

LONG-TERM SICKNESS ABSENCE DUE TO MUSCULOSKELETAL DISORDERS: THE NECESSARY INTERVENTION OF WORK CONDITIONS

Kerstin Ekberg¹ and Ingrid Wildhagen²

From the ¹Department of Occupational and Environmental Medicine, University Hospital, and ²Department of Primary Health Care and General Practice, Faculty of Health Sciences, Linköping, Sweden and Faculty of Health Sciences, Program of Health Education, University of Limburg, Maastricht, The Netherlands

ABSTRACT. To make rehabilitation of musculoskeletal disorders effective it is crucial to identify circumstances that tend to support the persistence of sickness absence. A total of 93 patients with recently developed disorders in the neck and shoulders were followed for one year after rehabilitation, in order to identify factors associated with recovery and chronicity, respectively. Health status was evaluated before rehabilitation and after 12 months in terms of sickness absence, pain ratings and self-rated quality of life, the Sickness Impact Profile. The study group was divided into tertiles based on their number of days of sickness absence during the follow-up period (short: < 25 days, medium: 25-101 days, long: > 101 days). Those with long-term sickness absence perceived higher physical and mental load in their jobs. There was also a higher proportion of persons who were not born in Sweden in this group and on average they had more sick-leave days the preceding year. Other background characteristics and personality ratings were similar between the groups. Long-term sickness absence was associated with worse ratings in quality of life after one year, and pain did not diminish during the follow-up year. Multiple regression analysis indicated that long-term sickness absence was largely associated with work conditions rather than with individual characteristics. Therefore, the results underscore the importance not only of treating the individual with musculoskeletal disorders, but in particular of improving his or her work conditions.

Key words: health, musculoskeletal disorders, work conditions, sickness absence, pain, Sickness Impact Profile, prognosis.

Musculoskeletal disorders commonly lead to sick-leave in many Western countries (2), and frequently to long absence from work. In Sweden, the average

number of sick-leave days for these disorders is about 100 days (20). Women suffer more than men from disorders in the neck and shoulders, and immigrants appear to be prime victims (7, 18). Physically demanding work conditions have traditionally been taken as the major cause of the disorders, and considerable efforts have been made to reduce muscle load with technological solutions. However, these efforts have not diminished the prevalence of musculoskeletal disorders; rather the prevalence appears to increase.

In many cases of musculoskeletal disorders it is difficult to establish specific diagnoses and the causes of the complaints remain unknown. Fortunately, many patients with acute complaints recover within some weeks with the help of rest, analgesics and general advice (5). The recurrence rate is high (10), however, and the development into a chronic state for many patients result in considerable suffering as well as high costs for society. Extensive efforts are made to treat patients with chronic problems, but also to prevent chronicity by active and early intervention (19). The results have not always been positive (e.g. 4, 15). Since good health is not a static condition, but a matter of degree determined by social values and circumstances, and also by psychological and physical conditions, studies aiming at evaluating the effectiveness of rehabilitation are faced with the problem of how to measure health.

Days of sick-leave is a common measurement of outcome in studies of effects of rehabilitation for musculoskeletal disorders. This variable is a complex measurement, since it is affected by the labour market and by the social insurance system. It is also affected by the values and other characteristics of the physician (31). Moreover, sickness absence is suggested to be affected by subjective stress at the work place (21), and by individual characteristics such as

the perception of health in relation to job demands and job strain (17). Hence, sick-leave days due to musculoskeletal pain may partly reflect musculoskeletal dysfunction, but partly also societal values and the individual's appreciation of the symptoms in relation to the work demands.

Pain is as complex a measurement as days of sickness absence. However, pain to a larger extent reflects individual, rather than societal, aspects of a disorder. It is now generally recognized that psychological factors play an important role in chronic pain. Attempts to distinguish pain of psychological origin from pain due to physical causes have not been successful. Anxiety and depression contribute to pain, some personality disorders and cognitive styles are associated with chronic pain, and in some cases pain may be maintained by psychological rewards (11). Personality factors influence the experience of pain and reactions to pain (3) and numerous studies have been performed to explore the relationship between pain and personality (e.g. 27, 28). Pain ratings are common outcome measurements in studies of effects of rehabilitation of musculoskeletal disorders.

Health-related behaviour, as measured by the Sickness Impact Profile (SIP), reflects health aspects in a wider sense (1). SIP has been considered an instrument for measuring quality of life. It was developed in order to provide a measurement of health status that could be used in the assessment of individuals or populations with chronic or acute illness. Physicians had the experience that the patients often seem to improve in terms of activities they undertake, yet their medical condition or pain and symptoms may remain unchanged. They reasoned that a systematic knowledge of the health-related behaviour of patients would help assess changes in treatment and care (1).

SIP has mainly been utilized for groups of patients with severe diseases, and only rarely in the present context. In one study (16) SIP was used as an outcome measurement of patients with fibromyalgia who participated in a "pain school". The pain school resulted in lower need for health care services and an increased rate of return to work, but there were no improvements in pain ratings or in SIP scores, compared with a control group. However, more studies are needed to assess the usability of SIP on musculoskeletal disorders.

To make rehabilitation effective, it is important to find determinants of health prognosis and which aspects of health are affected. The aim of the present

study was to assess the impact of physical work load, work organization, psychosocial conditions, and individual characteristics on some measurements of health, namely subjective pain, quality of life, and days of sick-leave after rehabilitation. In particular we wanted to determine the relative importance of work conditions for long-term sick-leave or chronicity in patients with disorders in the neck and shoulders.

METHODS AND SUBJECTS

The study was performed in a community in southern Sweden, which is characterized by many small manufacturing companies. Piecework is common. The primary health care needs in the area are essentially covered by two health care units, the Industrial Health Care and the Primary Health Care Center.

During a time period of 15 months all persons who consulted any physician in the community for musculoskeletal disorders in the neck, shoulders, arms or upper thorax were considered for participation in the study. In order to exclude individuals who suffered from chronic musculoskeletal problems the persons should at most have been on continuous sick-leave for four weeks. In addition, the disorder should not be caused by traumatic or bacterial agents, malignancy, rheumatic diseases, abuse, or by pregnancy. To be accepted for the study, subjects should be professionally active and in the age range of 18 to 59 years. The subjects were clinically examined by the same physician and physiotherapist before treatment and after 12 months. Diagnoses were set according to criteria described by Waris *et al.* (32).

Subjects who consulted the physician at the Industrial Health Care Unit were assigned to an active rehabilitation programme, while subjects at the Primary Health Care Unit obtained traditional treatment. The rehabilitation programmes have been described elsewhere (8). Briefly, the active rehabilitation programme comprised physical training, information, education, social interaction and work place visits. It had a duration of eight weeks, and it was based on activities performed in small groups (5-8 persons) with one or two physiotherapists. All subjects were on at least 50% sick-leave during the rehabilitation period. The traditional treatment comprised physiotherapeutic treatment, medication or other types of treatments along with rest and/or sick-leave as considered necessary by the physician. The treatment in this group was more passive and did not comprise group activities, education, or efforts to improve the work conditions (8).

Subjects

A total of 93 patients (74 females, 19 males) participated in the study, 53 subjects (57%) were given active rehabilitation and 40 subjects (43%) obtained traditional treatment. The most common diagnoses were tension neck syndrome (44%), humeral tendinitis (27%), and cervical syndrome (18%). Eleven percent were distributed on three other diagnoses in the neck and shoulders. Since the effects of the two different rehabilitation programmes did not differ in essential aspects (8), the groups were pooled into one group in the following analyses.

Procedure

Information on background factors, i.e. age, gender, immigrant status (born or not born in Sweden), family situation (number of children and their age), smoking habits and exercise habits (rarely, < 5 hrs per week, > 5 hrs per week) were collected with a questionnaire before treatment. It comprised seven subscales on physical work conditions (uncomfortable sitting and standing positions, physically demanding work, light lifting, repetitive movements demanding precision, work with lifted arms, monotonous work position), and eight subscales on organizational and psychosocial work conditions (work climate, work content, work pace, demands on attention, work planning, job security, job constraints, work role ambiguity). The questionnaire has been fully described by Ekberg et al. (6). The same questionnaire was answered after 12 months at a clinical check-up. Before treatment all subjects also filled out a questionnaire on personality, the Karolinska Scale of Personality (KSP) which includes 15 scales (26). Three subscales concern anxiety proneness (somatic anxiety, psychic anxiety, muscular tension), three subscales are related to extraversion in Eysenck's Personality Inventory (9) (impulsiveness, monotony avoidance, detachment), three subscales comprise aggression (indirect aggression, verbal aggression, irritability), and two subscales describe hostility (suspicion, guilt). KSP also comprises scales describing inhibition of aggression, psychasthenia, social desirability and socialization. The KSP has been fully described by Carlsson (3).

Measurements of health

Sick-leave: Information regarding sick-leave was obtained from the Swedish social insurance office. The number of sick-leave days due to musculoskeletal disorders was obtained for each subject for the entire year before the treatment, and per quarter of the year during the follow-up period.

Pain: Before treatment and after 12 months the subjects rated their present subjective musculoskeletal pain on a numeric scale ranging between 1 (no pain at all) and 10 (unbearable pain).

Health-related behaviour, SIP: Before treatment and at the clinical check-up after 12 months, all subjects answered a shortened version of the Sickness Impact Profile (SIP), which is a measurement of health-related behaviour (1). The original version comprises 12 scales. In the present study the following seven scales were used: mobility (physical dimension), alertness behaviour, emotional behaviour, social interaction (psychosocial dimension), work, home management, and recreation and pastimes (independent categories).

Statistical analysis

The study group was divided into tertiles depending on number of sick-leave days during the follow-up year. Cut-off points were set to make the groups equal in size. The lowest tertile ($n = 30$) comprised subjects with less than 25 days of sick-leave ($md = 5$ days), the medium group ($n = 31$) comprised subjects with between 25 and 101 days of sick-leave ($md = 49$ days), and the third group comprised subjects with more than 101 days of sick-leave ($md = 173$ days, $n = 32$) during the follow-up period (Table I). Sick-leave during the first quarter of the follow-up period, i.e. during the active rehabilitation period, was excluded in the analyses. Univariate comparisons between the subgroups in ratings of

personality and of work characteristics were made with Student's *t*-test, and for dichotomous data, with the Chi-square test. Comparisons of SIP-ratings were made with the Wilcoxon two-sample test, since data were skewed. Multiple regression analysis was performed in order to find which variables were associated with days on sick-leave. In these analyses the logarithm of days of sick-leave were used, since the distribution was skewed. Type of rehabilitation obtained, background characteristics, work environment factors, pain ratings before treatment, and SIP-ratings before treatment, in addition to the logarithm of days of sick-leave the previous year, were used as independent variables in this analysis. The variables were standardized to allow comparisons between them.

RESULTS

Short, medium and long-term sick-leave

Background characteristics: The demographics of the three subgroups with short, medium, and long sick-leave respectively are presented in Table I. There was a significant difference between the groups with regard to proportion of patients with immigrant status. In the group with short sick-leave after rehabilitation two immigrants were from the Nordic countries and one person from other countries. They had lived in Sweden for 15 years (range: 10–20 years) on average. Among immigrants in the medium sick-leave group, seven persons came from Nordic countries and two from other countries. They had lived in Sweden for 18 years (range: 6–44 years) on average. In the group with long-term sick-leave, seven persons came from Nordic countries and eight persons from other countries. They had lived in Sweden for an average of 19 years (range: 1–37 years). There was a tendency to overrepresentation of women in the long-term sick-leave group. The groups did not differ with respect to age, proportion of smokers, or exercise habits.

The three groups differed in number of days on sick-leave the year before rehabilitation. Those with short sick-leave during the follow-up also had less days of sick-leave the previous year, while the group on long-term sick-leave during the follow-up had significantly more days on sick-leave the preceding year. Three subjects did not return to work during the follow-up period.

Personality: The three groups were compared with regard to personality characteristics (Table II). Subjects with short sick-leave had lower ratings on the psychasthenia scale, compared with those with medium sick-leave. Subjects with short sick-leave and those with long sick-leave did not differ in personality ratings.

Table I. Demographics of the three subgroups with short (< 25 days), medium (25–101 days) and long (> 101 days) sick-leave during the follow up period

Statistical testing was performed with Wilcoxon two-sample test for days of sick-leave previous year, Student's *t*-test for the age variable, and with the Chi-square test for the dichotomous variables

	Sick-leave			Short vs. medium sick-leave <i>p</i>	Short vs. long sick-leave <i>p</i>
	Short < 25 days <i>n</i> = 30	Medium 25–101 days <i>n</i> = 31	Long > 101 days <i>n</i> = 32		
Age (years); mean (sd)	41 (11)	38 (11)	39 (10)	0.23	0.44
Women (%)	70	81	88	0.33	0.09
Immigrant status (%)	10	29	47	0.06	0.001
Smoker (%)	57	68	56	0.37	0.97
Exercising (%)	61	42	48	0.15	0.34
Days of sick-leave previous year; mean (sd)	13 (16)	24 (21)	43 (48)	0.006	0.002
median	6	17	21		

Work conditions: The groups with medium and long sick-leave differed significantly from the group with short sick-leave in having work with more monotonous work positions, and work with lifted arms. They also rated lower quality of work content in terms of less opportunities for stimulation and development and less influence on their jobs (Table III). In addition, those with long sick-leave had more demanding work conditions than the group with short sick-leave regarding uncomfortable sitting positions, repetitive movements demanding precision, and high job constraints, i.e. a work situation constrained by machines, equipment or close supervision. The experience of work role ambiguity, i.e. uncertainty about how to perform the job and whether one would manage the

job at all, was lower among those who had short sick-leave than in the other two groups.

In the short-term sick-leave group, one subject changed work tasks and four subjects changed work places during the follow-up year after rehabilitation. In the medium sick-leave group, five subjects changed work tasks and eight subjects changed work places during the follow-up period. In the long-term sick-leave group the corresponding numbers were six subjects who changed work tasks and ten subjects who changed work places.

Pain and ratings on the Sickness Impact Profile

The three groups did not differ in pain ratings before

Table II. Personality characteristics (Karolinska Scale of Personality, KSP) before rehabilitation of the three subgroups with short (< 25 days), medium (25–101 days) and long (> 101 days) sick-leave during the follow-up period

Student's *t*-test

KSP factor	Sick-leave						Short vs. medium sick-leave <i>p</i>	Short vs. long sick-leave <i>p</i>
	Short <i>n</i> = 30		Medium <i>n</i> = 31		Long <i>n</i> = 32			
	<i>m</i>	<i>sd</i>	<i>m</i>	<i>sd</i>	<i>m</i>	<i>sd</i>		
Socialization	67.2	8.9	64.3	8.5	64.3	9.4	0.19	0.21
Social desirability	2.6	2.2	2.1	2.2	3.3	2.6	0.41	0.27
Psychasthenia	20.9	4.4	23.5	4.3	21.9	5.4	0.03	0.46
Inhibition of aggression	24.0	4.5	25.4	4.8	25.9	5.6	0.26	0.16
Impulsivity	68.8	8.9	66.8	7.4	65.4	12.6	0.35	0.22
Anxiety	59.8	13.7	66.0	16.3	66.1	12.7	0.12	0.07
Hostility	20.9	3.8	22.0	3.5	22.3	3.2	0.24	0.14
Aggression	33.0	6.0	34.5	7.3	32.2	7.0	0.39	0.60

Table III. Average perceived ratings of work conditions before rehabilitation of the three subgroups with short (< 25 days), medium (25–101 days) and long (> 101 days) sick-leave during the follow-up period

Response scales ranging between 0 and 4 for physical work conditions and between 1 and 7 for organizational work conditions (Student's *t*-test)

Work environment factor	Sick-leave						Short vs. medium sick-leave <i>p</i>	Short vs. long sick-leave <i>p</i>
	Short <i>n</i> = 30		Medium <i>n</i> = 31		Long <i>n</i> = 32			
	<i>m</i>	<i>sd</i>	<i>m</i>	<i>sd</i>	<i>m</i>	<i>sd</i>		
Physical work conditions								
Uncomfortable sitting position	2.7	1.6	2.5	1.7	1.8	1.6	0.50	0.03
Uncomfortable standing position	2.2	1.4	2.5	1.3	2.1	1.6	0.44	0.77
Work with lifted arms	3.4	0.9	3.8	0.5	3.7	0.5	0.02	0.06
Repetitive movements								
demanding precision	2.3	1.1	1.9	1.0	1.6	1.0	0.17	0.009
Monotonous work position	2.3	0.8	1.5	1.1	1.8	1.0	0.002	0.01
Organizational work conditions								
High work pace	3.3	1.0	3.4	1.2	3.0	1.4	0.87	0.25
Demands on attention	5.8	1.0	5.4	1.0	5.5	1.1	0.18	0.33
Work planning	5.5	1.4	5.6	1.4	5.3	1.4	0.75	0.52
Job security	6.1	1.2	6.0	1.5	6.1	1.1	0.89	0.80
Job constraints	5.1	1.3	4.8	1.7	3.9	1.4	0.34	0.001
Work role ambiguity	6.5	0.7	5.9	1.2	5.8	1.5	0.05	0.07
Work content	4.2	1.4	3.3	1.2	3.1	0.9	0.009	0.001
Work climate	4.9	1.3	4.8	1.2	4.6	1.1	0.61	0.22

Note: Lower scores indicate worse work conditions.

treatment. After 12 months the group on long-term sick-leave had unchanged pain ratings, while the group on short-term sick-leave had improved (Table IV).

Before treatment, the group with medium sick-leave indicated more emotional problems and had a tendency to less social interaction on the SIP-scales compared with the group on short sick-leave. Those with long sick-leave had significantly more emotional problems, and more problems with home management and work, compared with those on short sick-leave (Table IV). After 12 months, the differences in ratings on SIP between those on short and long-term sick-leave encompassed all scales on SIP, in that those on long-term sick-leave had significantly worse quality of life ratings.

Predictors of days of sick-leave

Multiple linear regression analysis was performed with the logarithm of days of sick-leave as dependent variable. Since persons who experience their life as less successful might be more prone to remain on long-term sick-leave, two regression models were established. In one model, SIP ratings before rehabilitation

were included as predictor variables, along with pain ratings before treatment, the logarithm of days on sick-leave the preceding year, type of rehabilitation obtained, background characteristics, work conditions, and personality variables. In the other model, SIP-ratings were excluded. The final model comprises five major predictors of days on sick-leave after rehabilitation; low quality of work content, work positions involving uncomfortable sitting, immigrant status, number of days on sick-leave the preceding year and the personality scale hostility (Table V). Exclusion of number of days on sick-leave the preceding year did not significantly affect the remaining variables in the models. SIP ratings before rehabilitation were not associated with number of days on sick-leave during the follow-up period.

Associations between changes in health measurements

Comparisons were made between change in sick-leave and change in pain ratings during the follow-up period. Change in sick-leave was measured as a difference of at least five days in number of days on sick-leave between the last three quarters of the previous year and the last three quarters of the follow-up

Table IV. Average pain ratings and ratings on the Sickness Impact Profile (SIP) before rehabilitation and after 12 months in the three subgroups with short (< 25 days), medium (25–101 days) and long (> 101 days) sick-leave during the follow-up period

Student's *t*-test for pain ratings, Wilcoxon two-sample test for SIP-ratings

Outcome measure	Sick-leave						Short vs. medium sick-leave <i>p</i>	Short vs. long sick-leave <i>p</i>
	Short <i>n</i> = 30		Medium <i>n</i> = 31		Long <i>n</i> = 32			
	<i>m</i>	<i>sd</i>	<i>m</i>	<i>sd</i>	<i>m</i>	<i>sd</i>		
Pain ⁰	5.9	1.3	5.6	1.3	6.5	1.7	0.46	0.11
Pain ¹²	4.7	1.8	4.9	1.3	6.3	1.4	0.59	0.0006
SIP scales:								
Mobility ⁰	4.4	8.5	2.5	4.5	9.4	13.4	0.63	0.10
Mobility ¹²	1.5	5.9	1.5	4.7	7.0	13.2	0.51	0.045
Alertness behaviour ⁰	3.3	7.6	6.2	12.3	7.9	13.2	0.25	0.67
Alertness behaviour ¹²	4.4	13.4	3.7	7.6	13.0	22.0	0.30	0.012
Emotional behaviour ⁰	3.0	5.4	7.0	10.5	13.8	16.3	0.009	0.05
Emotional behaviour ¹²	1.5	3.7	8.3	10.3	17.8	23.4	0.004	0.0001
Social interaction ⁰	2.7	5.5	3.1	6.7	8.1	10.4	0.07	0.16
Social interaction ¹²	2.2	9.8	4.3	8.0	11.4	17.2	0.03	0.001
Home management ⁰	11.1	15.8	11.8	13.5	20.9	15.8	0.57	0.005
Home management ¹²	1.9	8.6	5.8	11.3	23.4	23.0	0.009	0.0001
Recreation and pastimes ⁰	8.3	11.2	8.2	10.8	12.5	12.8	0.28	0.92
Recreation and pastimes ¹²	4.4	10.3	6.8	10.7	14.1	13.6	0.25	0.001
Work ⁰	49.0	31.1	57.8	25.8	62.1	19.5	0.20	0.07
Work ¹²	2.2	7.9	16.5	26.4	30.0	27.4	0.008	0.0001

Note: Higher scores on SIP indicate worse health behaviour.

⁰ = measurement before rehabilitation.

¹² = measurement at 12 month follow-up.

year. Change in pain was measured as the difference between ratings before treatment and after one year. Out of those who increased their sick-leave at least five days during the follow-up period (*n* = 56), 16% had more pain, while 46% rated less pain at the 12 month follow-up. Out of the 14 subjects who decreased their sick-leave during the follow-up period with at least five days, 50% had less pain, while 14% indicated increased pain. Eighty percent of those with

unchanged (± 5) number of days on sick-leave had lower pain ratings at the follow-up compared to before treatment. Hence, change in sick-leave was not associated with change in subjective pain (Chi-square = 0.06, *p* = 0.97).

DISCUSSION

All subjects in this study suffered from recent disorders in the neck and shoulders and they had consulted a physician due to the disorder. They were all occupationally active. The initial aim of the study was to evaluate the effects of an early and active rehabilitation programme on symptoms in the neck and shoulders, compared with "traditional" treatment. The treatment programmes did not produce any difference with respect to the long-term outcome (8). In the present study, the aim was to assess which factors predicted long sick-leaves after rehabilitation was finished.

The group who remained on sick-leave for a long duration after rehabilitation comprised more immigrants and slightly more women than the group who

Table V. Multiple linear regression model with log sick-leave days after rehabilitation as dependent variable

Standardized beta coefficients (slope), variance explained by the variable (*R*²), and level of significance (*p*)

Independent variable	Standardized beta	<i>R</i> ²	<i>p</i>
Work content	-0.24	0.15	0.0002
Immigrant status	0.31	0.10	0.001
Sick leave previous year	0.34	0.07	0.006
Hostility (KSP)	0.25	0.05	0.008
Uncomfortable sitting	-0.25	0.04	0.03
Variance explained by model		0.41	

returned to work shortly after the rehabilitation period. The immigrant group comprised as many people from the Nordic countries as from other countries, which may imply that the cultural differences in health attitudes and expectations were small compared with those of the Swedes. All but one in the long-term sick-leave group had lived in Sweden for at least 10 years. The group of immigrants must therefore be considered as a stable group having settled in Sweden. The background characteristics of the groups were in all other respects essentially identical. The overrepresentation of immigrants in the group on long-term sick-leave may therefore have other, or additional reasons than the strain of being an immigrant.

Those on long-term sick-leave had on average more sick-leave days the year preceding rehabilitation. This was mainly due to a few subjects having comparably many days on sick-leave, as reflected in the large standard deviations, while the differences in median sick-leave days between the groups were smaller. It is possible that those who remained on long-term sick-leave in some respects had worse health before rehabilitation. Pain ratings did not differ between the groups before treatment, while there were some indications in SIP of more problems with regard to emotional behaviour and social interaction in the long-term sickness group before treatment.

It is often claimed that personality may be one important factor differentiating between those who return to work fast and those who tend to stay on sick-leave. Sivik (27) reported specific personality structures among pain-prone patients. She also reported a more pathologic personality among chronically ill patients compared with acutely ill patients. However, the results of the present study, in which the KSP was used as personality inventory, do not provide strong support for such a difference in personality characteristics associated with duration of sick-leave.

Comparisons of the perceived ergonomic and organizational conditions at work showed important differences between the groups. The patients who remained on long sick-leave after having finished rehabilitation, more extensively perceived their work tasks as comprising uncomfortable and monotonous sitting positions, and high demands on precision. They also perceived higher job constraints, i.e. work which was constrained by machines, equipment, or close supervision, and they experienced less opportunities for stimulation and development in their jobs,

and less possibilities to influence the work. Such work conditions are associated with increased risk for musculoskeletal disorders (2), as well as other stress-related diseases (13). It is common with an overrepresentation of women (22) and immigrants (18) in these jobs in industry, since they are considered low-status jobs although with high demands on endurance. Selection mechanisms in job assignment may be one reason for the overrepresentation of immigrants in the long-term sick-leave group. Women and those with low education have poorer opportunities for a career out of the harmful job into another job (14), while those who succeed in obtaining another job appear to have a better health prognosis (8). In the present study, most of those on short-term sick-leave returned to their previous jobs. Almost half of those on medium- and long-term sick-leave changed work tasks or work places during the year after rehabilitation. Thereafter their health prognosis was more positive than for those with unchanged work conditions (8).

The results of the multiple regression analysis, which should only be considered suggestive due to the limited number of subjects, indicate that long-term sickness absence due to musculoskeletal disorders to a large extent is preserved by the work situation, rather than by individual characteristics. The number of days on sick-leave the preceding year was associated with number of days on sick-leave during the follow-up period, which may lend some support to the idea of a sick-leave "proneness" in some subjects. It is also possible that there was an initial difference in degree of severity of the symptoms between the groups, although the pain ratings did not differ between them.

As emphasized by Granger (12) health concerns not only the organ level in physical and psychological terms, but also performance and social roles. In long-term sickness it is virtually impossible to separate physical and psychological variables from each other and from their social consequences, and physical impairment is frequently linked with psychological distress (25). The quality of life measurements in this study showed that those who had remained on long sick-leave, rather deteriorated in ratings on the Sickness Impact Profile. Effects of long-term sick-leave may be comparable to effects of disability pension or unemployment, which in other studies have been shown to cause increased physical and psychic illness (29).

Whitbeck (33) takes the stand that what qualifies as

a disease is relative to a societal context. This was vividly described by Reid et al. (24) in their analysis of the epidemic of repetition strain injury (RSI) in the Australian industry in the early 1980s. They stress that "the failure of the dominant explanations of RSI to accommodate the psychosocial and political dimensions of the illness . . . contributed to its chronicity" (p.601). Scepticism from the doctors, supervisors and colleagues forced the patients into a pattern of credibility seeking, which possibly maintained and prolonged their illness. Nijhof (23) also points to the interaction between the patient and the medical system as a cause for development of chronic musculoskeletal illness, in suggesting chronicity to be a result of an accepted self-labelling process, in which the "instruments" for self-labelling stems from sources within the society. Furthermore, the influence of work conditions as a contributory cause of sickness certification was most apparent among patients with musculo-skeletal disorders who had physically strenuous blue-collar jobs in a Norwegian study (30). In Sweden, the physician may be more prone to prolong sick-leave for those patients with disorders in the neck and shoulders who have monotonous and repetitive jobs.

To conclude, people who remained on long-term sick-leave after rehabilitation for disorders in the neck and shoulders had worse ratings on SIP after the follow-up year, compared with those with short-term sick leave. It appears that long-term sickness absence is associated with a "sick role" with detrimental effects on the quality of life. Those who remained on long-term sickness absence rated worse physical and organizational work conditions before rehabilitation. In particular, work conditions which involve low opportunities for development and influence on the job and uncomfortable sitting positions appear to be associated with long-term sickness absence, unless work conditions are changed. The results of the study underscore the importance of including the work conditions in programmes for rehabilitation of individuals with work-related musculoskeletal disorders. Furthermore, the results indicate the importance of noting early "signals" of poor health, not only in terms of days on sick-leave, but also in terms of psychological aspects of quality of life.

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Address for offprints

Kerstin Ekberg
 Department of Occupational and Environmental Medicine
 University Hospital
 S-581 85 Linköping
 Sweden