

## INTERDISCIPLINARY REHABILITATION OF HOSPITAL EMPLOYEES WITH MUSCULOSKELETAL DISORDERS

Gunilla Nordström-Björverud, MD,<sup>1</sup> and Ulrich Moritz, MD, PhD<sup>2</sup>

From the <sup>1</sup>Department of Rehabilitation Medicine, Lund University Hospital, Sweden, and <sup>2</sup>Department of Physical Therapy, University of Lund, Lund, Sweden

**ABSTRACT.** At Lund University Hospital a cooperation project started in 1989 between the Rehabilitation Clinic and the Occupational Health Service Unit for the rehabilitation of 34 hospital employees with musculoskeletal problems and a median sick-listing time of 6 months, treated as day-patients by an interdisciplinary team. Evaluation instruments used were the Nottingham Health Profile (NHP), Pain Drawing, Visual Analogue Scale for pain, and the Disability Rating Index (DRI). The most prominent immediate effect was a significant increase of perceived energy and significant improvement of the total score of health-related quality of life (NHP). After 12 months, 25 out of 34 (74%) subjects had returned to work. The reference group used consisted of 57 subjects referred earlier from the Occupational Health Service Unit to the Personnel Department, for vocational rehabilitation. The groups were followed by 2–4 years using questionnaires concerning working conditions and current health status. There was a significant difference ( $p = 0.038$ ) in return to work: intervention group 77%, reference group 58%.

*Key words:* Disability Rating Index, hospital employees, interdisciplinary rehabilitation, musculoskeletal disorders, Nottingham Health Profile, Pain Drawing, VAS for pain.

### INTRODUCTION

The need for rehabilitation of subjects who had been on the sick list for a long time became very urgent in Sweden at the end of the 1980s. The number of claims for work injury compensation was rising. The duration of sick leave was increasing. At Lund University Hospital, with a total staff of 8900, the mean sick-listing (including “at home with sick child”) was 40 days per year in 1989. Seventy percent of the sick-listing days belonged to the category of “sick-listed more than 30 days”.

Rehabilitation was often not begun until the subjects had

been on the sick list for a long time. Medical rehabilitation and treatment were probably not always sufficiently coordinated with vocational rehabilitation. The Rehabilitation Clinic was mostly used for rehabilitation of subject who had been sick-listed for 1–2 years.

To try to utilize the resources better, a cooperation project was started between the Rehabilitation Clinic and the Occupational Health Service Unit at the Lund University Hospital. The subjects chosen for the project were early cases with musculoskeletal problems.

The aim of the project was to develop a joint programme that would find medical and/or educational solutions to the subjects' problems, prevent physical inactivity and stimulate early return to work. The programme was expected to shorten the time for medical evaluation and care and promote early rehabilitation by the simultaneous use of medical and vocational rehabilitation methods. It was hoped that the programme could be used as a generally applicable model.

In the evaluation of the rehabilitation effect of the programme, results were compared with the results achieved by rehabilitation in conventional cooperation between the Occupational Health Service Unit and the Personnel Department of the hospital, without intervention from the Rehabilitation Clinic.

### MATERIALS AND METHODS

All subjects were hospital employees at the Lund University Hospital. All professional categories were accepted. *Inclusion criteria* were musculoskeletal pain from the neck/shoulder region, elbow, thoracic/lumbar region or pelvic/hip region, age between 20 and 60 years and consecutive sick-listing for 2 months or repeated sick-listing during the previous 12 months. *Exclusion criteria* were pregnancy, malignant disease or psychiatric disease.

#### *Intervention group*

This group consisted of 34 hospital workers between 1989 and 1992. Most of the subjects (25/34) were sent to the project from

the Occupational Health Service, 4 were referred by their ordinary physician, 4 were referred by a physician in cooperation with the Social Insurance Office, and 1 subject came on her own initiative. The subjects were seen by the rehabilitation physician within 2 weeks after referral and admitted within 6 weeks. One subject was male, and all the other 33 were women.

The age varied between 25 and 54 years, with a median (md) of 36 years. Thirty-two subjects were on the sick list when they entered the programme, while 2 had earlier repeated sick-listing periods.

The length of sick-leave during the previous 12 months varied between 2 and 12 months (mean 6.5 months, md 6 months). Most of the subjects had been completely off work; only 5 had been working part-time, mostly 50%.

Twelve out of the 34 subjects reported intestinal problems in their *earlier* anamnesis (gastric ulcer, gastritis, intestinal disease, irritable colon, pancreatic insufficiency). Ten subjects had an earlier anamnesis of musculoskeletal injury and 3 had had joint disorders.

#### Reference group

The original reference group consisted of 72 subjects, working at the Lund University Hospital, who were sent during the 1986–1988 from the Occupational Health Service Unit to the Personnel Department for vocational rehabilitation measures. When the subjects were sent to the Personnel Department their medical treatment was considered to be finished. They were, however, still on the sick list. It was regarded as unsuitable or impossible for them to go back to their earlier tasks.

A questionnaire was sent to the 72 subjects in July 1990. After being reminded once, 57 (79%) answered. The ages varied between 20 and 60, md 39 years. All 57 subjects were women. The dropout group (15 subjects) was analysed by means of earlier case records. There was no difference between

the groups regarding background variables such as age, sex or occupation. The main diagnoses were the same.

A comparison between the intervention group and the reference group shows that both groups are rather similar as regards the localization of musculoskeletal pain. None of the patients had specific diseases such as rheumatoid arthritis or advanced degenerative articular changes. The subjects belong to the same occupational groups (Table 1).

#### Mode of action

The project started in December 1989. The last subjects were discharged in April 1992.

#### Intervention group

The rehabilitation programme consisted of a period of 6 weeks admission as "day-patients" at the Rehabilitation Clinic, with activity 4 days per week, from 9 a.m. to 4 p.m. On the fifth day contact with the work place was recommended but not deemed compulsory. The subjects had contact with the same therapists [their "own" physiotherapist (PT), occupational therapist (OT), social worker and physician] during the whole programme period. The subjects were admitted in groups of 3 people, who were kept together during the period. They were informed in detail about the means and objectives of the programme. They were also informed that their employer wanted to give them a chance to return to work. The specified programme will be found in the Appendix.

*Visits to the work place.* Visits were made for all subjects. Participants were the subject him/herself, a physiotherapist from the Occupational Health Service Unit, and an occupational therapist from the Rehabilitation Clinic. In selected cases an occupational social worker from the Occupational Health Service Unit was present. The work place was represented by supervisors on different levels and sometimes workmates. Twenty of the 34 visits are documented (10 nursing staff, 6 cleaners, 3 secretaries and 1 laboratory assistant). In all cases ergonomics and suitable work techniques were discussed, as was the difficulty of getting the chance to take the time necessary for using already existing technical aids. Economically feasible improvements were suggested. The PT offered to return to the work place for further ergonomical information.

In a few cases the psychosocial environment was regarded as the main problem, often centring around lack of communication between different work teams. Those problems were discussed. The occupational social worker could offer her help. During the sixth and last week of the programme period the subject worked half-time at his/her work place and spent half-time at the Rehabilitation Clinic, in order to facilitate possible improvements at the work place.

A written informed consent to use and publish data from the project was obtained.

After discharge from the rehabilitation programme the medical responsibility for the subject was transferred to the Occupational Health Service.

A *structured follow-up* with appointments with the rehabilitation physician was performed at 2, 6 and 12 months after discharge. A further follow-up through a questionnaire was made after 2–4 years (md 2.8 years).

*Before the start* of the programme a questionnaire concerning current health status, working conditions and earlier illness together with a clinical status protocol was used.

Table I. Main localization of musculoskeletal pain and occupational groups: intervention group (IG) and reference group (RG)

	IG		RG	
	n	%	n	%
<i>Localization</i>				
Lumbar	12	(35)	23	(40)
Cervical	6	(18)	14	(24)
Thoracic	3	(10)		(0)
Joints/muscles	13	(37)	20	(36)
Total	34	(100)	57	(100)
<i>Occupational group</i>				
Nursing staff	16	(47)	27	(47)
reg nurses	2		6	
nursing aides	14		21	
Cleaners	10	(29)	17	(30)
Secretaries	4	(12)	3	(5)
Others	4	(12)	6	(11)
Unknown			4	(7)
Total	34	(100)	57	(100)

On admission, during the rehabilitation programme and at follow-up (2, 6 and 12 months) the following instruments were used for evaluation:

- the *Nottingham Health Profile (NHP)* (3, 4, 16). The NHP determines health-related quality of life. It consists of two parts. Part I describes quality of life in six variables (emotional reactions, sleep disturbance, lack of energy, pain, physical immobility and social isolation) in 38 statements to be accepted or denied. Part II contains seven questions on problems with work, housekeeping, social intercourse, family life, sexual life, hobbies and vacation;
- *Pain Drawing* (8, 13). By dividing the anatomical figure used for Pain Drawing into a number of areas, pain distribution and changes of painful sites can be quantified. The total number of areas is 56;
- *Visual Analogue Scale for pain* (11). On a simple vertical line of 100 mm the subjects mark their pain, from “no pain” (0 mm) to “unbearable pain” (100 mm);
- the *Disability Rating Index* (10). This is an instrument for the assessment of pure physical disability, mainly intended for clinical settings and rehabilitation programmes. The index consists of 12 items of physical function. The questions are quite open, e.g. “how do you manage heavy work?” Consequently, the answers reflect the subject’s own opinion of his/her disability. A 5-graded scale was used: 0% without difficulty, 25% with some difficulty, 50% with difficulty, 75% with great difficulty, 100% not at all; and, finally,
- a *questionnaire concerning working conditions*. Claims for work injury compensation, health insurance status and current health status (especially musculoskeletal discomfort), constructed for this study, were also sent to the subjects after 2–4 years (md 2.8 years).

#### Reference group

Two to four years (md 3.5 years) after referral to the Personnel Department a questionnaire (the same that was used for follow-up of the intervention group) was sent to the reference group, together with a request for a Pain Drawing. A written consent for using the data was obtained.

#### Statistical methods

In the parametric analysis Student’s *t*-test was used for calculation of the confidence interval and *p*-value; in the non-parametric analysis Wilcoxon’s signed-ranks test, Spearman’s correlation coefficient and  $\chi^2$  test were used. In variance analysis of the results of the NHP (part I) two models were used: on the one hand an ordinary parametric variance analysis, on the other hand a non-parametric analysis (according to Kruskal-Wallis). Differences between the different occasions of investigations for each question in part II were analysed by McNemar’s test. A level of significance  $p < 0.05$  was accepted.

## RESULTS

### The NHP

The NHP (parts I and II) was used on three occasions in the intervention group: before and immediately after the rehabilitation period and 12 months after discharge. It was noted that both the subjects and the social worker who administered the instrument found it easy to use.

The mean values on admission (especially for pain and lack of energy) differed notably from the mean weighted score of the general population, as given in the manual for the Swedish version of NHP (15) (Fig. 1).

Immediately after the rehabilitation period there was a statistically significant change for the better in the variable lack of energy (non-parametric test according to Kruskal-Wallis). Lack of energy was defined by the reaction to the following three statements: “Everything is an effort,” “I’m tired all the time,” and “I soon run out of energy.” There was no statistically significant change in the variable pain. But the 31 answers that could be analysed showed a tendency for less pain. The total score was significantly reduced (Table II).

One year after the rehabilitation period the level of energy was still significantly increased. And at this time the level of pain was significantly decreased (Table II).

The intervention did not influence emotional reactions significantly. During the rehabilitation period there was no difference concerning variables in part II of the NHP. But one year after discharge there were significantly ( $p = 0.001$ ) fewer problems at the work place due to musculoskeletal disorders.

### Pain Drawing

The number of pain-marked areas given by the intervention group on admission varied between 0 and 30 (mean 7.4, md 5), out of 56 possible. A comparison between clinical findings and pain-marked areas showed that only 56% of the marked areas corresponded to positive findings of tenderness or pain on motion. On the other hand, such clinical findings existed for 7 out of 34 subjects in areas that were not pain-marked. During the rehabilitation programme the drawings were only minimally changed.

There was a correlation between the Pain Drawings and the rehabilitation result. The subjects who still were unable to work after 12 months had on admission marked a pain area four times as great as that drawn by subjects who went back to work immediately after the rehabilitation period (13.5 and 3.5 areas, respectively). This difference remained in the questionnaire after 2–4 years. A comparison has been

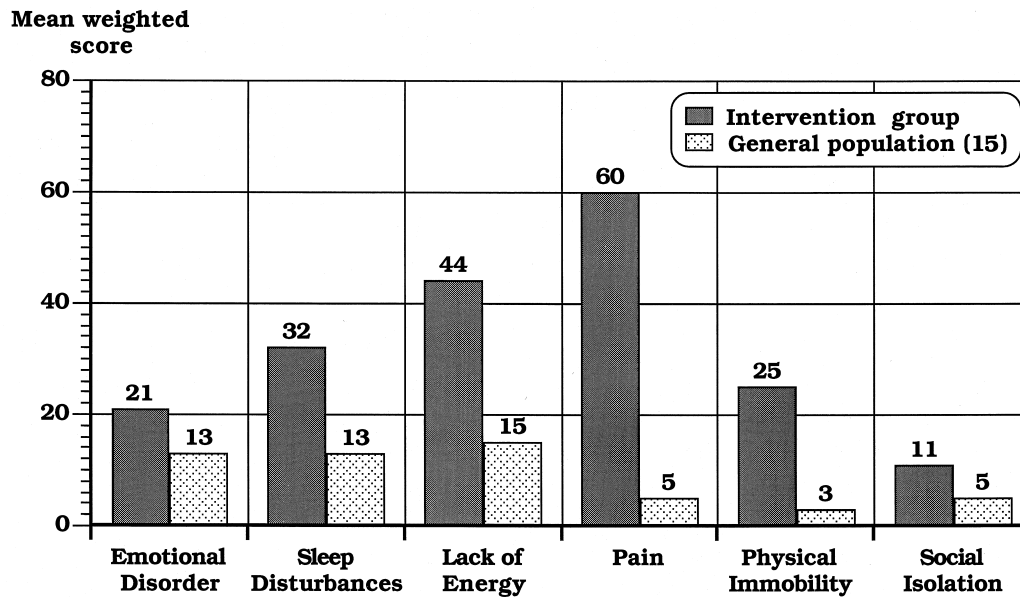


Fig. 1. Nottingham Health Profile (NHP) on admission. The figure shows the difference between mean weighted score for the general population (15) and for the intervention group.

made between number of marked pain areas, time of sick-listing and ability to work after 2–4 years. The comparison shows that short sick-listing and few pain-marked areas will increase the probability of returning to work.

#### The Visual Analogue Scale (VAS) for pain

All 34 subjects in the intervention group were asked to give a VAS for pain twice a day, twice a week. Twenty-four subjects completed the pain recordings, while 10 partly misunderstood the instructions. The main value on admission was 50 mm (md 56, range 0–98) and on discharge 43 (md 47, range 0–100).

The change of VAS ratings of pain over time was compared with that of the NHP pain item. The correlation was found to be low ( $r = 0.22$ ,  $p = 0.36$ ).

#### The Disability Rating Index (DRI)

All 34 subjects gave a DRI on admission, on discharge and after 12 months. The mean value on admission was 37.3 (md 37.5, range 10–77.5) on discharge 28.7 (md 25, range 0–85) and after 12 months 30.7 (md 25, range 0–92.5). There was no significant difference on admission between subjects who returned to work within 12 months (mean DRI 36.4, md 37.5) as compared to those who did not (mean

Table II. Change in NHP

	Admission—discharge		Admission—12 months	
	mean diff.	<i>p</i> -value	mean diff.	<i>p</i> -value
Emotional reaction	−2.38	0.18	7.62	0.97
Sleep disturbance	−4.33	0.25	−10.84	0.07
Lack of energy	−16.39	0.006	−11.19	0.008
Pain	−6.88	0.15	−17.14	0.03
Physical immobility	−5.45	0.18	−2.84	0.13
Social isolation	−4.13	0.40	−2.51	0.89
Total score	−6.40	0.014	−5.88	0.04

DRI 40, md 32.5). On discharge, DRI values for these groups were mean 22.8, md 17 and mean 48.9, md 60, respectively.

#### Questionnaire concerning working conditions and current health status

**Intervention group.** Directly after the 6-week rehabilitation period 21/34 subjects went back to work (full- or part-time) or started an educational programme. After 12 months 25/34 subjects were working (2 of them working at home with newborn children). Fifteen were working full-time. Nine of the subjects were still wholly sick-listed, 6 for their original disease, 2 for other diseases and 1 was in the late stages of pregnancy.

The questionnaire after 2–4 years was answered by 28/34 subjects. Information on sick-listing regarding the remaining subjects was obtained from the health insurance system. Twenty-six out of 34 subjects were at that time wholly or partially back to work (Table III). There was a slight difference in the time of pre-treatment sick-listing between the 8 subjects who were not working and the 26 who were working: 7.1 months and 5.6 months, respectively.

**Reference group.** The questionnaire after 2–4 years showed that 33/57 were working. The difference between the two groups is statistically significant.

The frequency of claims for work injury compensation was high in both groups, about 70%. Some claims (intervention group, four cases, reference group, six cases) were not finally settled at the time of the questionnaire, but of those that had been settled all the claims were granted work injury compensation.

The questionnaire included questions on:

- musculoskeletal discomfort during the previous 3 months;
- limitations in leisure activities due to musculoskeletal discomfort;

- limitations at work due to musculoskeletal discomfort; and
- use of analgesics.

A substantial proportion of the subjects who worked full-time (40–73% in the different subgroups), both in the intervention and in the reference groups, after 12 months and after 2–4 years, stated that they had musculoskeletal pain or discomfort often or daily. The problems constituted limitations both at work and in leisure activities for nearly all who mentioned symptoms of this kind.

Analgesics are used by about 30% of all subjects working full-time, by practically all subjects working part-time, and by about 80% of those not working. There is no difference between the reports on analgesics at discharge, after 12 months or after 2–4 years in the intervention group.

## DISCUSSION

Musculoskeletal disorders in hospital employees is an international problem and many epidemiological studies have been performed, mostly on nurses and nursing aides (1, 5, 6, 7, 9, 12, 14). The results indicate that the problem involve a multifactorial aetiology.

Some studies, mainly on prevention, have been made regarding hospital employees with painful musculoskeletal conditions, but few on the rehabilitation of the subjects (5). Gundewall et al. (2) introduced back muscle strength training as primary preventive treatment for personnel at a geriatric hospital in Sweden. The results were extraordinarily good with improvement of muscle strength and a considerable difference in sick leave between treatment group and control group. But the authors were uncertain whether the difference was caused by training *per se* or by psychosocial effects, that “someone for once cared about the health status of the staff”.

The fact that painful musculoskeletal conditions obviously have a multifactorial aetiology calls for an interdisciplinary approach, as was used in the present study.

The subjects in the intervention group and the reference group show a good degree of conformity as to age, occupation and localization of the predominant musculoskeletal pain. A comparison with the total group of employed nurses, nursing aides and cleaners at Lund University Hospital in March 1994 shows that the subjects are representative as to age (md 30–39 years in the total population) but that men are somewhat underrepresented. The subjects in the intervention group were accepted for the rehabilitation programme after a sick-listing period of 2 months (or shorter repeated sick-listing periods). The mean

Table III. Back to work, questionnaire after 2–4 years

	Intervention group		Reference group	
Working full-time	18	53%	27	47%
Working part-time	8	24%	6	11%
Not Working	8	24%	24	42%
Working	26	77%	33	58%

\* $p = 0.038$ .

sick-listing time for the subjects during the last 12 months before admission turned out to be 6 months. There was a slight difference in sick-listing time between those subjects who could go back to work and those who did not, 5.6 months and 7.1 months, respectively. This difference seems to be randomly distributed among the subjects and not correlated to the degree of musculoskeletal problems. There was a difference between the intervention group and the reference group with regard to mode of selection, which should be considered when conclusions are drawn. The reference group represents hospital employees who had been discharged from medical treatment but were in need of vocational rehabilitation. It should be noted that the rehabilitation of the reference group took place in a time of full employment, when there was a lack of qualified hospital employees. During the project period (1989–1992) the number of employees at Lund University Hospital (converted to full-time employees) was reduced from 8900 to 8000. This reduction made it more difficult for the employees to change to other jobs within the hospital.

The subjects had the opportunity to be seen by the clinic's regular consultants in orthopaedics and physical medicine. However, the need for this type of consultation during the rehabilitation seems to have been small. The subjects were probably medically well examined before being sent to rehabilitation.

Visits to the work place were always made at least once for each subject. We found that the visits did facilitate the subjects' chances of going back to work. The occupational therapist could often make small and cheap suggestions for a better work environment, based on her close knowledge of the subject's personal needs. Sometimes earlier unknown conflicts could be uncovered and tackled.

#### *Evaluation instruments*

The *NHP* was of great help for evaluation. It was easy to use for social workers and patients. It gave what we felt was a well nuanced description of the subject's quality of life. The statistically significant increase in energy during the programme period was felt and described by subjects and personnel as a "kick" that made it possible to tackle problems both of a physical and a social nature. In this the subjects had great help from the social worker who was probably sometimes regarded as a lay mother-confessor. The *NHP* showed that this higher energy level was maintained during the first year after the programme and that, at that time, the amount of what was regarded as the real problem—the musculoskeletal pain—was significantly reduced. The other four variables, sleep, emotion, social

isolation and physical mobility, were not significantly improved. Emotional scores were found to be related to return to work. This item could possibly be used as a predictor. *Pain drawing ad modum* Persson & Moritz (8) gave a method to evaluate the drawings quantitatively. The evaluation showed that there was a good correlation between the number of areas and the "back-to-work" result of the rehabilitation programme, i.e. the Pain Drawing might be used as a prognostic instrument.

The *VAS for pain* was probably not used in an adequate way. Scott & Huskisson (11) emphasize the importance of very clear instructions to the subjects on how the seemingly easy scale should be used.

The *DRI* is relatively easy to use, although the subjectivity of the questions sometimes puzzles the subjects. We have used the *DRI* with five fixed levels of answers. In the original article an open Visual Analogue Scale was used. Salén et al (10) found for healthy subjects a *DRI* of < 10% and for neck/shoulder and low back pain patients a *DRI* of 27–39%. This corresponds well to the overall *DRI* of about 35% on admission in this study, rather evenly distributed. Salén et al have made no follow-up of the index after treatment. In this study we found that although the *DRI* was evenly distributed among the subjects on admission, there was a difference in *DRI* on discharge. Those who could go back to work had a considerably lower *DRI* than those who did not go back to work, 22.8 and 48.9, respectively. In a situation where rehabilitation programmes (because of unemployment) sometimes imply a "rehabilitation to unemployment" the *DRI* might give a kind of objective picture of the subject's perceived capacity.

#### CONCLUSIONS

Hospital work, especially for nursing staff and cleaners, is heavy work. It has been described as one of the heaviest female occupations in modern society.

The model for a rehabilitation programme described in this article is very simple. Any rehabilitation clinic might, and very probably does, offer this kind of interdisciplinary rehabilitation to groups of subjects with problems from the musculoskeletal system. What has been special in this programme is that all the subjects came from the same employer and that there was an interested Occupational Health Service Unit to cooperate with.

The fact that the rather good rehabilitation result of 75% back to work after 12 months was maintained (77%) after 2–4 years should be ascribed not only to the rehabilitation

programme *per se* but also to the fact that the subjects were not left to themselves after the programme to cope with problems. The subjects were returned to the supervision of the Occupational Health Service, sometimes with additional visits to the Rehabilitation Clinic.

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Address for offprints:

Gunilla Nordström-Björverud, MD  
Department of Rehabilitation Medicine  
University Hospital  
SE-221 85 Lund  
Sweden

#### THE PROGRAMME

- (PT-ass) Morning training, with music, together with all day-patients. Four times a week.
- (PT) Training of muscle strength. Two times a week.
- (PT) Training of stabilization and coordination. Two times a week.
- (PT) “Body awareness” training, together with all day-patients. Two times a week.
- (PT-ass) Training of physical fitness. Two times a week.
- (PT-ass) Movements, relaxation and swimming in warm-water pool. Two times a week.
- (OT, PT and social worker) “Theoretical ergonomics”, once a week. A basic educational programme on anatomical and physiological aspects of the body; Swedish legislation on Social Security and Working Environment; and psychosocial aspects of working environment.
- (OT) “Applied ergonomics”. Three times a week. Training of individually chosen working tasks (lifting a patient, making a bed, sitting at a word processor, wiping the floor. . .)
- (PT) Individual contact. Three times a week.
- (OT) Individual contact. Two times a week.
- (Social worker) Individual contact. Once a week.
- (Physician) Individual contact once a week. The use of analgesics was discussed and a reduction suggested. Some subjects were offered tricyclic antidepressants in small “pain doses”. The subjects also had the opportunity to be seen by the clinic’s regular consultants in orthopaedics and physical medicine.
- (OT-ass) “Own activity” in the occupational therapy unit—painting or weaving or whatever the subject preferred. Two times a week.