. Identification of primary care physiotherapists for randomization.

the care-seekers' ability to return-to-work showed a sensitivity of 0.59 with a correspondingly specificity of 0.51. Thus, a possible selection bias by the physiotherapists selecting care-seekers to be in particular need of the team intervention, can be excluded.

From the OMPQ-r, sociodemographic information about country of origin, educational level, job title, work tasks and present employment status was used in the present study, while the remaining primary data from this questionnaire will be published elsewhere.

Register data on spells of sick leave during the period from 3 years before to one year after the inclusion date were subsequently gathered. Data were gathered on the number of spells of sick leave, the number of days in each period and on the proportion (25%, 50%, 75% or 100%) of full-time employment, as part-time sick listing was highly propagated in Sweden in that period.

Development of a tool for team-based functional behaviour analysis. The CBT method of functional behaviour analysis was adapted for conducting the study. Dysfunctional risk situations for long-term sick leave due to musculoskeletal symptoms was adopted from a comprehensive review of the scientific state-of-the-art performed by Kendall et al. (18, 19). Our development contributed to a clear conceptualization of identified risk factors and their organization in the form of checklists in 4 external domains, which we selected from the concepts used in social medicine. According to CBT, specific stimuli in these situations are followed by a reaction. In the same way as the external stimuli, identified risk factors conceptualized as the reaction of the care-seeker were organized as check-lists across the domains of a 3-response mode model (see below).

The 4 external domains comprise the community, the workplace, the family/spare time and the healthcare system. The *community domain* focuses on 4 dysfunctional issues of social legislation, standards and application. The *workplace domain* focuses on 8 dysfunctional issues of mechanical and psychosocial exposure as well as dysfunctional interactions between the individual and the workplace. The *family/spare time domain* focuses on 4 dysfunctional issues of social support and network as well as social participation and finally, the *healthcare domain* focuses on 6 dysfunctional issues of medical examination and treatment.

The 3-response mode model domains comprise cognitions, behaviour and psycho-physiological reactions. The *cognitions domain* focuses on a number of dysfunctional issues organized into the categories automatic thoughts, structures of thinking, fundamentals of thinking, depressive thoughts as well as emotionally unstable thinking. The *behaviour domain* focuses on 9 dysfunctional issues of surpluses and deficits of behaviour and finally, the *psycho-physiological reactions domain* focuses on 3 symptoms of acute and longstanding stress, i.e. anxiety, effects of pharmacological treatment including abstinence as well as tense muscles.

Clinical application. The clinical examination by each member of the team evaluated whether factors identified from the care-seekers' history, the interview and the physical examination, which are known to be a risk for long-term sick leave on the group level, would be relevant for the individual care-seeker. Relevance implies that the function of the factor for the individual care-seeker was to reinforce the problem behaviour. If a factor had that function, it was estimated whether the situation was stable or dynamic, i.e. possible to influence by known CBT techniques or by other means, or not. If assessed as stable, the factor would add the activity limits explained by the medical diagnosis, denoted conditions for rehabilitation in the CBT frame of reference. If assessed as dynamic, the factor was focused for intervention in an agreement between the team and the care-seeker. A necessary prerequisite for making an agreement was that the future functional goals should be formulated as alternatives to identified problem behaviours, and that the team evaluated that future reinforcement was expected to be sufficient to attain and maintain the goal behaviour.

According to the principles described above, it could be anticipated that not all care-seekers submitted to the CBT team evaluation would become a case for the CBT team rehabilitation. A subgroup could be expected not to need the CBT team rehabilitation, another subgroup could be expected not to have sufficient potential to attain and maintain possible goals, including returning to work. Thus, protocols were formulated for the handling of 9 clinically relevant subgroups on the basis of the stepwise inclusion and the CBT team analysis.

Clinically relevant subgroups defined by stepwise inclusion and CBT team evaluation

The first clinically relevant subgroup was defined by the care-seekers' physician resisting intervention. With respect to the care-seekers allocated for intervention, the physicians legitimizing sick leave were informed by telephone in order to gain their acceptance for intervention carried out by the CBT team.

When acceptance was obtained from the physician legitimizing sick leave, the care-seeker was contacted by telephone during the daytime during 4 consecutive working days.

The *second clinically relevant subgroup* was defined by not answering the telephone during the daytime.

The care-seekers declining the CBT team intervention defined the *third clinically relevant subgroup*.

It was neither the focus of this study nor in our hands to control or influence possible interventions in ordinary primary care. Thus in subgroups 1–3, no CBT team intervention was performed, but the subjects were followed in the social security register.

Eligible care-seekers were offered an examination by the specialist team. The CBT team consisted of 3 separate consultations by: (*i*) a physician specialized in pain treatment, (*ii*) a specially trained physiotherapist, and (*iii*) a psychologist trained in CBT. Subsequently, the medical and the CBT evaluation, employing functional behaviour analysis, were converged to establish additional and clinically relevant subgroups based on the medical status, the need for specialist team rehabilitation, and the care-seekers potential to profit from such individually geared low-intensity rehabilitation.

The *4*th *clinically relevant subgroup* was defined by the team conclusion that there was no need for CBT team rehabilitation. Indication for medical treatment or physiotherapy in ordinary primary care could be found.

The *5*th *clinically relevant subgroup* was defined by an indication for surgery or other treatment of a diagnosed medical condition.

The *6*th *clinically relevant subgroup* was defined by a medically explained functional impairment, which gave rise to a recommendation for disability pension.

The *7*th *clinically relevant subgroup* was defined by not having a potential to attain or maintain the functional goal of returning to work due

to an identified set-up of psychosocial complications. In contrast to the 6th subgroup, the functional impairment was assessed not to be explained by the medical condition. Most importantly, the difference from the succeeding subgroups (numbers 8 and 9) was that the CBT or other treatment could be applied in order to facilitate these care-seekers' return-to-work. Organizational co-ordination with the social insurance was always offered this subgroup if not clearly refused by the care-seeker.

The *8th clinically relevant subgroup* was defined by having the need for CBT rehabilitation and a potential to attain and maintain the goal return-to-work. However, based on the care-seekers' history or on the progress during the initial phase of rehabilitation, it appeared that the period on sick leave became prolonged mainly or exclusively due to a lack of co-ordination between healthcare interventions with the accomplishment of the obligations of the employer (e.g. work-station adjustments and supernumerary replacements) or due to obvious inactivity from the administrator of social insurance (e.g. cancellation of conferences, the finding of trainee posts or acceptance of termination of employment agreements).

The *9th clinically relevant subgroup* was defined by the evaluation concluding that CBT rehabilitation was indicated in order to facilitate a successful return-to-work as well as to improve and maintain the subjects' workability. Furthermore, no complicating factor was identified. This subgroup was divided further into whether the return-to-work was planned to be the former employment but with a reorganization of work tasks and/or working hours (9a), if education was planned before returning to gainful work (9b) or to the present job (9c).

Data analysis

The total number of days on sick leave was calculated during the period 3 years to one year before and during the year before identification as well as for the periods 0–6 and 7–12 months after identification, respectively. Days compensated with sickness and rehabilitation allowance were summed up. For each new period of sick leave found in the register of the National Social Insurance Board, the 14 days paid for by the employer were added. Part-time compensation was converted to full-time (e.g. 10 days on half-time sick leave was registered as 5 whole days during that period). The health economics calculation was performed as an approximation using a transferral of SEK 368 (Euro 42) a day instead of the actual individual costs.

Occupational class was classified according to job title and work tasks, using the manual issued by Statistics Sweden (28).

Statistical analysis

Data were analysed using the statistical software SPSS® vs 10.0.5 for Windows®. Sociodemographic group differences were tested by using ANOVA in the GLM module of the software considering numeric values on interval scales. Ordinal scale values were analysed by multinomial logistic regression. The relative risk of being sick-listed when belonging to the control group compared with the intervention group was analysed by ordinal logistic regression. Four analyses were performed dichotomizing the intervention and control groups by sick leave status (being on sick leave or not) after 90, 120, 150 and 180 days, respectively, after identification by the primary care physiotherapist.

RESULTS

Primary care consecutively identified 2550 new care-seekers of working age during the 16-month allocation period (Fig. 1). A total of 1430 fulfilled all predefined criteria and 1120 did not fulfil the inclusion criteria. Some of them were not presently on sick leave (n = 618), some had insufficient language skills (n = 216) and 158 did not participate due to lack of time at the consultation. The remaining 128 dropouts were not eligible for screening due to various organizational problems, mental health disorders or other reasons.

Of the eligible 1430 care-seekers, 597 were screened. Thus, there was a non-systematic loss of participants of 42% due to failure of the physiotherapist in order to comply with the study protocol. Of these, 96%, 575 care-seekers fulfilled the criterion of being on sick leave for less than 3 months during the previous year according to the register data (National Social Insurance Board database). Randomization was performed weekly so that a number of the care-seekers continuously filled up the treatment capacity of the team. By this procedure, we ended up by allocating 194 care-seekers to the intervention group and 381 to the control group.

Considering socio-demographic characteristics, the intervention and control group were similar (Table I).

The median age was 40 years, approximately 60% were women and approximately 25% were born outside Sweden. Employment in manual skilled or unskilled occupations was over-represented by a factor of 2–3 compared with the background population in the Malmö area (not shown in Table I). Between 6% and 9% of the participants were unemployed. Incident sick leave was defined as having being sick-listed less than 3 months during the year prior to identification. In fact, the majority had been sick-listed for considerably shorter periods of time, e.g. 69.7% and 74.5% less than one week in the intervention and control groups, respectively.

Table I. *Sociodemographic and sick leave characteristics of the intervention and control groups of care-seekers with new musculoskeletal pain-related sick leave*

	Intervention n = 194	Control n = 381
Age, years, median (interquartiles)	40 (31–48)	40 (32–50)
Sex, % women	61	57
Born in Sweden, %	75	76
Educational level, %		
> 12 years	24.0	22.5
10–12 years	65.2	61.4
< 9 years	10.8	14.2
Missing data	0.5	1.8
Occupational class, %		
High-level, non-manual	0.5	1.9
Middle-level, non-manual	9.7	9.7
Low-level, non-manual	12.8	9.2
Skilled, manual	23.1	22.8
Unskilled, manual	47.7	46.5
Missing data/other (e.g. self-employed)	6.2	10.0
Employment, %		
Gainfully employed	85.6	86.4
Student/in education	5.1	4.2
Unemployed	8.7	6.3
Missing data/other	0.5	3.2
Sick leave 3–1 years before, %		
< 1 week	70.3	65.6
1 week–1 month	16.4	12.9
1–3 months	7.7	14.9
3–6 months	4.6	4.8
Above 6 months	1.0	1.8
Sick leave the previous year, %		
< 1 week	69.7	74.5
1 week–1 month	15.9	15.3
1–3 months	14.4	10.2

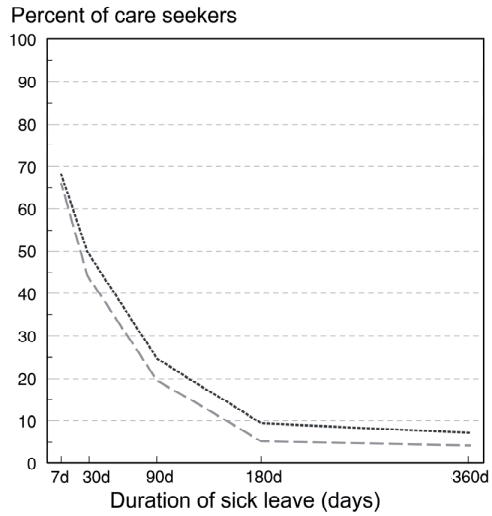

Fig. 2. Percentages of care-seekers in the intervention and control groups respectively, still on sick leave after 7, 30, 90, 180 and 360 days. The light-grey dashed line indicates the intervention group, $n = 194$ and the dark-grey dotted line indicates the control group, $n = 381$.

In the intervention group, the median number of days on sick leave was 22, and for the 75 percentile, the number of days was 77 days during the first 6-month period. Of the initially sick-listed care-seekers, 5.2% were still on sick leave after 180 days and 4.2% remained there after 360 days (Fig. 2). In the control group, the comparable figures were 30 days (median), 89 days (75 percentile), 9.7% and 7.2% (sick-listed on day 180 and on day 360, respectively). From the fourth month, the reduced numbers in the intervention group were statistically significant (Table II).

Although not statistically significant until the fourth month, it should be noted that the percentage compensated with sickness benefit was approximately 5% lower in the intervention group compared with the control group during the whole period from 1 to 12 months.

Table II. *Risks* of care-seekers in the control group for being sick-listed at different points in time compared with care-seekers in the intervention group, n = 381 and 194, respectively*

Splitting of sick leave periods	OR	95% CI
After 90 days	1.1	0.9–1.4
After 120 days	1.4	1.1–1.6
After 150 days	1.8	1.5–2.1
After180 days	2.3	1.9–2.6

*Odds ratio (OR) by ordinal logistic regression and 95% confidence intervals (CI).

The applied stepwise procedures and the team-based functional behaviour analysis resulted in a dividing of the intervention group into a total of 9 clinically relevant subgroups (Table III).

Subgroups responsible for reduced figures of sickness allowance at the beginning

It is probable, although not possible to analyse statistically as comparable figures are not available for the control group, that the reduction in days compensated by sickness allowance during the first months happened among the passively observed who were not reached by telephone during daytime (subgroup 2) and the passive intervention group assessed as having no need for CBT team rehabilitation (subgroup 4).

Subgroups responsible for reduced sickness allowance later on

The reduction in compensation later on could be ascribed to the active and specific interventions made during the CBT team rehabilitation. The reduction in subgroup number 9b was most pronounced, in which the care-seekers preferred to leave their work in favour of formal education. These care-seekers were typically on sick leave until their vocational training or higher education began. Subgroups 9a (planning for adjusted job) and 9c (in no need of adjustment) also showed a positive course. The percentage of the total number of compensated days was

Table III. *Categorization of the intervention groups into subgroups by the stepwise procedure of inclusion and clinical examination and the number of days per case compensated with sickness benefit during the 6 month periods 0–6 and 7–12 months after identification, n = 194*

		Compensated days/case	
Clinically relevant subgroup	*n*	Months 0–6	Months 7–12
Passive observation			
1. Care-seekers' physicians resist intervention (no contact with the care-seeker)	3	43	0
2. No contact with the care-seeker by telephone during daytime	38	21	6
Passive intervention before or after clinical examination			
3. Care-seeker do not want any other intervention than the one in primary care	53	39	29
4. Clinical examination concluding; no need for rehabilitation	35	31	17
5. Indication found for medical/surgical treatment	1	180	180
6. Indication for disability pension	5	180	180
7. No potential to attain or maintain a functional goal due to negatively interacting psychosocial factors	11	98	55
Active intervention after clinical examination			
8. Primarily a need for increased co-ordination between the employer and the social insurance executive	13	105	81
9a. Rehabilitation with adjusted job as the occupational goal	6	98	60
9b. Rehabilitation with education/study as the occupational goal	9	78	1
9c. Rehabilitation with unadjusted former job tasks as the occupational goal	20	38	24

low for these groups in both the first and the second 6-month period (comprising 6% and 8%, respectively)

Subgroups with deviant behaviour

The course of events for those who did not want any other intervention than the treatment in primary care (subgroup 3) was unfavourable. In this subgroup, the percentage of the total number of compensated days increased by 5.3%, from 22.3% during the first 6-month period to 27.6% during the second 6-month period. It is of particular interest to note that although this subgroup constitutes a large proportion of the allocated care-seekers, only a small number showed the deviant behaviour, e.g. due to a dysfunctional care-seeker–healthcare professional alliance.

Subgroup 8, defined by a lack of co-ordination between healthcare interventions with the accomplishment of the obligations of the employer or by obvious inactivity from the administrator of social insurance, comprised 7% of those allocated to the intervention group as a whole, but 27% of the rehabilitation cases. Due to the subgroup characteristics, it was no surprise that the percentage of the total amount of compensated days increased by 4.1%, from 14.7% during the first 6-month period to 18.8% during the second 6-month period.

Economic calculus

The team necessary for the task comprised a physician (0.5 post), a psychologist (1.0 post), a physiotherapist (1.0 post) and a secretary (1.0 post). The team capacity, working with this task only, is set to 140 assessments (3.3 assessments a week during 42 weeks a year) and 50 cases that undergo rehabilitation. This is the actual fraction of the care-seekers assessed in this study. The social security expenditure, calculated for an unskilled manual worker was 42 Euro a day in 2002 and the payroll tax of 40%. In the control group of 381 subjects, a total of 34,941 days were compensated during the first year. This is equivalent to 91.7 days per subject. In the intervention group of 194 subjects, a total of 14,927 days were compensated during the first year. This is equivalent to 76.9 days per subject. The reduction is thus 14.8 days per subject and year. Out of the 194 subjects allocated to assessment, 100 subjects actually went through an assessment, which means that the social security expenditure for 194/100*140 subjects a year will be influenced.

The final calculus consequently give 194/100*140 (subjects)*14.8 (days reduced on sick leave per subject)*42 (Euro per subject)*1.4 (payroll tax) = 236,357 Euro in reduced expenditure for the social security.

The actual salary, including payroll tax, for the team was 178,074 Euro in 2003. Additional expenditure could be estimated to 57,607 Euro (office materials, – rent, – maintenance). This gives a total operating budget of 235,681 Euro.

In this rather conservative calculation, this reduction equals the operating budget during the first year provided that only the actually reduced expenditure in social security is taken into account.

As the care-seekers in subgroups 3 and 8, showing deviant behaviours, constitute a significant proportion of the total ((53 + 13)/194 = 34%), this prompted a calculation of the costs for these subgroups. We assumed that the amount of days compensated with sickness allowance could have decreased to the same level as the mean for the other subgroups taken together, and found that the potential additional sickness allowance reduction could be as much as 599,113 Euro per primary care team and year.

DISCUSSION

This study showed that it was possible to reduce the number of days compensated with sickness allowance by CBT team intervention compared with usual treatment of spells of musculoskeletal pain in the primary care clinics. Most interestingly, the reduced costs in sickness allowance transferred to the intervention group balanced out the intervention costs during the first year, despite the cost-benefit analysis giving an obvious underestimation of the total savings, for example due to the focus on social security costs only and employing the level of transferral for an unskilled manual worker. We prefer to report this rather conservative calculation of cost-benefit, as this is sufficient to test our hypothesis. Individual information about the costs of healthcare or the decrease in production was not available, so we should have been forced to rely on a quite insecure and questionable estimate.

The time-line breaks (e.g. 90 and 120 days) employed, when calculating the point in time when the risk of being long-term sick-listed become statistically significantly increased for care-seekers in the control group, are arbitrary. The true time-point could therefore be anywhere between 90 and 120 days after care-seeking by the primary care physiotherapist.

It is promising that the application of our adaptation of functional behaviour analysis designed for the present study made it possible to define clinically relevant subgroups in which the course of events considering return-to-work happened in a predictable way. Nevertheless, what is presented in this study is only the face validity of the method applied by an experienced CBT team, as no such analysis was made of the care-seekers allocated to the control group.

In our opinion, the theory-driven formulation of clinically relevant subgroups has a high potential to contribute to the cost-efficacy. As staff specialized in CBT intervention are limited in number, it is of importance to use these resources for those care-seekers able to benefit most from them (i.e. subgroups 8 and 9). Last, but not least, for ethical reasons, another most important result of the present implementation of CBT team-based functional behaviour analysis is that foreseeable failures could be avoided among care-seekers evaluated as having no potential to attain or maintain a functional goal by CBT or any other rehabilitation method (i.e. subgroup 7).

The study revealed a prominent lack of implemented workplace-based return-to-work interventions. It was beyond the control of the CBT team to influence this situation considering a number of care-seekers declining (subgroup 3) and by definition of subgroup number 8.

As there was no focus on the question in the scientific design of the present study, it should be regarded only as a suggestion that, by increased co-operation with CBT rehabilitation teams,

twice the amount of money in social security expenditure could be saved as was actually documented in the study. It should be emphasized that it is the combination of increased co-operation and CBT rehabilitation that will make increased savings possible, not increased co-operation in general. In such an ideal situation, after 4 months the reduced expenditure in social security might meet the annual cost of the CBT team.

It should be mentioned that the information sharing of the functional behaviour analysis and the effects of co-ordination with the administrator of social security implies a risk of disagreement with both the care-seeker and professional colleagues. This is not a result of applying functional behaviour analysis to the problem. According to a study by Jensen et al. (29), the best agreement concerning the evaluation of patients' need of rehabilitation and potential to benefit from it, performed by the informal team in primary care (physician, physiotherapist and social security official), was 0.17, expressed as the kappa statistics. The conclusion from this study was a general lack of common standards in the evaluation. It is therefore worth noting that possible disagreements between the CBT team theory-based evaluation, employing functional behaviour analysis, and any experienced professionals non-theoretical evaluation must be seen basically as a disagreement between theoretically based, validated, facts and a matter of opinion based on "gut feeling".

It is our experience that most of the patients find the analyses relevant, the proposed interventions adequate, and that they often express their gratitude spontaneously by not being asked to "start from the beginning" (in functional behaviour analysis, the present situation and the future are in focus). A small minority of 1–2% find the analysis, or more often the consequences of the analysis, violating.

Finally, it should be emphasized that the risk factors on the checklists are only proven at the group level and cannot be generalized to individual care-seekers without being preceded by functional behaviour analysis.

In conclusion, the hypothesis that the cost reduction will balance out the intervention costs was confirmed. It was possible to reduce social security expenditure substantially in a primary care setting. As a conservative calculation, taking only the reduction in social security costs into account, the intervention costs were balanced out during the first year. Suggestions were made concerning the possibility of increasing the cost reduction by a factor of 3 by increased co-operation in combination with CBT team multimodal interventions. Due to a prominent lack of implemented workplace-based return-to-work interventions, we find it feasible to conclude that the major cause for the statistically significant effect on sick leave in this study was the applied functional behaviour analysis by the experienced CBT team, the valid classification into clinically relevant subgroups making appropriate interventions possible when needed.

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