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Effectiveness of multidisciplinary rehabilitation treatment for patients with chronic pain in a primary health care unit

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HIGHLIGHTS

- Multidisciplinary rehabilitation for chronic pain in primary health care was analyzed.
- Depression and social activity improved significantly one year after treatment.
- Sick leave and utilization of health care decreased significantly.
- Patients with chronic pain benefit from rehabilitation in primary health care.

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ABSTRACT

Background: In recent years, multidisciplinary rehabilitation (MDR) became an alternative treatment option for chronic non-cancer pain. MDR is mostly available in specialized pain units, usually at rehabilitation centers where the level of knowledge and therapeutically options to treat pain conditions are considered to be high. There is strong evidence that MDR in specialized pain units is affecting pain and improves the quality of life in a sustainable manner. There are few studies about MDR outcome in primary health care, especially in those units situated in rural areas and with a different population than that encountered in specialized hospitals. That, in spite of the fact that the prevalence of pain in the patients treated in primary care practice is about 30%. The aim of this study is to analyze the effectiveness of MDR for chronic non-cancer patients in a primary health care unit.

Methods: This study included a total of 51 patients with chronic pain conditions who were admitted and completed the local MDR-program at the primary health care unit in Arvika, Sweden. The major complaint categories were fibromyalgia (53%), pain from neck and shoulder (28%) or low back pain (12%). The inclusion criteria were age between 16 and 67 years and chronic non-cancer pain with at least 3 months duration. The multidisciplinary team consisted of a general practitioner, two physiotherapists, two psychologists and one occupational therapist. The 6-week treatment took place in group sessions with 6–8 members each and included cognitive-behavioral treatment, education on pain physiology, ergonomics, physical exercises and relaxation techniques.

Primary outcomes included pain intensity, pain severity, anxiety and depression scores, social and physical activity, and secondary outcomes were sick leave, opioid consumption and health care utilization assessed in the beginning of the treatment and at one year follow-up. Data was taken from the Swedish Quality Register for Pain Rehabilitation (SQRP) and the patients' medical journal.

Results: One year after MDR treatment, sick leave decreased from 75.6% to 61.5% ($p < 0.05$). Utilization of health-care during one year decreased significantly from 27.4 to 20.1 contacts ($p = 0.02$). There were significant improvements concerning social activity ($p = 0.03$) and depression ($p < 0.05$), but not in anxiety ($p = 0.1$) and physical activity ($p = 0.08$). Although not statistically significant, some numerical decrease in the mean levels of pain intensity, pain severity and opioid consumption were reported one year after MDR ($p > 0.05$).

Conclusions: The results obtained one year after rehabilitation indicated that patients with chronic non-cancer pain might benefit from MDR in primary health care settings.

Implications: This study suggests that MDR in primary care settings as well as MDR at specialized pain units may lead to better coping in chronic non-cancer pain conditions with lower depression scores and higher social activity, leading to lower sick leave. This study demonstrated that there is a place for MDR in primary health care units with the given advantage of local intervention in rural areas allowing the patients to achieve rehabilitation in their home environment.

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1. Introduction

Chronic non-cancer pain appears as a significant phenomenon and a public health problem in Scandinavia and other countries [1–3]. Breivik et al. investigated chronic pain in Europe and found that pain with moderate to severe intensity occurs in 19% of adult Europeans with a prevalence of 18% chronic pain among the general Swedish population [4]. A significant proportion of those affected have difficulty living with their pain which is affecting "their social and working lives" [4]. The prevalence of pain in the patients treated in primary care practice is about 30%. A little less than half of these patients received a prescription for analgesic drugs. The pain diagnoses at a primary care level showed a predominance of musculoskeletal pain [5].

Most research on treatment with multidisciplinary pain rehabilitation (MDR) has taken place in specialized expert level units, usually at rehabilitation centers where the level of knowledge and therapeutically options to treat pain conditions are considered to be high. There are few studies about MDR outcome in primary health care, especially in those units situated in rural areas and with a different population than that encountered in the university hospitals. For example, the distance from Arvika, a town of about 17,000 inhabitants situated in Värmland in the middle of Sweden, to the closest university clinic in Örebro is 150 km. To travel there several times a week or a month to access a rehabilitation program simply is not possible for many chronic pain patients. This is in spite of the well-known fact that chronic pain is a condition which is not limited to urban settings [6,7]. There are differences between urban and local programs when considering the main outcomes such as pain, pain intensity, physical or social activity and also important psychometric values such as depression and anxiety [8].

There is evidence that MDR of chronic pain, which today is mostly available in special pain units, affects the quality of life and sick-leave in a positive and sustainable manner [3,8]. However, there is not enough evidence to determine which patients should be treated in highly specialized units and which may be treated in primary care MDR-programs. In recent years, multidisciplinary rehabilitation (MDR) became an alternative treatment option for chronic pain [3,9–11]. It is considered that MDR improves the potential for patients to return to work [12], and reduces sick leave [13,14]. These benefits were mostly observed after multimodal rehabilitation treatment in patients with chronic back pain [15]. Evidence-based treatment with multimodal rehabilitation for patients with complex pain syndromes is still poorly studied.

The aim of the study was to determine if patients with chronic pain problems could benefit from multidisciplinary pain rehabilitation in primary health care units.

2. Methods

The MDR program at the local primary health care unit was developed according to the Swedish recommendations for rehabilitation of non-cancer pain patients [3]. The present study was conducted as a prospective controlled pragmatic trial [16]. This study was performed in accordance with the Declaration of Helsinki and the CONSORT Statement [17,18] and approved by the Regional Ethical Board.

2.1. Participants and study design

One hundred and sixty-nine patients were the potentially participants for rehabilitation's program (Fig. 1). The inclusion criteria were age between 16 and 67 years and chronic non-cancer pain with at least 3 months duration. Pain was of musculoskeletal origin from the neck–shoulder region, low back pain or such generalized pain conditions as fibromyalgia. An important inclusion criterion was high motivation to life changes and to return to work after completing the multimodal rehabilitation. Exclusion criteria were ongoing medical treatment for the specific pain condition, psychiatric disease, drug abuse as well as use of opioids more than the equivalent of 40 mg oral morphine/day (Table 1). All assessed patients signed a consent form and underwent a complete multidisciplinary team evaluation with individual interviews and examination by all team members. The demographics, education, mean localization and duration of complaints, duration of sick leave at assessment, anxiety, depression, opioids consumption, social and physical activity were assessed before and one year after rehabilitation in all the patients.

The multidisciplinary team consisted of a general practitioner, two physiotherapists, two psychologists and one occupational therapist. All patients were examined clinically by the same GP. The interviews followed a structured and standardized protocol. The assessment took place at the pain unit which is located close to the primary health care unit. The mean assessment duration was about 2 weeks. Each examination protocol was accessible by the other team members. Then, a team meeting with all team members was held in order to discuss the findings. The special focus was on patients' motivation to participate in treatment, biopsychosocial resources and their expectations concerning rehabilitation. The assessment ended with a team conference with the patient and in some cases with the patients together with family members. The team was represented by two or three members, avoiding a large group setting which was considered to be uncomfortable to many patients. There, all team findings were presented to the patient who was given the opportunity to ask questions concerning the evaluation or proposed treatment.

2.2. Interventions

The aim of treatment was not to reduce pain but to focus on patients' quality of life, reduce their drug consumption and maintain or restore their capacity to work. The team was working multidisciplinarily and consisted of 2 cognitive-behavioral educated psychologists, one general practitioner with a special interest in pain rehabilitation, one medical secretary, an ergonomic therapist and 2 physiotherapists with special education in body-awareness and cognitive-behavioral therapy. It may be noted that no member of the team had special experience in pain treatment more than on the primary health care level. In Sweden, there is an ambition that all these professions should be available in all primary health care units throughout the country. The 6-week treatment took place in group sessions with 6–8 members each. The first patient group was started in November 2008. Up to August 2011 a total of 8 groups underwent treatment. In this way, all patients could receive MDR-treatment as outpatients while living at home, avoiding long travel. There was the possibility to have close contact with the responsible general practitioner as well as

Table 1
Inclusion and exclusion criteria.

Inclusion criteria:
• Age between 16 and 65 years
• Chronic non-cancer pain (>3 months)
• Diagnosis of pain in the neck–shoulder region, low back pain or generalized pain conditions
• High motivation to life changes and return to work after completing rehabilitation
Exclusion criteria:
• Psychiatric disease moreover moderate depression and anxiety
• Drug abuse
• Use of opioids >40 mg oral morphine equivalents/day
• Ongoing medical treatment for pain condition

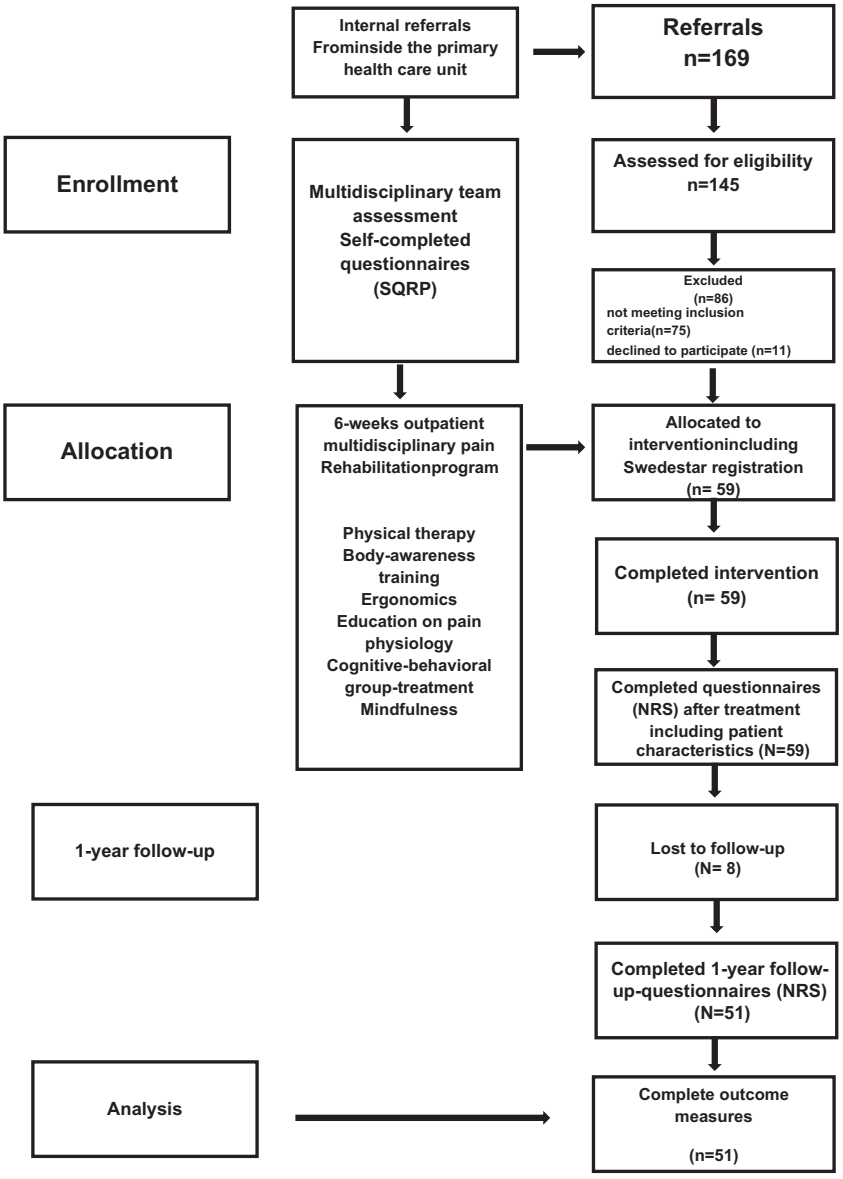

Fig. 1. Flow diagram.

the local office of the Swedish Insurance Agency and the place of work. This model provided a unique link between patient's rehabilitation on the one hand and every-day-life on the other hand.

If the interdisciplinary team assessed the patient as qualified for MDR, he/she was included in the next program. The rehabilitation treatment was scheduled over 6 weeks which included 3 days of treatment with 5 h each day, interrupted by two free days a week (Table 2).

At the third week, a mid-program interview was held by one of the psychologists. During treatment, the participant was given the opportunity to have individual contacts with all team members. At the end of the MDR, the patient met all team members individually again for treatment follow-ups. The aim of these meetings was to encourage the patient to go back to work and to use the new skills in every-day-life. At this point, the referring GP, the local Swedish Insurance Agency and the employer were invited to attend to inform them about the treatment results. Before, at the end of program and one year after MDR program the patients filled in the questionnaires. The follow-up was done one year after the patient finished treatment.

2.3. Questionnaires

The pain unit in Arvika is linked to the Swedish Quality Registry for Pain Rehabilitation (SQRP). This registry was initiated by the Swedish Association for Rehabilitation Medicine in 1995 and has aggregated data since 1998. It compares all patients referred to the majority of Swedish MDR-units. The SQRP uses several validated, standardized self-reporting instruments for pain and its consequences such as the Multidimensional Pain Inventory (MPI), Hospital Anxiety and Depression Scale (HAD) the EQ-5D and SF-36 Health Survey [19]. Furthermore, it collects demographic data such as age, sex and education level but also on diagnoses relevant to rehabilitation [20].

Pain intensity was assessed by the Numeric Rating Scale (NRS) with anchor points no pain = 0 and worst pain imaginable = 10. The Numeric Rating Scale is used as a self-reporting numeric scale where higher values indicate higher level of pain [21–23].

The Hospital and Anxiety Depression Scale (HAD) was developed by Zigmond and Snaith in 1983 for use with physically ill patients [24]. It measures symptoms of anxiety and depression on

Table 2
Components of the rehabilitation program (6 weeks).

General practitioner (12 h of education)
• Anatomy and pain physiology
• Causes of pain and predisposing factors
• Type of pain, mechanical, inflammatory, neuropathic and severity
• Pharmacological treatment of pain
• Mindfulness training
Ergonomics (18 h)
• Provided education on exercises/postures to avoid the pain, on body awareness training and its implication in pain.
Physiotherapist (20 h)
• Patients were given recommendations about individual training, time to rest, breathing exercises as the basis for relaxation, body awareness and postural control.
• Patients were given a practical program with proprioceptive, posture awareness exercises and a daily routine of stretch exercises
Psychologist (28 h of cognitive behavioral-treatment)
• Provided education about influences of cognitions, emotions and behavior in pain
• Cognitive restructuring (Modulation of negative thoughts affecting emotions and pain)
• Use of attention (Increasing attention focus)
• Patients were given a practical program about time organization and reinforcement, problem solving, life values
Additional education (12 h) provided by
• Swedish Insurance Agency
• Swedish Employment Agency
• Local fitness center
• Dietary adviser

a scale from 0 to 21 points for each outcome. Zero to 7 points is regarded as no significant anxiety or depression, 8–10 points indicating possible signs for anxiety/depression and >10 points indicating moderate or severe anxiety or depression [25]. It gives clinically meaningful results as a psychological screening tool and is sensitive to changes both during the course of disease and in response to both psychotherapeutic and psychopharmacological intervention [26].

The Multidimensional Pain Inventory (MPI) is a pain-specific instrument. It was developed in 1985 by Kerns et al. [27] in order to increase reliability and validity in the assessment of chronic pain. The MPI is recommended for use in conjunction with behavioral and psychophysiological assessment strategies in the evaluation of chronic pain patients in clinical settings. It detects psychosocial and behavioral consequences of chronic pain using scales 0–6, value 0 indicating no problems and 6 severe problems. It consists of 12 subscales. The SQRP uses five subscales for pain severity, pain control, activity, impact of pain on daily life and emotional imbalance [28,29]. For this study, only the scale for pain severity was used.

The SF-36 on health-related quality of life was constructed to survey health status in clinical practice and research, health policy evaluations, and general population surveys. It consists of 36 questions grouped to eight scales and two indices [30,31]. The scales are social function, pain, health in general, vitality and others. For the present study, only the scale on social function was used. There is valid control data on the Swedish general population for this instrument [32]. Normal values for the Swedish population for different ages and sex has been presented [33].

The EQ-5D has been used to measure quality of life and health aspects in comparison to other instruments [34–36]. The EQ-5D seizes physical and psychosocial function. It consists of five dimensions, each on a scale with three values (1 = no problems; 2 = moderate problems; 3 = severe problems). In addition to this, it contains a health barometer with 101 values (0 = worst imaginable condition; 100 = best imaginable condition). The five dimensions are activity, mobility, personal hygiene, pain and depression. The measured values are transferred to an index which is correlated to a healthy population. There is recent evidence that the sensitivity for correlating of this index to the Swedish population is weak [37]. For this study, the EQ-5D was used because it has a long tradition in Sweden.

2.4. Outcomes

In the present study, data on sick-leave was taken directly from the medical doctor's sick-leave journals for each patient. These documents were available from the software-system "Swedestar" used by all medical doctors at the primary health care unit at Arvika. No patient in the MDR group had been assessed by another doctor elsewhere concerning sick leave. Sick leave in Sweden is registered in percentages of sick leave at 100%, 75%, 50%, 25% or 0%. Data on health care utilization were taken also from Swedestar. Here, all types of contacts with the primary health care unit but also the local emergency unit at the local hospital during 12 months before the patients' first assessment visit at the MDR-unit and 12 months after the program finished were compared for all single MDR-group patients. These contacts considered the number of visits to doctors and nurses as well as the number of prescriptions or telephone calls.

The consumption of analgesics and especially opioids was considered of special interest. The impact on rehabilitation regarding opioid prescription is often neglected or unclear. Therefore it was decided to use opioid consumption as a primary outcome for this trial. For this, Swedestar was used to assess all prescriptions for strong and weak opioids during the 12 months before the patient's first assessment visit at the MDR-unit and compare them to the 12 months after the program finished for all single MDR-group patients. All opioid doses were transformed to a standardized oral opioid equivalent dose as used in the Swedish medicines information portal on the internet as published by the trade association for the research-based pharmaceutical industry in Sweden [38].

3. Statistics

GraphPad PRISM version 4.0 (GraphPad Software, San Diego, CA) was used for handling and analyzing the data. Data are presented as either means ± SD or as median with ranges, 25% and 75% percentiles. The level of significance was set at a p value < 0.05. This study was a descriptive observational study, thus no randomization or blinding was done. Non-parametric statistical methods were performed as follow: the chi-square test and the Mann–Whitney U test were used to test for differences in patient characteristics at admission and after 12 months. The independent-samples t-test was used to test for differences in the changes in pain intensity and the physical sub-scores of SF-36 scores at admission and at 12 months after.

4. Results

A total of 169 patients were referred to the local pain rehabilitation group at the health care pain unit Arvika. Eighty-six were excluded because at assessment that they did not fulfill the inclusion criteria (Table 1). Thus, the remaining 59 patients were admitted to the rehabilitation program and completed the routine questionnaires. All the 59 patients who started the MDR program finished it successfully, no one discontinued or withdrew before the end. After completing MDR the SQRP-questionnaires was answered by 59, at one-year follow-up by 51 patients. Patients' characteristics are shown in Table 3. Most participants were female (86%, n = 44) and the mean age was 48 ± 7.8 years for both women and men. The major complaint category was generalized pain such as fibromyalgia (53%). Others were pain from neck and shoulder such as whiplash-trauma (28%) or low back pain (12%).

The study results are presented in Fig. 2. Sick leave decreased from 75.6 ± 32% before MDR to 61.5 ± 36% at one-year follow-up

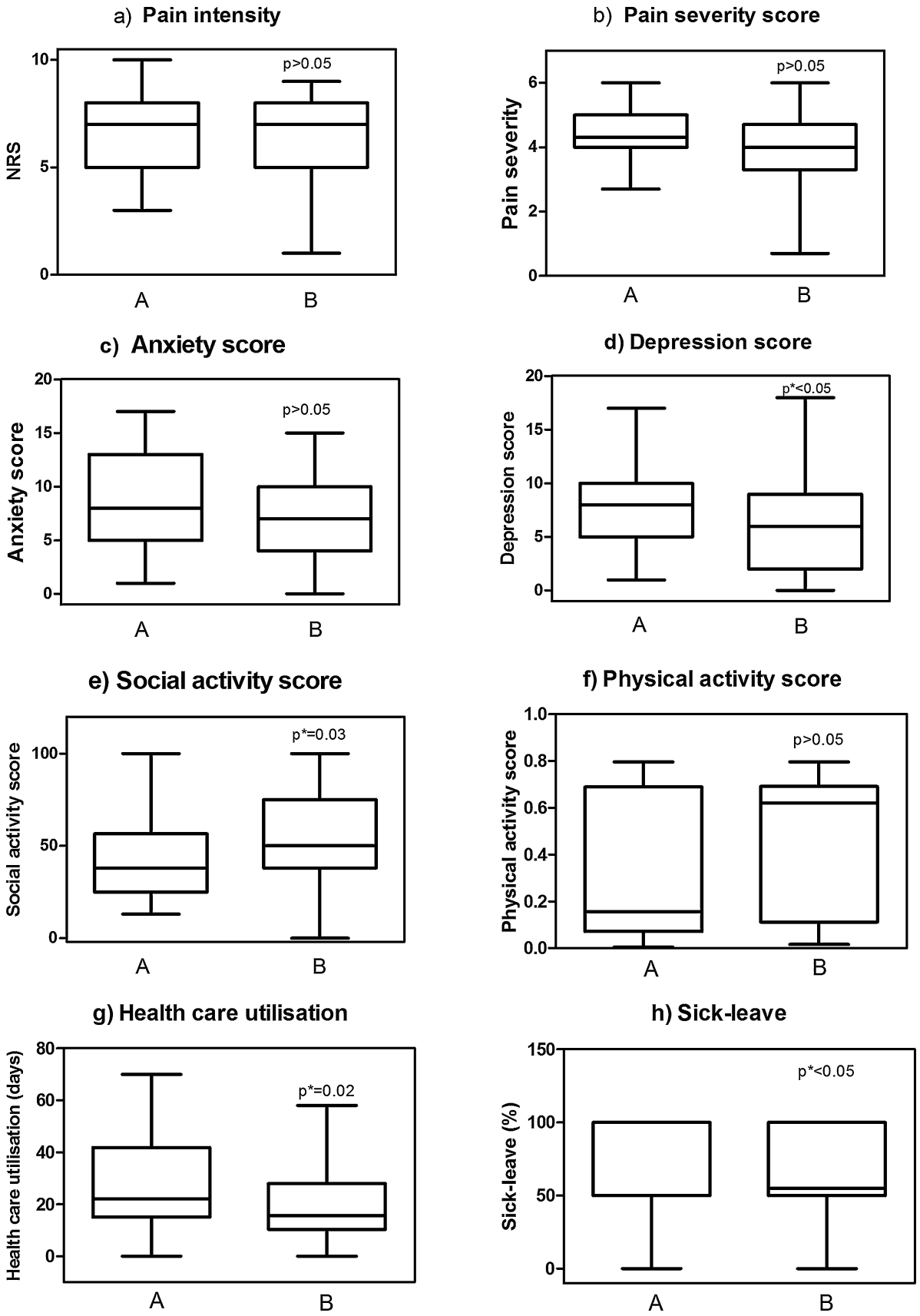

Fig. 2. Results: A box-and-whisker plot indicating the smallest observation, lower quartile, median, upper quartile, and largest observation for (a) pain intensity, (b) pain severity, (c) anxiety score, (d) depression score, (e) social score, (f) physical activity score, (g) health care utilization, and (i) sick leave.

Table 3
Baseline characteristics of the study population in comparison to the Swedish Quality Register of Pain Rehabilitation (SQRP) patients before treatment.

	Arvika Primary Care	SQRP
Total number of subjects completing MDR including patient characteristics (Nov. 2008–Aug. 2011)	*N* = 51	*N* = 4251
Sex		
Male	*N* = 7 (14%)	*N* = 1098 (26%)
Female	*N* = 44 (86%)	*N* = 3153 (74%)
Mean age (years) ± SD	48 ± 7.8	45
Education higher than secondary school	*N* = 10 (20%)	*N* = 1157 (27%)
Localization of complaints		
Neck/shoulder	*N* = 14(28%)	*N* = 1063 (25%)
Low back	*N* = 6 (12%)	*N* = 792 (19%)
Generalized pain	*N* = 27 (53%)	*N* = 1454 (34%)
Moderate/severe depression (HAD ≥ 11)	29%	31%
Moderate/severe anxiety (HAD ≥ 11)	43%	35%
Mean duration of complaints at assessment (days)	4120	3040
Mean duration of sick leave at assessment (days)	2294	1731

($p < 0.05$). Mean health-care utilization decreased from 27.4 ± 7 contacts during the 12 months before treatment to 20.1 ± 14 contacts during the 12 months after treatment ($p = 0.02$). Consumption of opioids decreased without reaching statistically significance from 1828 mg morphine equivalents per patient during 12 months before to 1382 mg 12 months after treatment ($p > 0.05$). Regarding the primary outcomes, there were significant differences concerning social activity ($p = 0.03$), but not physical activity ($p = 0.08$). Patients improved in the psychometrical outcomes depression and anxiety with mean values in HAD for depression 8.15 before and 6.28 one year after treatment ($p < 0.05$). For anxiety, MDR-participants had a mean value for HAD of 8.71 before and 7.0 12 months after treatment ($p > 0.05$). The mean level of pain intensity reported before MDR was reported as 6.71 on NRS-scale and sank to 6.27 one year after treatment finished. This decrease was not statistically significant ($p > 0.05$). The mean pain severity decreased from 4.38 to 3.97 and this change was not of statistical significance.

5. Discussion

In the present study, the effectiveness of multidisciplinary rehabilitation for patients with chronic non-cancer pain in a local primary health care setting was analyzed. The baseline characteristics of the population observed at the Pain Unit Arvika differed from the observed population of the Swedish Quality Register for Pain. The latter represents only participants from larger pain rehabilitation units. The Arvika-population consisted of a higher percentage of women, many patients with generalized pain conditions such as fibromyalgia, lower education levels, patients with a longer duration of complaints and a longer duration of sick-leave. In several studies, these items were described as negative predictors for successful rehabilitation [39–41]. A possible explanation might be that the socioeconomic population structure of rural inhabitants on average is often regarded as lower educated and with lower socioeconomic status. In these rural areas, there might exist a different sociocultural view on pain and chronic pain conditions with women still take higher responsibility for children, family and housework leading to a higher burden and fewer possibilities to focus on disease prevention or rehabilitation.

Many studies on MDR focus on outcomes such as pain intensity, pain severity, depression and anxiety [42]. There is less known the role played by MDR concerning sick leave from work, in spite of the fact that avoiding sick leave is considered a primary goal of most rehabilitation concepts. Some studies used data from institutions such as social insurance systems, to examine levels of sick leave [19], but in the present study we used Swedestar, a computerize way to collect information from the patients' journals. The tight correlation between pain intensity and pain severity on one hand and psychometric values such as anxiety and depression on the other hand is a well-known fact and discussed in many trials [43]. In spite of this, little is known on the impact of rehabilitation at primary care level to anxiety and depression. Depression and anxiety are common among patients with chronic pain [25] and have been found to increase the risk for reduced activity levels or social functioning. Improvement in psychological factors is described as essential for increased physical activity. In the present study, anxiety and depression declined at follow-up with significant reduction for depression ($p < 0.05$). Furthermore, the effects of MDR in primary care on both physical and social activity are widely unknown. The MDR in the present primary care setting showed improvement in all three primary outcomes sick-leave, health care utilization and opioid prescription with a significant reduction in health-care utilization. It is well-known that patients with chronic pain complaints are characterized by specific health-care consumption patterns with often a high frequency of contacts with primary health-care units as well as emergency units [44,45] but without improvement in symptoms. In that way, they are often described as a group of high users of the medical system putting special press on providers, although, there is hardly any focus on health-care utilization in rehabilitation research. This is possibly due to the fact that links between rehabilitation centers on the one hand and primary health care units on the other hand are minimal in many settings. Rehabilitation programs located in primary health care must therefore have a natural focus on the effectiveness regarding which extended health care is needed after completion of rehabilitation. Although the MDR itself did not in any way focus on medication more than optimizing it at assessment, there was a numerical decrease of opioid consumption at one-year follow up. All these findings mean a reduction of health care costs after treatment [46,47]. These benefits of MDR might be explained by a change in patients' behavior, pain self-management or the way of dealing with more complex pain conditions. Possibly participants of MDR at the primary care level may feel more safe or secure due to the multidisciplinary treatment setting the patient in focus. Although in previous studies a decrease of pain intensity and pain severity was described [43,48] no statistically significant change was found in the present study, but the items for both social and physical activity increased. These findings may support the assumption as above stating that MDR in primary care may lead to better self-esteem in chronic pain patients who often are trapped in a vicious circle of pain, physical and social inactivity, sick leave, depression and a self-fulfilling prophecy of even more pain. In future, there is a strong need for more research analysing these outcomes on larger study populations, e.g. in multicentre studies.

This study suggests that MDR in primary care settings may lead to better coping in chronic pain condition with the result of lower depression scores and higher activity, leading to lower sick leave. This study demonstrated that there is a place for MDR in primary health care units with the advantage of local intervention in rural areas allowing the patients to achieve rehabilitation in their home environment.

6. Study limitations

A weakness of the analysis is the low study number with only 51 patients. This low number and the high proportion of women (86%) may be a source of bias. There is a need for evidence based

studies concerning local rehabilitation programs in order to find out which patients may benefit from MDR at the primary care [41]. Naturally, there will be fewer participants in local settings compared to larger units at e.g. university hospitals or more urban rehabilitation clinics.

Another weakness is the lack of a control group. Here the patients have acted as their own controls, before and one year after participation in the pain rehab program. This is not optimal, a separate control group receiving no treatment would have been more appropriate. This is however difficult to arrange.

Therefore, the design using the patients as their own controls, before and after treatment, and comparing the results with data from a national quality register for pain rehabilitation is considered sufficient.

7. Conclusion

This trial describes a patient population that did not have access to larger units for MDR treatment. Further research is needed to identify practical criteria by which patients may best receive MDR at primary care units and which patients should be referred to a specialized pain unit. We furthermore are in need for larger and better conducted studies assessing MDR in primary care. As a suggestion for the future, local MDR therapy may become available for patients with access to a pain- or rehabilitation specialist. In that way, the specialist could use his/her special knowledge for recommendations of rehabilitation levels locally or in more specialized units. As well, all MDR units should have close contact with the larger specialized rehabilitation units for tight cooperation.

Author contributions

(1) Klaus Stein contributed to conception and acquisition of data, Adriana Miclescu contributed to analysis and interpretation of data;
(2) Both authors participate in revising it critically for important intellectual content
(3) Both authors give final approval of the version to be submitted and for revised version.

Founding sources

None declared.

Conflicts of interest

None declared.

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