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PREDICTIVE FACTORS FOR WORK CAPACITY IN PATIENTS WITH MUSCULOSKELETAL DISORDERS

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Objective: **To identify predictive factors for work capacity in patients with musculoskeletal disorders.**
Design: **A descriptive, evaluative, quantitative study.**
Subjects/Patients: **The study was based on 385 patients who participated in a rehabilitation programme.**
Methods: **Patients were divided into 2 groups depending on their ability to work. The groups were compared with each other with regard to sociodemographic factors, diagnoses, disability pension and number of sick days. The patient's level of exercise habits, ability to undertake activities, physical capacity, pain and quality of life were compared further using logistic regression analysis.**
Results: **Predictive factors for work capacity, such as ability to undertake activities, quality of life and fitness on exercise, were identified as important independent factors. Other well-known factors, i.e. gender, age, education, pain and earlier sickness certification periods, were also identified. Factors that were not significantly different between the groups were employment status, profession, diagnosis and levels of exercise habits.**
Conclusion: **Identifying predictors for ability to return to work is an essential task for deciding on suitable individual rehabilitation. This study identified new predictive factors, such as ability to undertake activities, quality of life and fitness on exercise.**

Key words: work capacity, musculoskeletal disorders, health predictors, primary healthcare, vocational rehabilitation.

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INTRODUCTION

Long-term sickness certification is an increasing problem, both in Sweden and internationally (1, 2). In 1998, 470,000 inhabitants of Sweden were long-term sick-listed or were receiving benefits, with an annual cost of 65 billion Swedish crowns (SEK) (7.1 billion Euros) (3). By 2002, the number of people in Sweden with sickness certification had almost doubled and the costs are predicted to increase 36% by 2008 (4). The diagnoses in long-term sickness certifications were predominantly of neck or back disorders and only 5% of people affected received any kind of active rehabilitation (3).

Research into back and neck/shoulder disorders and physical work has identified several risk factors and the prognostic value of different psychological factors for the ability to return to work (5). The most important factors were an optimistic/pessimistic outlook on life, the degree of rigidity concerning work tasks, the degree of social assistance and self-image. A good social environment has been proven to be the most important factor for a positive result in a multidisciplinary rehabilitation programme (6).

The aim of this study was to identify predictive factors for work capacity in patients with musculoskeletal disorders in relation to sickness certification by studying sociodemographic characteristics, ability to undertake activities and physical capacity, quality of life (QoL), pain and earlier sickness certification.

MATERIAL AND METHODS

Design and settings

The study has a descriptive, evaluative, quantitative design. It was located in a medium-sized city on the west coast of Sweden, with approximately 65,000 inhabitants. Permission was obtained from the operating manager for withdrawal of non-identifiable data from patient records, during the period May 1992 to May 1999.

Study population

The study was based on 385 patients who participated in a rehabilitation programme. The patients were divided into 2 groups: the "sickness absence" group ($n = 146$; 48% men) and the "sickness presence" group ($n = 231$; 37% men), depending on their ability to return to work 6 and 12 months after rehabilitation, and the number of sick days. Criteria for the "sickness absence" group were ability to work full-time at follow-up 6 and 12 months after intervention and with a maximum of 3 weeks of continuous sick leave during this period (Fig. 1). Patients who had any kind of sickness certification, greater than mentioned above, temporary disability pension or disability pension were included in the "sickness presence" group.

Ethical permission was not required, because the study used previously collected data from a regular rehabilitation programme with non-identifiable patient codes.

The mean age in the "sickness absence" group was 38 years and in the "sickness presence" group 44 years ($p < 0.0001$). The levels of unemployment and educational attainment were not significantly different between the groups; however, the profession classification had a higher level, according to the socio-economic division, in the "sickness presence" group ($p = 0.014$). Marriage was not significantly different between the groups, nor whether the spouse received a disability pension or whether the patients had a work-related disease.

Rehabilitation programme

The rehabilitation programme consisted of daily rehabilitation, 4 hours per day over a period of 5 weeks, with 8 patients in every period. The rehabilitation team comprised a physician, physiotherapists, occupational therapist and psychologist. Staff from the Regional Social

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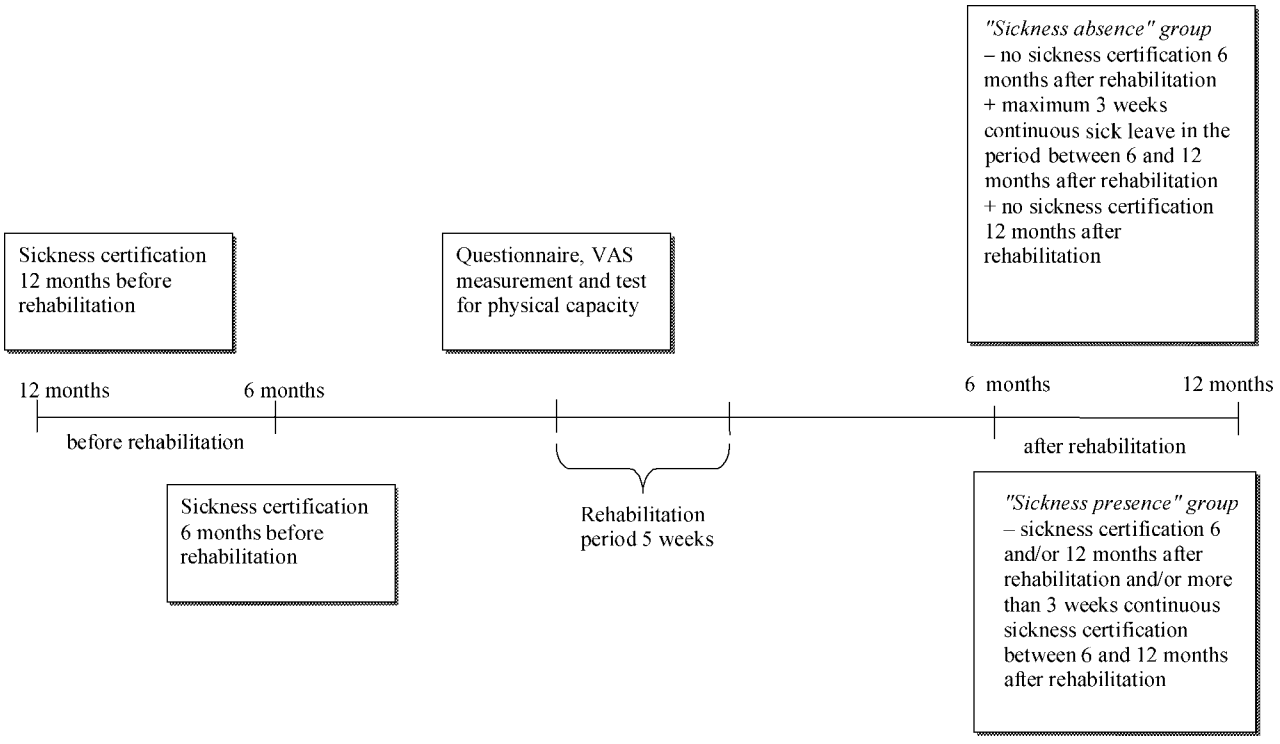

Fig. 1. Flow chart for different activities in the rehabilitation project and the division into "sickness presence" or "sickness absence" groups.

Insurance Office and the patient's employer participated as an important part of the rehabilitation programme. The rehabilitation programme consisted of an individual training programme, gymnastics on land and in water, structured relaxation, ergonomic information and lessons, discussions concerning aetiology and occurrence of pain. The physiotherapist and the occupational therapist made an inventory of the patient's workplace and work tasks. At the end of the rehabilitation period all team members, personnel from the Regional Social Insurance Office, the employer and the patient took part in a rehabilitation conference, resulting in the production of an individual plan for rehabilitation based on the patient's capacity.

Instruments and data collection

Questionnaire. The following items were studied: sociodemographic data, such as gender, age, employment status, educational level, profession according to a socio-economic division in a 1–7 graded scale (Statistical Central Bureau), marital status, spouse's disability pension and work-related disease. The diagnoses were classified according to the primary healthcare classification of ICD-9 (7). The educational level of the participants was rated by scores from 1 to 5 (elementary school (6 years) = 1, compulsory school (9 years) = 2, vocational training school = 3, upper secondary school = 4, university = 5). They were also asked about their levels of exercise habits, ability to undertake activities, pain (estimated at the time of the question and during the last 4 weeks) and QoL.

Assessment of physical capacity. Physical capacity was measured by the heart rate during sub-maximal work on a cycle-exerciser (ml O_2/kg*min) (8). It was compared with the questions about levels of exercise in the questionnaire (no exercise = 0, sometimes = 1, once a week = 2, 2–3 times a week = 3, > 3 times a week = 4).

Visual analogue scale registration. The groups were compared concerning the estimation of rating on a 10-cm visual analogue scale (VAS) (9) evaluating difficulty of doing 15 different activities (dressing, lying down, sitting for a short time, standing up from sitting, walking, climbing stairs, carrying a bag, making the bed, bending forward, light work, running, heavy work, heavy lifting, exercising, car driving). The patients also used VAS for rating their degree of pain at that moment and in the last 4 weeks, from "no pain at all" to "very severe pain". The QoL question, from "very bad" to "very good", should reflect their whole life situation (10).

Sickness certification data before intervention. Data were obtained from the Regional Social Insurance Office concerning the patients' sickness certifications for the same diagnosis 6 and 12 months before the intervention period.

Data analysis

Cross-tabs were used to divide the population into 2 study groups ("sickness absence" group or "sickness presence" group). The Mann-Whitney U-test was used to compare the "sickness absence" group with the "sickness presence" group concerning education, profession, levels of exercise habits and self-rated pain before the intervention.

A *t*-test was used to compare the "sickness absence" group with the "sickness presence" group concerning age, ability to undertake activities and fitness-test. The *t*-test was also used to compare the number of sick days from 12 months and 6 months before the start of the intervention. Logistic regression analysis was performed in order to identify independent variables. Values of $p < 0.05$ were considered significant.

RESULTS

The results from a fitness test on a cycle exerciser before intervention showed that the patients in the "sickness absence" group had higher levels of fitness ($p = 0.012$) (Table I). There was no significant difference in levels of exercise habits between the groups. Patients in the "sickness presence" group had lower levels of ability to undertake activities (mean value in the "sickness presence" group 5.4 on the VAS and in the "sickness absence" group 4.7) with a significant difference independent of other factors for functional ability ($p < 0.0001$). An analysis of the 5 most important factors was also performed (difficulty in

Table I. *Results of analysing predictive factors for work capacity in patients with musculoskeletal disorders, with a logistic regression analysis with age and gender as independent variables in each analysis. In the first 5 analyses education also was used as independent variable*

Predictive factors	*n*	*β*	*p*	OR	95% CI
Physical capacity	336	−0.042	0.012*	0.959	0.927–0.991
Sickness certification during previous 12 months	372	0.006	0.0001*	1.006	1.003–1.008
Functional capacity	358	0.024	0.002*	1.024	1.009–1.040
Exercise habits	360	−0.75	0.337	0.927	0.795–1.082
Pain	364	0.017	0.002*	1.018	1.007–1.029
Employment (having work)	375	0.413	0.12	1.512	0.897–2.547
Sickness certification during previous 6 months	376	0.008	<0.0001*	1.008	1.004–1.012
Married/unmarried	375	−0.001	0.996	0.999	0.610–1.635
Spouse's disability pension	157	−0.583	0.271	0.558	0.198–1.575
Work-related disease	129	−0.236	0.312	0.79	0.500–1.248
Difficulty in:					
running	364	0.01	0.003*	1.011	1.004–1.018
working hard	367	0.016	0.006*	1.016	1.005–1.028
heavy lifting	367	0.018	0.002*	1.019	1.007–1.031
exercising	364	0.01	0.004*	1.01	1.003–1.018
car driving	367	0.001	0.835	1.001	0.993–1.009
Quality of life	306	−0.012	0.01*	0.998	0.978–0.997

*$p < 0.05$; OR = odds ratio; CI = confidence intervals.

running, heavy work, heavy lifting, exercising and car driving). All of these resulted in an independent significance except for car driving (Table I).

Multivariate analysis of the variable QoL resulted in a statistical difference between the 2 groups ($p = 0.01$), with a higher score for QoL in the "sickness absence" group. The "sickness presence" group had more pain than the "sickness absence" group, with a mean value in the "sickness presence" group of 5.3 on the VAS and in the "sickness absence" group of 4.5 ($p = 0.002$) (Table I). The question about the degree of pain during the last 4 weeks showed no significant difference between the 2 groups. There was a difference between the groups with the diagnosis "back pain without neurological findings" and a difference for the diagnosis "neck/shoulder pain". However there were no significant differences between any of the groups (Table II).

The difference in sickness certification during the 6 months before intervention was significant ($p < 0.0001$), with less sick-days in the "sickness absence" group (Table I). In the previous 12-month period the "sickness presence" group had a mean of 205 sick-days before the intervention and the "sickness absence" group 134 days ($p < 0.0001$).

DISCUSSION

During the early 1990s many small rehabilitation centres were set up in Sweden with the aim of reducing sickness certification; this had positive results (11, 12). Sociodemographic variables such as gender and age (4, 13–15) are important factors for the ability to return to work, which were in accordance with our study. In contrast to other studies, not having work to return to after the sickness period (4, 16) was not significant. A high degree of unemployment has an increased risk for long-term sickness certification (4). The person's profession is another important factor for the ability to return to work (4). Blue-collar workers with a higher degree of physical strain in their jobs usually have a higher risk of long-term sickness certification than do white-collar workers (4), but in this study the patients in the "sickness presence" group had a significantly higher professional ranking. However, there was no difference between the two groups regarding educational level. A higher professional ranking sometimes involves a higher stress level and a higher degree of responsibility, with more demands, both from the patient and colleagues, which might be an explanation for the unexpected result. Another unexpected result was that a disorder

Table II. *The diagnostic panorama of the patients in the rehabilitation programme*

Diagnosis according to ICD 9-classification	Group "sickness absence" *n* (%)	Group "sickness presence" *n* (%)	Total *n* (%)
Arthrosis (715)	2 (1)	3 (1)	5 (1)
Chronic knee disease (717)	3 (2)	4 (2)	7 (2)
Joint pain (719E)	1 (1)		1 (0.3)
Cervical spine syndrome (723)	27 (18)	81 (35)	108 (29)
Backache (724C)	44 (30)	44 (19)	88 (23)
Disc degeneration with radiculitis (724E)	44 (30)	60 (26)	104 (28)
Shoulder syndrome (726A)	20 (14)	22 (10)	42 (11)
Bursitis and synovitis (726D)	2 (1)	2 (1)	4 (1)
Soft tissue rheumatism (728)	1 (1)	13 (6)	14 (4)
Problems relating to extremities (729F)	1 (1)	13 (6)	14 (4)
Muscle and connective tissues diseases (739R)	1 (1)	1 (0.4)	2 (1)
Total	146 (100)	230 (100)	376 (100)

classed as a work-related disease had no significant difference. However, it should be noted that the Swedish Social Insurance had at this time changed their rules for economic compensation from a work-related disease.

Physical capacity and ability to undertake activities

The importance of self-rated habits of exercise for the ability to return to work was unexpectedly not significant, although the "sickness absence" group scored significantly higher in the fitness test. The patients showed great individual differences in ranking exercise. Subjective differences in ranking exercise might be an explanation for this result. A lower ability to carry out activities in long-term sick-listed patients with musculoskeletal disorders has also been shown in other studies (11). The ability to undertake activities correlated inversely with pain. Consequently, the "sickness absence" group performed the most difficult activities more easily.

A low QoL was a negative predictive factor (12) and the pain had a significantly higher score in the "sickness presence" group than in the "sickness absence" group (14), which was in accordance with other studies. Patients with a diagnosis of low back pain without neurology did not have a faster rehabilitation compared with the other diagnosis and consisted of a third of the patients in the "sickness absence" group. In the "sickness presence" group a third of patients had the diagnosis neck/shoulder pain, which is in accordance with other studies (5).

Early rehabilitation

The importance of early rehabilitation has been debated (4, 13). The results of this study support the effect of an early rehabilitation, with a sickness certification of 4.5 months in the "sickness absence" group and 7 months in the "sickness presence" group, during a 12-month period before the start of the rehabilitation. However, there may be other explanations, for example, provision of the correct intervention at the correct time or with motivated patients, for a successful result (16).

A strength of this study was the large number of patients ($n = 385$) and that it was possible to study several important variables, in contrast to many studies with a small population and with focus on few parameters. The comparisons between the "sickness absence" and the "sickness presence" groups could be performed with an equal distribution between the groups. However many other important data are missing, for example workplace environment (17), work tasks and colleagues, and other facts about the family situation. With more recent knowledge, we could have used more reliable and valid instruments.

However, both health and risk factors should be relevant when planning the individual's primary and secondary prevention. Since the connections in this heterogeneous patient group look more like a network than a chain, there is need for more research, to develop better methods of early identification of the most suitable rehabilitation procedure for the individual in primary healthcare. It would be of further interest to compare the predictive factors from this study with a 12-month evaluation and the sickness certification with a 5-year evaluation in a longitudinal study.

In conclusion, identifying predictors for ability to return to work is essential in order to direct correct individual rehabilitation. This study identifies new predictive factors, such as ability to undertake activities, QoL and fitness during exercise, as independent important factors, however it does not support self-rated levels of exercise habits as a predictive factor. Other better-known factors, such as gender, age, education, pain and previous sickness certification periods, were also identified, but an opposite relation to profession was found, with the higher profession scores in the "sickness presence group". The identification of predictive factors could be a valuable instrument in prioritizing the provision of resources to the patients with the best chance of a successful rehabilitation.

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