

ORIGINAL REPORT

## ONE-YEAR FOLLOW-UP OF TWO DIFFERENT REHABILITATION STRATEGIES FOR PATIENTS WITH CHRONIC PAIN

Daniel Merrick, MD<sup>1</sup>, Gunnevi Sundelin, PhD, PT<sup>2</sup> and Britt-Marie Stålnacke, PhD, MD<sup>1</sup>

From the <sup>1</sup>Department of Community Medicine and Rehabilitation, Rehabilitation Medicine and <sup>2</sup>Department of Community Medicine and Rehabilitation, Physiotherapy, Umeå University, Umeå, Sweden

**Objective:** To determine outcomes for 2 rehabilitation strategies for patients with chronic pain: a 2-day interdisciplinary team assessment followed by either: (i) a 4-week outpatient multimodal rehabilitation programme, or (ii) a subsequent rehabilitation plan.

**Methods:** After a 2-day interdisciplinary team assessment at our pain rehabilitation clinic 296 consecutive patients were selected to either multimodal rehabilitation ( $n=76$ ) or rehabilitation plan ( $n=220$ ). They completed questionnaires regarding pain intensity (Visual Analogue Scale), disability (Disability Rating Index), life satisfaction (LiSat-11), anxiety and depression (Hospital Anxiety and Depression Scale) at assessment and again at 1-year follow-up.

**Results:** Both groups showed significant improvements at 1-year follow-up regarding pain intensity. In addition, the multimodal rehabilitation group improved in the disability items (“light work” and “heavy work”), depression and life satisfaction (“leisure”, “somatic health”, and “psychological health”). In the rehabilitation plan group “somatic health” improved, although not statistically significant.

**Conclusion:** This study indicates that multimodal rehabilitation may have long-term positive effects on pain, disability, depression and domains of life satisfaction. However, a minor intervention, rehabilitation plan with follow-up in primary care, can improve pain and “somatic health”. Based on the biopsychosocial approach, an interdisciplinary assessment of patients with chronic pain seems to be of value for selecting patients to different rehabilitation interventions.

**Key words:** pain; pain measurement; disability; patient satisfaction; cognitive therapy; behaviour therapy; interdisciplinary health teams; motivation.

J Rehabil Med 2012; 44: 764–773

*Correspondence address:* Daniel Merrick, Department of Community Medicine and Rehabilitation, Rehabilitation Medicine, Umeå University, 901 87 Umeå, Sweden. E-mail: daniel.merrick@rehabmed.umu.se

Submitted August 10, 2011; accepted April 18, 2012

### INTRODUCTION

Pain of duration more than 3 months is considered to be chronic according to the International Association of Study of Pain (1, 2). Chronic pain accounts for significant economic and societal costs. For example, in 2003, productivity losses and direct

healthcare expenditures attributed to chronic pain patients in Sweden were reported to be 9.5 billion Euros (2).

Chronic pain is common in Sweden and in other European countries, with a prevalence in the adult population reaching 15–19% (3, 4). Chronic pain conditions often have negative consequences on several aspects of daily life, such as participation in society during both leisure and working time, as well as on the total experience of life satisfaction (5).

Pain is a common cause for seeking primary healthcare. Previous studies have shown that pain is the most common reason for a visit to a primary care physician in Scandinavia, and that musculoskeletal pain constitutes the majority of the painful conditions in which 20–50% of patients experience chronic pain (6, 7).

The heterogeneity of patients affected by pain, together with physical, psychosocial and work-related factors may contribute to the persistence of pain (8). Moreover, psychological factors, such as depression, anxiety, stress and fear avoidance, as well as pain behaviour and coping strategies, all seem to play a significant role in the development of chronic pain (9). Therefore, pain researchers have emphasized that these factors should be addressed in assessment and interventions for patients with chronic pain (9, 10), and an interdisciplinary approach based on the biopsychosocial model (8) has been proposed to manage the entire complex spectrum of chronic pain.

During the last two decades, several studies have focused on multimodal rehabilitation of chronic pain (5, 11). Systematic reviews have shown that, compared with less extensive or no treatment, cognitive-behavioural multimodal rehabilitation (MMR) programmes produce significantly greater improvement in pain experience and cognitive coping, and reduce the behavioural expression of pain. The effects appear to be stable over time (11). However, this does not necessarily mean that all patients with chronic pain require multimodal treatment. It may be postulated that patients with less complex chronic pain states would, in some cases, benefit from unimodal treatments, e.g. physiotherapy or cognitive-oriented psychologist sessions (12–14), or a combination of treatments provided by a few non-team-related professions, i.e. intermediary rehabilitation (2). A team approach for the initial assessment may be important for the appropriate selection of patients for the adequate intervention. Although patients who participate in multimodal rehabilitation programmes probably undergo some kind of team assessment prior to the programmes, this procedure is poorly described in the literature.

Thus, to further investigate the team assessment in the rehabilitation process we conducted a longitudinal study of patients with chronic pain with a one-year follow-up of two different rehabilitation strategies, i.e. a two-day interdisciplinary team assessment followed by either: (i) a 4-week outpatient MMR programme, or (ii) a subsequent rehabilitation plan (RP), but no MMR. The aims were:

- to describe the selection procedure for the two rehabilitation strategies;
- to determine the outcomes of the two rehabilitation strategies at 1-year follow-up regarding pain intensity, activity, depression, anxiety and life satisfaction.

METHODS

Design

The present study is a prospective longitudinal study with a one-year follow-up of two different rehabilitation strategies for patients with chronic pain. The study was conducted in a clinical setting at the Pain Rehabilitation Clinic at the Umeå University Hospital, Sweden.

Patients

A total of 296 patients with disabling chronic musculoskeletal pain (on sick leave or experiencing major interference in daily life due to chronic pain causing treatment-seeking behaviour) were referred mainly from primary care units to our pain rehabilitation clinic and assessed consecutively by interdisciplinary teams between 1 October 2007 and 30 September 2008. Written and signed informed consent was obtained from all participants. Seventy-six patients were eligible for an outpatient, MMR programme during 4 weeks. A total of 220 patients were selected to the rehabilitation plan and primary care group (RP). Both groups were followed up after 1 year (Fig. 1). This study was performed according to the Declaration of Helsinki and approved by the Regional Ethical Review Board of Umeå University (Dnr: 08-160M).

Two-day interdisciplinary assessment

The referred patients were assessed during two days at the pain rehabilitation clinic by interdisciplinary teams consisting of a specialist physician in rehabilitation medicine, a physiotherapist, a social worker, an occupational therapist, and a cognitively trained psychologist if needed. Each professional interviewed and examined the patients individually according to a standardized protocol. This 2-day team assessment was based on a biopsychosocial approach that considers the physical, psychosocial and social aspects of the chronic pain condition.

The physician's assessment included the following: a pain history and clinical examination to exclude serious underlying conditions that would cause pain; need for further investigations, e.g. imaging, blood tests, other specialist referrals; and/or optimization of the pharmacological treatment. The psychologist assessed psychological factors, such as anxiety and depression. Coping strategies were assessed by the psychologist and the social worker. The physiotherapist performed a structured physical examination, and the occupational therapist examined activity levels in daily life. The team also assessed the patients' expectations and readiness for change. The team discussed their separate findings and then provided suggestions for further investigation and/or rehabilitation at a team conference in the absence of the patient. On the second day findings, appraisals and recommendation of rehabilitation were discussed at a team conference together with the patient, and the referring general practitioner was also invited to attend. During the conference the patient received information and explanations about their pain and had an opportunity to ask clarifying questions.

Multimodal rehabilitation programme

If the interdisciplinary teams assessed that the patient needed a MMR, was motivated to participate, agreed to the content of the rehabilitation programme, and fulfilled the inclusion criteria, they were accepted to this programme at the Pain Rehabilitation Clinic, at the Umeå University Hospital. Inclusion criteria for the MMR programme were: (i) disabling chronic pain (on sick leave or experiencing major interference in daily life due to chronic pain); (ii) age between 18 and 65 years;

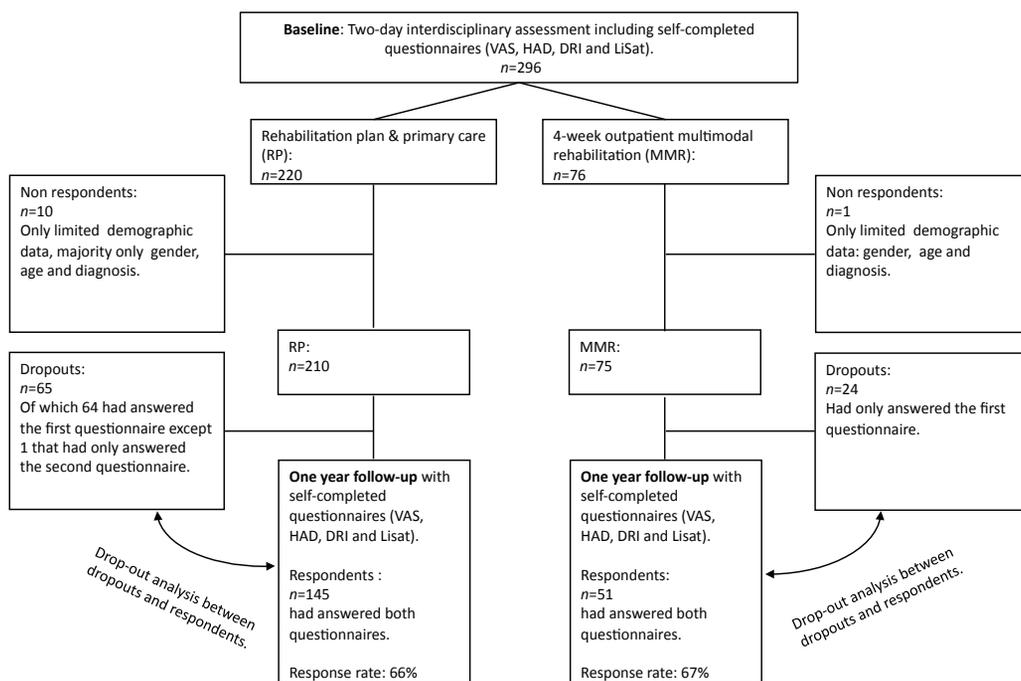


Fig. 1. Chart showing the flow of patients at assessment and at one-year follow-up.

(iii) no further medical investigations needed; (iv) written consent to participate and attend to the MMR programme; (v) agreement not to participate in other parallel treatments.

Exclusion criteria were: (i) ongoing major somatic or psychiatric disease; (ii) a history of significant substance abuse; and (iii) state of acute crisis.

The MMR was based on cognitive-behavioural principles (15). The MMR programme included physical therapy (exercises, relaxation and body-awareness training) and occupational therapy (ergonomics), information about bodily and psychological reactions to chronic pain, training in coping strategies as well as education in pain management. The patients were encouraged to take an active part with goal-setting in the individual team conferences, which were held 2–4 times during the course of the programme. Most treatments were conducted in groups of 6–8 participants, but each participant also had individually tailored sessions with the different members of the team.

The group schedule over the 4 weeks contained 34 h of physiotherapy sessions, 11.5 h of occupational therapy sessions, 15 hours of psychology sessions, 2 h of lectures from a physician in rehabilitation medicine, and 2 h of general information. At the end of the programme contacts were established with external collaborating partners, such as the workplace, the social insurance agency and the patient's general practitioner.

#### Rehabilitation plan and primary care group

If the interdisciplinary teams considered that the patient needed further investigation, or were not motivated to participate in the programme, or would benefit from unimodal or intermediary treatments only, and/or did not fulfil the inclusion criteria for the rehabilitation programme, a rehabilitation plan was presented to the patient and his/her general practitioner. The rehabilitation plan included team assessment of the patient's pain condition and suggestions and recommendations for further treatment for the RP group. If the patient's general practitioner could not attend the conference, the individual rehabilitation plan was sent to him/her to monitor.

The general goals for both interventions were reduced pain intensity, and improved activity and life satisfaction, especially regarding somatic and psychological health. In addition, the specific goals in the MMR group were to improve their coping strategies during the 4-week outpatient programme and improve their working ability. In the present study we did not include variables such as sick leave and return to work since these will be included in an upcoming study.

#### Procedure

Information concerning the team conferences and rehabilitation plans was collected from the medical records. Postal questionnaires containing standardized instruments included in the Swedish Quality Registry for Pain Rehabilitation (SQRP) (16) were used at the initial interdisciplinary team assessment and at one-year follow-up for both groups. The questionnaires covered demographics, pain intensity, anxiety/depression, disability and life satisfaction, as well as patients' beliefs about recovery. The patients completed the first set of questionnaires at home and handed them in at the initial assessment. For the one-year follow-up patients completed the second questionnaire at home to be returned by post in prepaid addressed envelopes. If the patients had not answered within 3 weeks reminders were sent out by post, and in some cases the patients were reminded by phone.

#### Questionnaires

The focus in our study was on pain intensity, activity, depression, anxiety and life satisfaction including psychological health. This is reflected in the self-completed questionnaires described below.

#### Visual Analogue Scale

The visual analogue scale (VAS) was used to rate pain intensity for the previous 7 days (mean pain last week) and current pain (17). The patient was asked to mark his or her experienced pain on a continuous

100-mm horizontal VAS. The anchor points were "no pain" = 0 and "worst pain imaginable" = 100.

#### Hospital Anxiety and Depression Scale

The Hospital Anxiety and Depression Scale (HADS) (18, 19) was used to identify symptoms of anxiety and depression. It consists of 14 items (7 items in each subscale) to be assessed on a 4-point Likert scale (range 0–3), where the total score is the sum of each subscale (range 0–21). HADS is categorized as "normal", "mild" and moderate/severe.

#### Disability Rating Index

The level of disability was measured by the Disability Rating Index (DRI) (20). The DRI instrument is a questionnaire covering 12 items concerning physical function and is constructed as a self-administered form where the patient indicates their presumed ability (capacity) to perform various daily physical activities on a 100-mm visual analogue scale. The anchor points were "manage without difficulty" = 0 and "cannot manage at all" = 100. The DRI items can be analysed separately and/or as a total mean index score, the DRI Index.

#### LiSat-11

Life satisfaction was assessed using the LiSat-11 questionnaire (21), which comprises estimations of life satisfaction in 11 domains. Levels of satisfaction were assessed on a 6-grade scale (from 1 = very dissatisfying to 6 = very satisfying), i.e. higher scores indicate higher levels of life satisfaction. The LiSat-11 scale was dichotomized into either satisfied (5–6) or not satisfied (1–4). Only persons with a family, partner, etc., were asked to complete the relationship domains.

#### Statistical analyses

Data were analysed using SPSS version 18.0 software and are reported as means (standard deviation (SD)) unless indicated otherwise. For the DRI items in Tables II, III and IV, data are reported as median and interquartiles. Differences between groups at the baseline were tested with Mann-Whitney *U* tests and  $\chi^2$  tests. Wilcoxon test and the McNemar test were used for analyses of the two rehabilitation strategies groups over time. In order to avoid mass significance we interpreted *p*-values < 0.01 as statistically significant.

Univariate logistic regression analyses were employed to analyse association between the life satisfaction domains "life as a whole", "somatic health" and "psychological health" at 1-year follow-up, and the following dichotomized variables: anxiety (normal and mild vs moderate/severe), depression (normal and mild vs moderate/severe), gender (female/male), patients' beliefs about recovery (positive vs negative), education (university vs primary school and secondary school), activity impairment (DRI index; 0–50 mm vs 51–100 mm), pain intensity VAS (current pain; 0–50

Table I. Distribution (percentage) of recommendations in the rehabilitation plans

Recommendations	%
Radiological investigation (X-ray, magnetic resonance imaging), physiotherapy, psychological therapy and pharmacological treatment	16
Physiotherapy and psychological therapy	16
Physiotherapy and pharmacological treatment	15
Physiotherapy, radiological investigation and pharmacological treatment	10
Physiotherapy, psychological therapy and pharmacological treatment	10
Physiotherapy	8
Physiotherapy and radiological investigation	7
Occupational therapy and physiotherapy	6
Radiological investigation and pharmacological treatment	6
Physiotherapy and occupational therapy	6

mm vs 51–100), age ( $\leq 39$  vs  $> 39$  years), and intervention (MMR vs RP). Variables that had a  $p$ -value  $< 0.3$  in the univariate regression analyses were then included in the stepwise multiple regression analyses. The results of the logistic regression analyses are presented as odds ratios (OR). The reliability of the OR is expressed as 95% confidence interval (CI). Statistical significance was set at  $p < 0.05$  for the multiple regression analyses.

RESULTS

A total of 296 consecutive patients at our Pain Rehabilitation Clinic were assessed for selection to either a multimodal

rehabilitation programme ( $n = 76$ ) or a rehabilitation plan ( $n = 220$ ). Fig. 1 shows a flow-chart of the population distributions. Data were missing for 10 patients in the RP group and 1 patient in the MMR group, and these patients were thus excluded (“non-respondents”). Both the first questionnaire at the 2-day assessment and the second questionnaire after 1 year regarding pain intensity (VAS current pain and VAS pain average last week), the 12 DRI items, LiSat-11 and HADS were completed by 145 patients in the RP group and by 51 patients in the MMR group.

Table II. Comparison between those who answered both questionnaires (respondents) and those who answered only one questionnaire (drop-outs) in the 2 rehabilitation strategies at baseline

Variable	n	RP		Drop-outs	Differences between respondents and drop-outs	p-value	MMR		Drop-outs	Differences between respondents and drop-outs	p-value
		Respondents	Baseline				Respondents	Baseline			
Age, mean (SD)	145	40 (10)	65	36 (11)	0.005	51	39 (10)	24	39 (9)	ns	
Current pain, mean (SD)	145	62 (21)	64	61 (22)	ns	51	59 (22)	23	57 (17)	ns	
Pain last week, mean (SD)	145	67 (19)	64	69 (20)	ns	51	64 (22)	23	60 (14)	ns	
DRI, median (percentiles 25; 75)											
Dressing without help	143	5 (1; 20)	64	7 (1; 21)	ns	51	3 (0; 10)	24	2 (1; 27)	ns	
Outdoor walks	143	24 (5; 55)	64	46 (14; 69)	0.019	51	22 (4; 47)	24	6 (1; 25)	ns	
Climbing stairs	144	27 (4; 51)	64	35 (11; 52)	ns	51	22 (6; 38)	24	20 (1; 32)	ns	
Sitting for a longer period	145	50 (30; 75)	64	53 (30; 82)	ns	51	56 (22; 79)	23	42 (17; 65)	ns	
Standing bent over a sink	140	48 (17; 73)	64	55 (18; 82)	ns	51	49 (12; 67)	24	43 (2; 77)	ns	
Carrying a bag	144	51 (29; 75)	64	53 (32; 80)	ns	51	54 (25; 79)	24	56 (22; 89)	ns	
Making a bed	144	33 (12; 59)	64	32 (9; 63)	ns	51	21 (5; 49)	24	30 (7; 62)	ns	
Running	144	86 (52; 97)	64	87 (51; 98)	ns	50	76 (26; 95)	24	48 (19; 87)	ns	
Light work	144	43 (18; 63)	64	47 (23; 55)	ns	51	30 (15; 56)	24	46 (22; 68)	ns	
Heavy work	144	89 (67; 98)	64	93 (85; 99)	ns	51	85 (58; 97)	24	87 (57; 95)	ns	
Lifting heavy objects	145	95 (73; 99)	64	94 (81; 100)	ns	50	94 (71; 98)	24	90 (76; 99)	ns	
Participating in sports/exercise	144	63 (36; 86)	63	77 (52; 95)	0.013	51	47 (20; 78)	24	52 (23; 83)	ns	
DRI index	145	51 (38; 63)	64	56 (44; 67)	ns	51	43 (33; 60)	24	43 (31; 60)	ns	
HADS: Anxiety, %	144		63		ns	51		23		ns	
Normal		63.9		52.4			56.9		60.9		
Mild		14.6		14.3			23.5		13.0		
Moderate/Severe		21.5		33.3			19.6		26.1		
HADS: Depression, %	144		63		0.022	51		23		ns	
Normal		54.9		47.6			52.9		56.5		
Mild		22.9		12.7			17.6		17.4		
Moderate/Severe		22.2		39.7			29.4		26.1		
LiSat-11, % satisfied											
Life as a whole	144	31.3	62	24.2	ns	51	35.3	23	21.7	ns	
Vocation	141	23.4	60	18.3	ns	50	26.0	22	13.6	ns	
Economy	144	31.3	61	21.3	ns	51	35.3	23	17.4	ns	
Leisure	144	23.6	63	12.7	ns	51	11.8	22	13.6	ns	
Contacts with friends and acquaintances	144	45.8	62	40.5	ns	51	21.6	22	31.8	ns	
Sexual life	140	33.6	60	33.3	ns	48	48.2	23	21.7	ns	
Daily activities	144	51.4	61	41.0	ns	51	64.7	23	43.5	ns	
Family life	130	64.6	49	59.2	ns	48	70.8	20	60.0	ns	
Partner relationship	119	68.9	44	68.2	ns	46	78.3	17	70.6	ns	
Somatic health	143	6.3	63	4.8	ns	51	0.0	23	8.7	0.033	
Psychological health	143	38.5	63	23.8	0.041	51	21.6	23	39.1%	ns	

$p$ -value  $< 0.01$  considered significant, but  $p$ -values between 0.01 and 0.05 are also shown.

RP: rehabilitation plan; MMR: multimodal rehabilitation; ns: not significant; SD: standard deviation; HADS: Hospital Anxiety and Depression Scale; DRI: Disability Rating Index; LiSat-11: Life Satisfaction 11 questionnaire.

### Rehabilitation plans

The general practitioners were present at 37 cases (17%) of team conferences on the second day of the assessment for the RP group. The most common sets of recommendations in the rehabilitation plans are shown in Table I.

### Drop-out analyses

Patients who had answered both the first and the second questionnaires ("respondents"; MMR:  $n = 51$ ; RP group:  $n = 145$ ) were compared with those who had completed only one questionnaire (drop-outs; MMR group:  $n = 24$ ; RP group:  $n = 65$ ). The comparisons were made in each intervention group separately (Table II).

At baseline there were no significant differences between the drop-outs and the respondents in terms of disability, anxiety,

depression and life satisfaction in general for both the RP group and the MMR group. In the RP group the only significant difference was found for age ( $p = 0.005$ ), where the drop-outs were younger.

### One-year follow-up in the MMR group

For the MMR group the pain intensity decreased significantly from 59 (SD 22) to 46 (SD 27) mm for "VAS current pain" ( $p = 0.002$ ) and from 64 (SD 22) to 47 (SD 27) mm regarding VAS "mean pain last week" ( $p < 0.001$ ) at 1-year follow-up. Compared with baseline the DRI items "light work" ( $p < 0.001$ ), "heavy work" ( $p < 0.002$ ) and DRI index ( $p = 0.007$ ) together with depression ( $p = 0.007$ ) improved significantly at 1-year follow-up. The MMR group also improved significantly regarding the life satisfaction domains "leisure" ( $p = 0.001$ ), "somatic

Table III. Differences at 1-year follow-up compared with baseline in each group

Variable	RP		RP		MMR		MMR	
	<i>n</i>	Baseline	Follow-up	<i>p</i> -value	<i>n</i>	Baseline	Follow-up	<i>p</i> -value
Current pain, mean (SD)	143	62 (21)	57 (25)	0.025	51	59 (22.4)	46 (27)	0.002
Pain last week, mean (SD)	143	67 (19)	60 (24)	<0.001	51	64 (21.9)	47 (27)	<0.001
DRI, median (percentiles 25; 75)								
Dressing without help	142	5 (1; 20)	5 (0; 25)	ns	50	3 (0; 11)	3 (0; 14)	ns
Outdoor walks	142	25 (5; 55)	31 (5; 56)	ns	50	22 (4; 48)	11 (0; 33)	0.043
Climbing stairs	143	27 (5; 51)	30 (3; 64)	ns	50	22 (6; 38)	15 (0; 35)	ns
Sitting for a longer period	142	50 (32; 76)	48 (21; 74)	ns	50	57 (22; 79)	50 (23; 63)	0.028
Standing bent over a sink	137	48 (18; 74)	51 (17; 80)	ns	50	48 (12; 68)	26 (7; 52)	ns
Carrying a bag	143	50 (29; 75)	53 (28; 75)	ns	50	53 (25; 79)	48 (23; 71)	ns
Making a bed	143	31 (12; 59)	34 (6; 62)	ns	50	21 (5; 50)	14 (0; 47)	ns
Running	142	86 (52; 97)	86 (44; 100)	ns	49	76 (26; 96)	66 (27; 84)	ns
Light work	143	41 (18; 63)	33 (13; 60)	ns	50	31 (15; 57)	17 (0; 31)	<0.001
Heavy work	143	88 (67; 98)	82 (61; 97)	ns	50	88 (58; 97)	65 (46; 87)	0.002
Lifting heavy objects	144	95 (73; 99)	91 (66; 100)	0.034	49	94 (70; 98)	87 (56; 97)	ns
Participating in sports/exercise	143	62 (35; 86)	57 (29; 89)	ns	50	47 (20; 80)	31 (12; 56)	0.014
DRI index	144	51 (38; 63)	49 (34; 65)	ns	50	44 (33; 60)	39 (22; 56)	0.007
HADS: Anxiety, %	143	6.6 (4.6)	6.9 (5.0)	ns	50	7.2 (4.1)	6.4 (3.6)	ns
Normal		64.3	55.9			56.0	68.0	
Mild		14.0	23.1			24.0	14.0	
Moderate/severe		21.7	21.0			20.0	18.0	
HADS: Depression, %	143	7.2 (4.6)	7.2 (4.7)	ns	50	8.0 (4.2)	5.4 (3.4)	0.007
Normal		54.5	55.9			52.0	74.0	
Mild		23.1	18.9			18.0	18.0	
Moderate/severe		22.4	25.2			30.0	8.0	
LiSat-11, % satisfied								
Life as a whole	142	31.0	28.9	ns	49	34.7	51.0	ns
Vocation	139	23.0	24.5	ns	50	26.0	26.0	ns
Economy	143	30.8	23.1	ns	50	34.0	36.0	ns
Leisure	142	23.2	23.2	ns	50	10.0	36.0	0.001
Contacts with friends and acquaintances	143	46.2	35.7	0.02	50	20.0	38.0	0.035
Sexual life	137	33.6	28.5	ns	47	40.4	51.1	ns
Daily activities	143	51.0	54.5	ns	50	64.0	66.0	ns
Family life	128	64.8	60.9	ns	46	71.7	82.6	ns
Partner relationship	112	71.4	60.7	0.043	45	77.8	84.4	ns
Somatic health	141	5.7	12.8	0.013	50	0.0	20.0	0.0012
Psychological health	141	39.0	43.3	ns	50	20.0	50.0	0.001

$p$ -value < 0.01 considered as significant, but  $p$ -values between 0.01 and 0.05 are also shown.

RP: rehabilitation plan; MMR: multimodal rehabilitation programme; ns: not significant; SD: standard deviation; HADS: Hospital Anxiety and Depression Scale; DRI: Disability Rating Index; LiSat-11: Life Satisfaction 11 questionnaire.

health” ( $p < 0.001$ ), and “psychological health” ( $p < 0.001$ ). Table III describes these comparisons.

*One-year follow-up in the rehabilitation plan group*

For the RP group, pain intensity decreased significantly, from 67 (SD 19) to 60 (SD 24) mm for VAS “mean pain last week” at 1-year follow-up ( $p < 0.001$ ). Only the LiSat domain “somatic health” improved at 1-year follow-up ( $p = 0.013$ ), increasing from 5.7% satisfied patients at baseline to 12.8% at 1-year follow-up. No statistically significant improvements were found for the other variables. Table III describes these comparisons.

*Comparisons at baseline between rehabilitation plan and multimodal rehabilitation groups*

At baseline the MMR group had a more a positive outlook ( $p = 0.008$ ), were more satisfied with “contact with friends and acquaintances” (0.003), and had significantly better capacity

scores regarding the DRI items; “outdoor walks” ( $p = 0.006$ ), “running” ( $p = 0.003$ ) and “participating in sports/exercise” ( $p = 0.001$ ). Table IV describes these comparisons. Since there were significant differences between the groups at baseline we decided not to compare the groups over time.

*Patients’ pre-treatments beliefs about recovery*

When analysing the MMR and the RP groups together, all patients with a positive outlook regarding recovery before the interventions had a significant mean “VAS current pain” intensity score reduction of 11 mm (SD 27) at 1-year follow-up, compared with a reduction of 3.0 mm (SD 22) for those with a negative outlook ( $p = 0.021$ ). For VAS “mean pain last week” the mean reduction for those with a positive outlook was 16 mm (SD 26), compared with 6.0 mm (SD 20) for those with a negative outlook at 1-year follow-up ( $p = 0.001$ ). For DRI index the positive outlook group had a mean reduction of

Table IV. Comparison between rehabilitation plan (RP) and multimodal rehabilitation (MMR) programme at baseline

	n	RP	Mean (SD)	n	MMR	Mean (SD)	p-value
<i>Demographic characteristics</i>							
Age, mean (SD)	210	38.9 (10.5)		75	39.2 (9.7)		ns
Gender (females %)	210	62		75	76		0.027
Education, %							ns
Primary	205	19.5		73	17.8		
Secondary school		63.4			58.9		
University		17.1			23.3		
Job status, %	207			74			ns
Employed		59.4			75.7		
Unemployed		26.1			14.9		
Students		4.3			4.1		
Others		10.2			5.5		
<i>Pain condition characteristics, mean (SD)</i>							
Current pain, mm	209	62 (22)		74	58 (21)		ns
Mean pain last week, mm	209	68 (19)		74	62 (20)		0.043
Years with chronic pain	172	6.2 (6.4)		61	5.2 (5.0)		ns
How convinced are you about recovery? %							
5-category scale:	198			73			
1–3: positive outlook		34.3			52.1		0.008
4–5: negative outlook		65.7			47.9		
HADS: Anxiety, %	207		7.1 (4.8)	74		7.0 (4.3)	ns
Normal		60.4			58.1		
Mild		14.5			20.3		
Moderate/severe		25.1			21.6		
HADS: Depression, %	207		7.6 (4.7)	74		7.8 (4.5)	ns
Normal		52.7			54.1		
Mild		19.8			17.6		
Moderate/severe		27.5			28.4		
Diagnostic groups, %							
Columnar pain		49.5			49.3		ns
Extremity pain		19.5			14.7		
Widespread pain (RA, fibromyalgia)		0.5			1.3		
Headaches		2.4			–		
Somatoform pain		6.7			14.7		
Stress related disorders		2.9			–		
Repetitive strains		5.2			2.7		
WAD		6.2			5.3		
Others		3.8			6.7		
Missing data		3.3			5.3		

Table IV. *Contd.*

LiSat-11, satisfied, %					
Life as a whole	206	29.1	74	31.1	ns
Vocation	201	21.9	72	22.2	ns
Economy	205	28.3	74	29.7	ns
Leisure	207	20.3	73	12.3	ns
Contacts with friends and acquaintances	206	44.2	73	24.7	0.003
Sexual life	200	33.5	71	35.2	ns
Daily activities	205	48.3	74	58.1	ns
Family life	179	63.1	68	67.6	ns
Partner relationship	163	68.7	63	76.2	ns
Somatic health	206	5.8	74	2.7	ns
Psychological health	206	34.0	74	27.0	ns
DRI, median (percentiles 25; 75)					
Dressing without help	207	5 (1; 20)	75	3 (0; 17)	ns
Outdoor walks	207	27 (9; 60)	75	18 (2; 39)	0.006
Climbing stairs	208	28 (8; 53)	75	22 (5; 36)	0.029
Sitting for a longer period	209	50 (30; 77)	74	52 (22; 76)	ns
Standing bent over a sink	204	51 (18; 78)	75	47 (10; 74)	ns
Carrying a bag	208	52 (30; 75)	75	55 (25; 80)	ns
Making a bed	208	32 (11; 60)	75	25 (5; 56)	ns
Running	208	87 (52; 97)	74	65 (26; 95)	0.003
Light work	208	45 (20; 62)	75	33 (16; 60)	ns
Heavy work	208	92 (73; 99)	75	85 (58; 96)	0.055
Lifting heavy objects	209	95 (78; 99)	74	93 (74; 98)	ns
Participating in sports/exercise	207	70 (44; 89)	75	49 (23; 81)	0.001
DRI index, median (percentiles 25; 75)	209	52 (39; 65)	75	42 (32; 60)	0.019

*p*-value <0.01 considered as significant, but *p*-values between 0.01 and 0.05 are also shown.

ns: not significant; HADS: Hospital Anxiety and Depression Scale; DRI: Disability Rating Index; LiSat-11: Life Satisfaction 11 questionnaire; WAD: whiplash associated disorders; RA: rheumatoid arthritis; SD: standard deviation.

9.0 ± 20 mm, compared with an increase of 1.0 ± 16 mm for the negative outlook group at 1-year follow-up (*p* = 0.001).

#### Univariate logistic regression and stepwise multivariate analyses

Univariate logistic regression analyses were performed, and the variables obtained with *p*-values < 0.3 underwent stepwise multiple regression analyses (Table V). In the stepwise multivariate analysis low depression scores and positive belief about recovery at baseline were associated with satisfied patients in both the domains "Life as a whole" and "Psychological health" at 1-year follow-up. In addition, selection to MMR and low current pain intensity, were also associated with satisfied patients in the domain "Life as a whole" in the stepwise multivariate analysis. Only low activity impairment was associated with satisfied patients in the domain "Somatic health", in the stepwise multivariate analysis (Table V).

## DISCUSSION

In the present study, two strategies for chronic pain patients were followed-up after one year: a two-day interdisciplinary team assessment followed by either (i) a 4-week outpatient MMR, or (ii) a subsequent RP and primary care. Both groups improved at one-year follow-up. The MMR group showed long-term effects on pain, disability, depression and several domains of life satisfaction, while the patients in the RP group showed positive results regarding pain and somatic health.

We also described the assessment and selection procedure of patients for MMR or RP. In our study patients beliefs about recovery and the judgement by the interdisciplinary teams on no further investigation, were important factors to be selected for the MMR programme. In the RP group 40% of patients needed further investigation and generally had more negative beliefs about recovery and were therefore referred back to primary care for follow-up of the rehabilitation plan.

It seems reasonable to assume that patients with chronic pain undergo some kind of assessment before participating in multimodal rehabilitation programmes. There is a lack of studies of the assessment and selection procedure prior to rehabilitation programmes and these procedures are poorly described in the literature (22, 23). However, the effects of MMR programmes are fairly well documented in several studies (5, 22).

For patients attending pain clinics, the explanation of their problem is considered important for the relief of their pain (24). Improved understanding of patients' expectations by pain clinic clinicians may lead to better patient understanding of their pain and greater life satisfaction (24). Niemistö et al. (12, 25) have reported positive long-term results for chronic pain after a physician consultation that included proper information about the pain condition and advice for the future. The two-day interdisciplinary assessment in the present study also included information about and explanation of pain, which may have contributed to the results in both groups at one-year follow-up.

The rehabilitation programme interventions for chronic pain are unique, in the sense that the patient him/herself plays

Table V. Univariate logistic regression and stepwise multivariate analyses

Covariates	n	OR (95% CI)	p-value	Dependent
Univariate logistic regression				
Normal and mild anxiety	191	3.1 (1.3–7.6)	0.010	Satisfied in "Life as a whole"
Normal and mild depression	191	2.3 (1.0–4.9)	0.039	
Woman	192	1.9 (1.0–3.9)	0.065	
Positive belief about recovery	182	3.1 (1.7–5.9)	0.0005	
University education	189	1.2 (0.6–2.5)	0.62	
Low activity impairment	186	1.9 (1.0–3.4)	0.048	
Age	192	1.1 (0.6–1.9)	0.84	
Low current pain intensity	192	2.9 (1.5–5.5)	0.001	
Multimodal rehabilitation	192	2.6 (1.3–5.0)	0.005	
Multiple logistic regression				
Multimodal rehabilitation	176	2.8 (1.3–6.1)	0.010	Satisfied in "Life as a whole"
Normal/mild depression	176	2.6 (1.1–6.5)	0.036	
Low current pain intensity	176	3.5 (1.7–7.2)	0.001	
Positive belief about recovery	176	2.4 (1.1–4.8)	0.019	
Univariate logistic regression				
Normal and mild anxiety	192	0.8 (0.5–3.2)	0.61	Satisfied in "Somatic health"
Normal and mild depression	192	1.3 (0.5–3.1)	0.59	
Woman	193	2.1 (0.8–5.9)	0.15	
Positive belief about recovery	183	1.5 (0.6–3.6)	0.34	
University education	190	0.7 (0.6–3.8)	0.43	
Low activity impairment	186	2.5 (1.0–6.0)	0.045	
Age	193	2.1 (0.9–4.7)	0.089	
Low current pain intensity	193	2.1 (0.9–4.7)	0.085	
Multimodal rehabilitation	193	1.7 (0.7–4.1)	0.20	
Multiple logistic regression				
Low activity impairment	186	2.5 (1.0–6.0)	0.045	Satisfied in "Somatic health"
Univariate logistic regression				
Normal and mild anxiety	192	2.7 (1.3–5.8)	0.011	Satisfied in "Psychological health"
Normal and mild depression	192	2.3 (1.2–4.7)	0.019	
Woman	193	1.0 (0.5–1.8)	0.92	
Positive belief about recovery	183	2.1 (1.2–4.0)	0.015	
University education	190	1.5 (0.7–3.1)	0.28	
Low activity impairment	186	1.5 (0.8–2.7)	0.17	
Age	193	1.1 (0.5–1.7)	0.83	
Low current pain intensity	193	1.7 (0.9–3.2)	0.097	
Multimodal rehabilitation	193	1.3 (0.7–2.5)	0.42	
Multiple logistic regression				
Positive belief about recovery	173	2.0 (1.1–3.9)	0.029	Satisfied in "Psychological health"
Normal/mild depression	173	2.4 (1.1–5.3)	0.026	

OR: odds ratio; 95% CI: 95% confidence interval.

a crucial role in the rehabilitation process and participation in the MMR interventions as an active team member. In the present study there were some significant differences between the MMR group and the RP group at baseline. The patients in the MMR group with positive beliefs about recovery were more satisfied regarding the LiSat-11 domain "contacts with friends and acquaintances", and reported somewhat better activity results. The patients' beliefs about their future can affect the long-term results (26, 27) and may have been a factor that was observed by the assessment teams, since a large proportion of those who were less convinced about the recovery was selected to the RP group. These results are also in accordance with a study by Foster et al. (28), who reported that patients expecting their back problem to last a long time were more likely to have poor clinical outcomes.

In a separate analysis on patients' beliefs about recovery, we analysed the MMR and the RP groups together and divided them

into two groups: positive vs negative beliefs about recovery based on their answers during the two-day interdisciplinary assessment. The "positive group" showed a significant decrease in pain intensity and increase in level of activity at one-year follow-up compared with those with negative beliefs. In the stepwise multivariate analyses, the variable "positive belief about recovery" was significantly associated with satisfied patients in the domains "Life as a whole", and "Psychological health". These results are in agreement with some other studies that have shown that patients' beliefs seem to predict positive outcome concerning increased quality of life (27, 29).

MMR has been shown to have positive long-term effects on chronic pain in several areas (2, 5, 22). In line with a previous Swedish study by Westman et al. (30), who also used the same self-completed questionnaires (VAS, DRI and HADS) as in the present study and who reported positive results at a 5-year follow-up, the scores on these instruments improved significantly in our MMR

group. The long-term effects with decreased pain and a higher level of activity after MMR may also reflect perceived life satisfaction, which is in agreement with previous studies (30, 31).

According to the SQRP 2008 annual report for patients referred to rehabilitation clinics in Sweden, the majority of patients were only assessed and were not selected to MMR (16). Since the SQRP only includes and evaluates patients who participate in MMR, we decided to also conduct a follow-up of the patients not selected for MMR. In our study we found positive results on pain and somatic health after a two-day interdisciplinary team assessment and a rehabilitation plan. This may be of importance since there are patients with chronic pain who may benefit from less intense rehabilitation interventions. Patients with chronic pain are a heterogeneous group (32). Some previous studies have shown that unimodal treatments alone with a cognitive-behavioural approach resulted in positive findings regarding pain intensity, disability and healthcare consumption, and were cost-effective compared with semi-light outpatient multidisciplinary rehabilitation programmes (14, 33). Although the RP group probably included both those patients who were assessed as being likely to benefit from simpler interventions and those assessed as being in need of further investigations, the positive findings in the RP group seem to be in line with the studies above, which indicate that it is not cost-effective to treat all patients with chronic pain in time-consuming and costly multimodal settings (14, 33). Instead, the focus should be on finding the correct subgroups and providing suitable interventions. The first step in identifying the patients' impairments in different areas is likely to undergo an interdisciplinary team assessment.

It is interesting to note that depression was a significant factor in the present study for both interventions at one-year follow-up. Both groups had a higher extent of moderate/severe depression (MMR group: 30%; RP group: 22%) at baseline in comparison with a non-clinical sample of representative members of the general population in a western European country (3.6%) (34). Moreover, in comparison with patients with chronic pain in a Danish multimodal programme who reported a HADS depression total score of 6.8 (35), the MMR patients were also more depressed (total score of 7.8). Among the drop-outs in the RP group almost 40% had moderate/severe depression, compared with 22% of the respondents. A possible explanation for the drop-outs from the study was their severe depression state.

Indeed, depression is common among patients with chronic pain and has been found to increase the risk for higher pain intensity, reduced activity levels and deteriorated social and occupational functioning and life satisfaction (9). In accordance with Børsbo et al. (36), our study emphasizes that psychological factors, such as depression, seem to be essential for its impact on quality of life and disability. It is well known that chronic pain can trigger depressive symptoms, and that depression, in turn, increases the adverse effects of pain. These two conditions work in a negatively synergic way, in that the depression reinforces the chronic pain and the chronic pain promotes depressive symptoms, which together can result in reduced physical activity and life satisfaction (36). It seems that the MMR cognitive-behavioural programme improved subject's self-perceived depression level measured by HADS at one-year follow-up despite their high level of moder-

ate/severe depression at baseline. This was also noted in that the LiSat domain "psychological health" improved. Moreover, in the stepwise multivariate analyses, we found that low depression scores at assessment was associated with satisfaction regarding "life as a whole" and "psychological health" after one year. Hence, an improvement in chronic pain patients' depression score over time would possibly result in a self-perceived increased activity and life satisfaction, which occurred in the MMR group.

Certain methodological considerations need to be highlighted in the present study. Since we used an already existing registry, the Swedish Quality Registry for Pain Rehabilitation (SQRP) (16), other outcome measures of interest were not included. It would of course had been of value to have had validated questionnaires covering coping, fear avoidance, etc. Although we lacked questionnaires covering these topics the included questionnaires are validated and have been widely used in clinical practice for assessment of pain intensity, anxiety and depression, disability, and life satisfaction in patients with chronic pain (17–21). In addition, the questionnaires are used nationwide since they are included in the SQRP (16). Accordingly, our instruments can be considered as appropriate for the assessment of patients with chronic pain.

The difference between statistical significance and minimal clinically important differences (MCID) (37) is of vital clinical interest. MCID for pain intensity has been described by Hagg (38) to correspond to 18–19 units on VAS and by Salaffi (39) to a mean reduction of 15%. With these results in mind, the MMR group decreased in pain intensity by 13 mm (22%) for "current pain", and by 17 mm (27%) for "mean pain last week", which in our study could be considered as clinically important.

Our aim was to audit the quality of care in both groups over time, not to perform a randomized controlled study. Hence, the patients served as their own historical controls. Moreover, no comparisons between the groups were made over time since they were different at baseline. Another limitation of our study was the lack of control group because our data were generated in a clinical setting in ordinary healthcare. One may, of course, argue that the changes observed represent a spontaneous improvement over time. However, it is known that once chronic pain is established it is unlikely to resolve itself without interventions (40). Compared with the SQRP 2008 annual report with about 600 chronic pain patients our patients in the MMR program were in the same age group, slightly more were university educated (23% vs 21%), and a lower proportion were unemployed (15% vs 26%) (16). Concerning the same comparison with approximately 1,400 chronic pain patients who were only assessed, our RP patients were 3 years younger (mean), we had less females (62% vs 74%), and a lower proportion of our patients were unemployed (26% vs 38%) (16).

In conclusion, the present study indicates that MMR has long-term effects on pain, disability, depression and several domains of life satisfaction, including somatic health and psychological health. Our findings also demonstrate that a less intense intervention, such as a two-day interdisciplinary assessment with a subsequent rehabilitation plan (RP group) with follow-up in primary care, can have long-term results on pain and somatic health in patients assessed as not eligible for MMR. In addition,

an interdisciplinary team assessment for patients with chronic pain prior to their participation in rehabilitation based on the biopsychosocial approach may be of value for selection and recommendation of different rehabilitation strategies.

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