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Is there a right treatment for a particular patient group? Comparison of ordinary treatment, light multidisciplinary treatment, and extensive multidisciplinary treatment for long-term sick-listed employees with musculoskeletal pain

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Abstract

In general, randomized controlled studies concerning return to work have failed to demonstrate significant treatment effects for long-lasting musculoskeletal pain, and most treatments examined have not been economically beneficial. Individuals ($n = 654$) sick-listed for at least 8 weeks with musculoskeletal pain, selected from the Norwegian mandatory sickness insurance system and volunteering to participate, were categorized into three groups differing in a prognosis score (good, medium, poor) for return to work, based on a brief, standardized screening of psychological and physiotherapy findings. They were then randomly assigned to three outpatient treatments with three different levels of intensity (ordinary treatment, light multidisciplinary, and extensive multidisciplinary treatment). The evaluation was based on 14 months follow-up data on return to work collected from social security records. The patients with good prognosis for return to work do equally well with ordinary treatment as with the two more intensive treatments. The patients with medium prognosis benefit equally from the two multidisciplinary treatments. The patients with poor prognosis receiving extensive multidisciplinary treatment returned to work at a higher rate than patients with poor prognosis receiving ordinary treatment, 55 vs. 37% ($P < 0.05$) at 14 months. Multidisciplinary treatment is effective concerning return to work, when given to patients who are most likely to benefit from that treatment. Measures of pain or quality of life are not included in this study. The cost–benefit analysis of the economic returns of the light multidisciplinary and the extensive multidisciplinary treatment programs yields a positive net present social value of the treatment. A simple, standardized, screening instrument including only psychological and physiotherapeutic observations may be a useful clinical tool for allocating patients with musculoskeletal pain to the right level of treatment.

Keywords: Musculoskeletal pain; Screening; Return to work; Multidisciplinary treatment; Light mobilization; Cost–benefit analysis

1. Introduction

Musculoskeletal pain is a major cause of morbidity, disability, and economic loss (Nachemson, 1992; Brage et al., 1998; Jensen and Bodin, 1998; Cherkin et al., 1998; Hutubessy et al., 1999; Maniadakis and Gray, 2000). Much effort has been made in order to find health-improving treatment for these complaints. However, the quality of research in this field is mixed. A limitation in many of these studies is the lack of a randomized control group. An additional limitation is that there are few randomized studies reporting long-term effects.

Systematic reviews and meta-analysis of randomized controlled studies (Morley et al., 1999; van Tulder et al., 2001) have concluded that cognitive-behavioral treatments are effective concerning pain experience, cognitive coping and appraisal, pain behavior, and behavioral expression of pain. Compas et al. (1998) concluded the same in a narrative review of selected studies. Little is documented concerning

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the effect of multidisciplinary treatment on return to work for patients on long-term sick leave for musculoskeletal pain. In their 12 months follow-up study, Haldorsen et al. (1998a) found that a multimodal cognitive-behavioral treatment program resulted in better physical and psychological health, but had no effects on the return to work rate, compared to a randomized control group receiving ordinary treatment by the GPs (general practitioners). Similar results have been found in a comparable study by Alaranta et al. (1994).

A growing number of studies have appeared in the literature attempting to identify the best predictors for return to work for patients with musculoskeletal pain. Psychological trait and state variables have been claimed to give better prediction than conventional medical information alone, especially for subacute and chronic pain. Values of up to 80% have been reported predicting return to work after 6 months for models based exclusively on psychological factors (Hasenbring et al., 1994). For fear-avoidance variables alone 70% correct 12 months prediction of sick leave for back pain has been reported (Klenerman et al., 1995). In general, combinations of sets of predictors seem more important than single predictors (Weiser and Cedraschi, 1992; Mellin et al., 1993; Dozois et al., 1995; Gatchel et al., 1995; Hildebrandt et al., 1997; Haldorsen et al., 1998b,c,d), supporting the consensus of musculoskeletal pain being a multidimensional problem.

Despite the rising health care costs of musculoskeletal pain, little is documented concerning costs of treatment (Goossens and Evers, 1997; Cherkin et al., 1998). In their article about the economic burden of back pain in the UK, Maniadakis and Gray (2000) conclude that research into cost-effective interventions to prevent and treat back pain should be a priority.

The problems of identifying effective treatments for musculoskeletal pain may be aggravated by the fact that health and economic evaluation studies include patients with very different prognosis for return to work. It is for example reasonable to expect that extensive treatment is of scant value to patients with a good overall prognosis of returning to work. As stated by several authors, e.g. Cherkin et al. (1998), we have to identify the subgroups of patients who benefit from different types of treatments to advance a step further in the evaluation studies.

In this study, long-term sick-listed employees with musculoskeletal pain were screened into three different levels of prognosis for return to work (good, medium, poor), and, independent of the screening result, randomly allocated to three different treatments (ordinary treatment, light multidisciplinary, and extensive multidisciplinary treatment). The prognosis for return to work was evaluated with a brief and standardized instrument based on previous studies of prognostic factors for low-back pain patients (Haldorsen et al., 1998b,c,d) and four standardized physiotherapist's tests. The three levels of treatment offered in this study were based on previous studies of treatment effects. The extensive multidisciplinary treatment was an intensive four-week multidisciplinary treatment with follow-ups (Jensen et al., 1994; Elkayam et al., 1996; Bendix et al., 1997, 1998a; Haldorsen et al., 1998a,d; Jensen and Bodin, 1998). The light multidisciplinary treatment was in many aspects similar to a light mobilization program with follow-ups, which has proven efficient for low-back pain patients (Indahl et al., 1995, 1998). Ordinary treatment was referral to general practitioner combined with some physiotherapy, which is the standard treatment offered to most of these patients in Norway, and which has been used as a 'control group' in previous Norwegian studies (Indahl et al., 1995, 1998; Haldorsen et al., 1998b; Eriksen and Ursin, 2000; Hagen et al., 2000).

The following research questions are investigated in this study: (1) is it possible to develop a screening instrument that can differentiate between patients with good, medium, or poor prognosis for return to work? (2) is there a right treatment for a particular patient group? and (3) does right treatment for a particular patient group yield positive net returns for the society?

In this study, follow-up data were collected from the national social insurance register. Hence, the outcome measure is return to work. Measures of pain or quality of life are not included in the study.

2. Methods

2.1. Design

The randomized controlled trial took place at an outpatient clinic in Bergen, Norway, between January 1996 and March 1997. The participants were recruited from the sickness insurance records of the municipality of Bergen and five surrounding municipalities. This area has a total population of approximately 270 000. During the enrolment period, all sick-listed persons that fulfilled the inclusion criteria were approached in writing by the Local office of the National Health Insurance and invited to participate in the treatment experiment.

Inclusion criteria were: holding a permanent job and being sick-listed more than 50% for more than 8 weeks or sick-listed at least 2 months per year for the last 2 years for musculoskeletal pain (ICPC diagnoses L 01–05, 08, 09, 18–20, 26–29, 81–86, 92, 93, and 99, and N02 (Lamberts and Wood, 1987)).

The participants were excluded if they were pregnant, had insufficient knowledge of the Norwegian language, loss of vision or hearing, or were registered substance abusers. The medical exclusion criteria were active rheumatological disease, progressive neurological disease, serious cardiac or other internal medical condition, or decreased lung capacity, malignant basic diseases, acute traumas, infections, or acute vascular catastrophies.

2.2. Material

A total of 1988 sick-listed employees were invited to participate in the study, 813 (41%) accepted the invitation by signing a consent form, 510 (26%) wrote back explaining that they did not wish to be considered for the program (negative responders), and 665 (33%) did not respond to the invitation (non-responders). Among those who accepted the invitation, some, 97 (4.9%), dropped out before randomization. In addition, 52 (2.8%) were excluded before randomization for medical or administrative reasons. Ten patients who assigned to receive one of the two clinical treatments withdrew from the study before treatment was completed. All data regarding these individuals was removed from the study. The final experimental sample includes 654 (33%) individuals.

2.3. Screening instrument

The screening consisted of a questionnaire and an examination by a physiotherapist (see Tables 1 and 2). The questionnaire was based on previous prognostic studies by Haldorsen et al. (1998b,c,d) and consisted of 15 items related to psychological and motivational factors. The factors chosen show significant predictive values concerning return to work in at least one of the three interventions (Haldorsen et al., 1998b,c,d). As shown in Tables 1 and 2 the questions are dealing with the ability to work, the pain, the belief in personal control over the pain, how they generally felt, and when they expected to be back at work.

After formal consent was obtained, the questionnaire was mailed to the patients, who returned it back at the time of the first examination at the clinic. The letter also stated briefly that the investigation involved different types of treatment, that the aim was to find more effective ways of treating musculoskeletal pain, and that it would involve the lottery of randomization. Instructions were also given about the questionnaires, for instance that there were no right or wrong answers.

The other part of the screening instrument consisted of four standardized physiotherapy examinations. (1) Examination of movement: seven separate tests were taken from a more extensive examination called the Global Physiotherapeutic Examination (Sundsvold et al., 1982). The tests selected were testing of passive gravity movements in the arm, shoulder, cervical, and lumbar region, where resistance and resilience is evaluated and one forms an impression of the patient's ability to relax and of his spinal flexibility. The patient's ability to roll up from supine without arm support is also evaluated. (2) Tender points (Wolfe et al., 1990): the presence and number of tender points were determined using the American College of Rheumatology 1990 test procedure for fibromyalgia. The specified tender points are pressed by finger pressure with an approximate force of 4 kg. (3) The Sock Test (Strand and Wie, 1999): in this test the patient pretend to put on a sock sitting on a high bench, with the feet not touching the floor. The activity is first demonstrated to the patient. The Sock Test scores reflect perceived activity limitations and restrictions of the musculoskeletal system. The scores are given from 0 (can grab the toes with fingertips and perform the action with ease) to 3 (can hardly, if at all, reach as far as the malleoli). (4) Lifting Test, PILE (Mayer et al., 1988, 1990): progressive isoinertial evaluation (PILE) evaluates lifting capacity. This test involves incremental weight lifting. The patient progressively increases the weight lifted and total work until an objective end-point is reached. The tests of lifting capacity represent an important aspect of functional evaluation.

2.4. Scoring system

The final score for return to work was based on both parts of the screening instrument, each part counting equally. Each part concluded by classifying the individual as either having good, medium, or poor prognosis for return to work. The patients with good prognosis were given score 1, with medium prognosis score 2, and with poor prognosis score 3 (see Tables 1 and 2).

When deciding the prognostic score, the number of 1, 2, and 3 values on both parts of the screening instrument were counted. The rating value for the four physical tests was multiplied by three to balance out the score of the 15-item questionnaire. For example, if the patient scored value 1 on three of the physical tests and value 3 on the fourth test, the total score of the physical tests would be 9 (one value) and 3 (3 values). The final score was the value (1, 2, and 3) found most frequently for both parts of the screening instrument. When ties occurred, numbers in parenthesis were used (see Table 1). The final scoring of the forms was left to the medical doctors, who did the classification after the physical examination of the patient. The screening instrument was easy to use, and all patients were classified as having good, medium, or poor prognosis within a couple of minutes.

2.5. Randomization

After the screening and physical examination by the doctor, randomization was performed by means of a sequence of pre-labeled cards contained in sealed envelopes. The allocation sequence was prepared beforehand by a physician outside the clinic (one of the authors: K.K.). Due to a limited capacity at the clinic an external block randomization (Pocock, 1991) was performed resulting in three groups with more patients in the control group (ordinary treatment). For each group of 60 randomly assigned patients, 25 were assigned to ordinary treatment, 20 to the light multidisciplinary treatment program with follow-ups, and 15 to the extensive multidisciplinary treatment with follow-ups. When enrolment was completed, the randomization resulted in the following distribution of patients; ordinary treatment ($n = 263$, 40%), treatment

Table 1
Prognosis for return to work (screening instrument with coding key). Psychosocial factors. The patient is instructed to tick off one option for each question. The number indicates the weight given to this particular answer. The most frequently used weight is the final score for Part 1 – psychosocial factors (1, good prognosis; 2, medium prognosis; and 3, poor prognosis for return to work). The number in parenthesis after the weight indicates adjustment for tied scores

Ability to work

	Aggravate the condition	Delay the healing	No effect	A slight positive effect	Very positive effect
1. If you continue working, how will that affect your complaints	2 (3)	2 (3)	1	1	1

Give your opinion on each of the following statements

	Strongly disagree	Rather disagree	Slightly disagree	Slightly agree	Rather agree	Strongly agree
2. I have no possibility of affecting my own work situation	1	1	2	2	3	3
3. I have a problem with turning down tasks either at home or at work	1	1	2	2	3	3

To what extent have you been troubled with neck pain the last 30 days?

	None	Some	Much	Severe
4. Neck pain	1	2	3 (2)	3

Tick off in the square that best describes how you are feeling now.

	Not at all	Somewhat	Moderately so	Very much so
5. I am tense	1	2	3	3
6. I feel self-confident	3	2	2 (1)	1

Tick off in the square that best describes how you generally feel.

	Almost never	Sometimes	Often	Almost always
7. I feel pleasant	3	2	2	1
8. I worry too much over something that really doesn't matter	1	2	3	3
9. I lack self-confidence	1	2	3	3
10. I feel inadequate	1	2	3	3

Give your opinion on the following statements

	Strongly disagree	Rather disagree	Slightly disagree	Slightly agree	Rather agree	Strongly agree
11. If I get sick, it is my own behavior which determines how soon I get well again	3	3	2	2	1	1
12. If I take the right actions, I can stay healthy	3	3	2	2	1	1

Give your opinion on each of the following statements

	Very suitable	Suitable	Neither suitable nor unsuitable	Unsuitable	Very unsuitable
13. I feel psychologically strong	1	2	3	3	3
14. I expect to be back at work within a few weeks	1	2	3	3	3
15. I expect I have to live with my health complaints in the years to come	3	3	2	2	1

Table 2
Physiotherapist evaluation. The physiotherapist ticks off one option for each test based on standardized scores. (1, good prognosis; 2, medium prognosis; and 3, poor prognosis for return to work). The most frequently used weight is the final score for Part 2 – physiotherapist evaluation. The rating value for the four physical tests are multiplied by 3 to balance out the score of the 15-item questionnaire. The final score is the value (1, 2, 3) found most frequently for both parts of the screening instrument

		Good prognosis	Medium prognosis	Poor prognosis
1. Ability to relax and spinal mobility		(0-6 points)	(7-9 points)	(>9points)
		_____1_____	_____2_____	_____3_____
2. Number of tenderpoints (ACR – criteria)		(0-4)	(5-10)	(>10)
		_____1_____	_____2_____	_____3_____
3. The Sock Test		(score 0&1)	(score 2)	(score 3)
		_____1_____	_____2_____	_____3_____
4. Lifting test - PILE	Females:	(>12,7 kg)	(8,1-12,7 kg)	(0-5,9 kg)
	Men:	(>17,2 kg)	(12,7-17,2 kg)	(0-10,4 kg)
		_____1_____	_____2_____	_____3_____

based on a light multidisciplinary treatment program with follow-ups ($n = 222$, 34%), and an extensive multidisciplinary treatment program for 4 weeks with follow-ups ($n = 169$, 26%).

2.6. Treatment

2.6.1. Ordinary treatment

The patients receiving this treatment were referred back to their general practitioner (treatment as usual) after the clinical examination and screening at the Outpatient Spine Clinic. In Norway, general practitioners give most of the patients with long-lasting musculoskeletal pain medication, advice, and refer them further to physiotherapists or chiropractors.

The personnel at the Outpatient Spine Clinic consisted of a neurologist, a general practitioner, a psychologist, two nurses, and four physiotherapists. These personnel were responsible for both the treatment programs given at the clinic. After the screening test and clinical examination by a medical doctor, further evaluation was performed by a physiotherapist, nurse, and the psychologist if necessary, for both the experimental groups. Follow-ups were performed by one of the members of the treatment program depending on nature of the problem. Group sessions were given by different team members, but the psychologist had the main responsibility of supervising the other team members.

2.6.2. Light multidisciplinary treatment with follow-ups

This treatment was in many aspects based on a light mobilization program described by Indahl et al. (1995, 1998) and Haldorsen et al. (1998b). The patients were given 1-h lecture about topics such as exercise, lifestyle and fear-avoidance advice. After this session, the patients were given individual information and feedback by the team. They were told how pain, or anticipation of pain, could add to the binding and guarding of the neck and back and lead to increased muscular activation and, subsequently increased pain. The patients were encouraged to gradually improve their activity level even if the pain got worse. Great emphasis was put on the effort to reduce fear about musculoskeletal pain and avoid sickness-behavior (Troup and Slade, 1985; Waddell et al., 1993; Waddel, 1998; Vlayen and Linton, 2000). Increased pain during increased activity in most cases was told to be normal reactions. The patients received an individually based graded exercise program based on physical tests (Ljunggren, 1993). Some of the patients were referred to external physiotherapist for further help in performing their exercise program, but usually a maximum of 12 additional sessions was recommended. A few patients were referred to an external psychologist. All patients were followed up to 1 year with individual pain management given by different team members as required, and occasional work place interventions. On an average, each patient received three individual follow-ups as required by one of the team members. In addition, all the patients were offered individual appointments with the team at 3, 6, and 10 months.

2.6.3. Extensive multidisciplinary treatment program with follow-ups

The patients participating in this program were given a more extensive multidisciplinary treatment program at the clinic, which lasted for 4 weeks, with 6-h sessions 5 days per week (Haldorsen et al., 1998a,d). The program included cognitive-behavioral modification, education, exercise, and occasional workplace interventions. The cognitive-behavioral modification was given in group sessions (2-h sessions per week) (Jensen and Bodin, 1998). The patients were encouraged to take responsibility for their own health and lifestyle. The cognitive coping strategies were discussed and advice given. The education sessions involved different topics such as anatomy, pain, physical and mental coping strategies, work, and lifestyle. The education sessions (2-h sessions per week) involved all categories of professionals in the interdisciplinary team. The lectures were followed by small group sessions where the patients discussed the issues raised in class. The exercise was given partly as group activity and partly as individual training. The patients received an individually based graded exercise program based on physical tests (Ljunggren, 1993). Under continuous supervision by a physiotherapist an exercise program was given daily to the patients for 1.5–3.5-h per day. The patients received a 15-min warm-up exercise program before they started the individual exercises. The exercise program emphasized to increase the flexibility of the spine and strengthen the paravertebral stabilizing muscle groups. In addition body awareness training, relaxation training, stretching, and cardio-active training were emphasized. The patients were encouraged to think of the functional level they could achieve, and not focus on the pain. At the end of the 4-weeks program, the patients developed their own rehabilitation plan. The patients were followed up to 1 year with individual pain management given by different team members as required. The patients in this treatment group received the same follow-ups as patients in the light multidisciplinary treatment group.

2.7. Outcome measures

The purpose of the three different treatment programs was to restore occupational function and to facilitate return to the previous work place. In this study, we use return to work as outcome measure. We expect that higher propensity of return to work not only induces gains in production, but also reflects improvements in health and quality of life. While the latter effects are surely important, we only include production gains explicitly in the economic analysis.

Follow-up data are collected from the social insurance register, which provides information regarding duration, amount of sickness benefits, rehabilitation benefits, and disability pension. Here, absence of sick pay or related benefits in a given month is interpreted as having returned to work. Since all the patients are entitled to receive benefits due to sickness, and since Norwegian legislation prohibits dismissal of workers on sick leave, we argue whether using absence of payments from the social insurance in a given month is a reliable indicator for the patient working in that particular month. This study is based upon follow-up data for the first 14 months after testing. Treatment took place approximately 1–2 months after testing.

2.8. Cost–benefit analysis

The economic benefits were calculated by treating patients with the light multidisciplinary treatment program or with extensive multidisciplinary treatment instead of ordinary treatment by a standard cost–benefit formula (Haveman et al., 1984; Berkowitz, 1988; Risa, 1997). The economic returns were measured in terms of increases in the net present value of production for the society when treatment causes patients to return to work instead of receiving disability pension. The economic benefits were calculated by multiplying treatment effects by the discounted mean of the net present value of productivity gains when patients return to work. We used observed earnings 2 years after testing for those who returned to work as the basis for estimation of productivity gains. The marginal cost of public funds were set to 0.2. The social discount rate was set to 0.035.

The economic returns of treatment were evaluated in this experiment, and in cases where patients had received treatment according to the prognosis rather than randomization. In the first case, calculation of benefits is based on treatment effects measured by the difference in return to work, averaged over the first 14 months, between those who received any of the treatments at the clinic and those who received ordinary treatment, and on the number of patients actually receiving treatment at the clinic. In the second case, the effect of multidisciplinary treatment is measured by the difference in return to work for patients with poor prognosis who received multidisciplinary treatment and patients with poor prognosis who received ordinary treatment. The effect of light multidisciplinary treatment is measured by the difference in return to work for patients with medium prognosis who received light multidisciplinary treatment and patients with medium prognosis who received ordinary treatment. The calculation of benefits is based upon the number of patients who would have received any of the treatments if the screening result was decisive for the type of treatment.

Information regarding the cost of treatment at the clinic is available only on a yearly basis, and was not monitored at the patient level. Therefore, the cost–benefit analysis is based on annual production. We use the performance in 1996 as a proxy for per year treatment capacity and cost of treatment. Of the 654 participants in the trial, 504 were enrolled during 1996. Of these, 208 received ordinary treatment, whereas 168 received the light multidisciplinary treatment program, and 128 received extensive multidisciplinary treatment. If screening results rather than randomization had been decisive for the choice of treatment, 116 would have been assigned to ordinary treatment, 241 to the light multidisciplinary treatment program, and 147 to extensive multidisciplinary treatment.

2.9. Ethics

All participants were thoroughly informed by personal instruction and a written consent was then obtained prior to inclusion. The Regional ethic committee accepted the study and it was performed according to the Helsinki declaration. The project was endorsed by the Norwegian Data Inspectorate.

2.10. Statistical analysis

The data were analyzed according to intention to treat principals. Significant differences between groups were evaluated by analyses of variance (ANOVA) with Bonferroni correction for overall error rate, and with Chi-square tests. The differences in the monthly fractions of patients returned to work from the three treatment groups yield a direct measure of the impact of treatment. The return to work data is not available for government-employed workers ($n = 27$). Therefore, return to work data is based on $n = 627$ ($654 - 27$) patients. In this study, follow-up data is available also for non-participants, i.e. negative responders and non-responders. Statistical significance was defined as $P < 0.05$.

3. Results

Table 3 shows the distribution of patients grouped by treatment and prognosis. Each treatment group consisted of patients who had a prognosis that were assumed to suit the specific treatment group as well as patients from the two other prognostic categories.

3.1. Baseline characteristics

Baseline characteristics of the treatment groups, screening groups, and non-participants are given in Table 4. No significant differences were found between the treatment groups (randomized groups). In the screening groups, more men than women were categorized to have good prognosis ($\chi^2 = 59.9$, d.f. = 2, $P < 0.001$). It was also found that patients with poor prognosis were older than patients with good or medium prognosis ($F(2, 653) = 9.5$, $P < 0.001$).

The typical participant in this study is a married female worker, approximately 43 years old, with annual earnings in 1995 of approximately US$ 25 000.

Negative responders are older than the participants ($F(3, 1164) = 6.9$, $P < 0.001$), and have more neck and shoulder pain ($\chi^2 = 25.9$, d.f. = 3, $P < 0.001$). Non-responders are more often men ($\chi^2 = 50.9$, d.f. = 3, $P < 0.001$), more often single (marital status) ($\chi^2 = 9.2$, d.f. = 3, $P < 0.03$) and have less generalized muscle pain ($\chi^2 = 9.5$, d.f. = 3, $P < 0.03$). Nineteen percent of the non-responders are recidivists (patients who have been sick-listed for musculoskeletal pain for more than 2 months in the last 2 years). This is significantly more than among the participants ($\chi^2 = 17.1$, d.f. = 3, $P < 0.001$).

3.2. Validation of the screening instrument

Is it possible to develop a screening instrument that can differentiate between patients with good, medium, or poor prognosis for return to work?

An evaluation of the validity of the screening instrument was conducted by examining the relationship between the screening category and return to work data after 14 months. As displayed in Fig. 1, the screening instrument differentiated between patients with different prognosis for return to work, independent of the type of treatment. This was especially the case for patients classified to have poor prognosis. Among patients classified to have poor prognosis only 44% ($n = 79$) returned to work after 14 months, compared to 61% ($n = 83$) among patients with good prognosis ($\chi^2 = 8.5$, d.f. = 1, $P < 0.004$), and 57% ($n = 180$) among patients with medium prognosis ($\chi^2 = 7.6$, d.f. = 1, $P < 0.006$).

3.3. Identification of treatment effects

Is there a right treatment for a particular patient group? Fig. 2 shows that both light multidisciplinary and exten-

Table 3
Participants, grouped according to treatment and prognosis for return to work (government employed workers in parenthesis)[a]

Screening prognosis	Treatment			
	Ordinary	Light multidisciplinary	Extensive multidisciplinary	*N*
Good	70	46	26	142(6)
Medium	120	116	92	328(14)
Poor	73	60	51	184(7)
N	263(15)	222(8)	169(4)	654(27)

[a] Due to missing data on individual sickness spells, government-employed patients ($n = 27$) had to be excluded from the evaluation.

Table 4
Baseline characteristics of the treatment groups and screening groups ($n = 654$) and non-participants ($n = 1175$)

Characteristics	Treatment			Screening prognosis for return to work			Non-participants	
	Ordinary	Light multidisciplinary	Extensive multidisciplinary	Good	Medium	Poor	Non-responders	Negative responders
Gender, no. (%) female	63.2	67.6	68.6	38.7	72.9	74.8	46.8	60.0
Age (years)								
Mean (SD)	44 (10.9)	43 (10.3)	43 (10.5)	43 (10.2)	43 (10.2)	46 (11.0)	42 (11.7)	46 (11.3)
Range	21–66	21–65	23–66	22–66	21–66	22–65	20–67	20–67
Marital status								
Single	19.9	20.7	21.3	26.0	18.3	20.0	25.7	16.7
Married	62.0	60.8	63.3	58.5	64.3	61.1	54.1	68.0
Previous married	18.1	18.5	15.4	15.5	17.4	18.9	20.2	15.3
Ann. pre-treat. income[a]	190 800	183 700	186 900	221 500	180 000	174 900	193 400	186 500
(SD)	(74 840)	(68 250)	(90 750)	(94 500)	(61 080)	(84 450)	(99 890)	(78 400)
Diagnosis ICPC (%)[b]								
Back pain	42.9	43.7	43.2	44.4	40.9	47.4	47.3	40.7
Neck/shoulder pain	33.5	31.9	32.8	35.3	34.7	28.4	34.3	40.5
Generalized musclepain	11.3	9.5	11.2	5.6	12.2	11.4	6.0	6.9
Other	11.8	14.9	12.8	14.7	12.2	13.2	11.7	12.0
Recidivist (%)[c]	10.2	10.4	15.4	12.0	11.0	11.9	19.0	12.3
N	263	222	169	142	328	184	665 (20)[d]	510 (14)[d]

[a] Ann. pre-treat, Annual pre-treatment (mean).
[b] Diagnosis given by the GPs.
[c] Recidivist, patient sick-listed at least 2 months per year for the last 2 years for musculoskeletal pain.
[d] Number of government-employed workers in parenthesis.

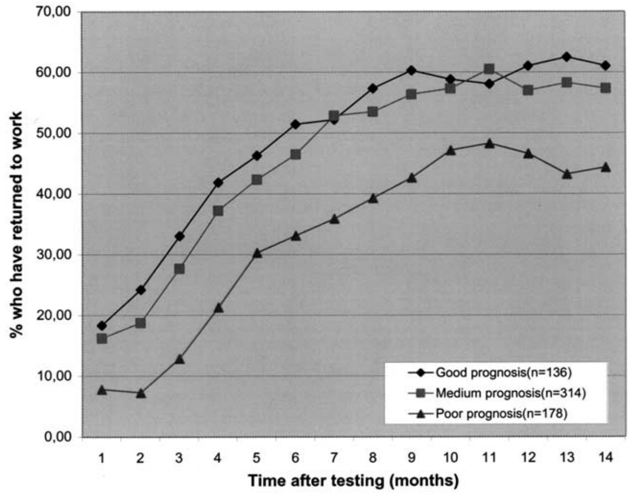

Fig. 1. Evaluation of the screening instrument. Number of patients who have returned to work in the three prognostic groups.

sive multidisciplinary treatment increases the possibility of returning to work, compared to ordinary treatment (independent of screening category). This effect occurred already 5 months after time of testing. The difference is about 10% after 14 months, in favor of those receiving either light multidisciplinary treatment ($\chi^2 = 3.6$, d.f. $= 1$, $P = 0.05$) or extensive multidisciplinary treatment ($\chi^2 = 4.6$, d.f. $= 1$, $P < 0.04$) (see Fig. 2).

None of the three treatments were advantageous for patients classified to have good prognosis. Extensive multidisciplinary treatment for these patients did not result in higher return to work rate than ordinary treatment. For patients classified to have medium prognosis for return to work a light multidisciplinary treatment program with follow-ups seemed sufficient. Extensive multidisciplinary treatment for these patients had no additional effect concerning return to work after 14 months. Ordinary treatment for patients classified to have medium prognosis gave poor results. The differences in return to work rate were statistically significant both between light multidisciplinary treatment and ordinary treatment (63% ($n = 71$) and 48% ($n = 54$) ($\chi^2 = 5.5$, d.f. $= 1$, $P < 0.02$) and between extensive multidisciplinary treatment and ordinary treatment (62% ($n = 55$) and 48% ($n = 54$) ($\chi^2 = 3.9$,d.f. $= 1$, $P < 0.05$). The patients classified to have poor prognosis clearly needed extensive multidisciplinary treatment (see Fig. 3). Ordinary treatment by the GPs or light multidisciplinary treatment with follow-up gave poor results, as measured by return to work. The effect was seen after 4–5 months. The difference between extensive multidisciplinary treatment and ordinary treatment was statistically significant (55%, $n = 28$ and 37%, $n = 26$) ($\chi^2 = 3.7$, d.f. $= 1$, $P < 0.05$).

Most patients returned to work if they were given treatment that corresponded with their screening category (see Fig. 4). Between 55 and 64% had returned to work after 14 months in the different prognostic groups when given what was assumed to be the right treatment.

Gender and age influenced the prognosis score, and return to work. Women were classified to have had a more moderate or poor prognosis, as compared to men. Older patients with poor prognosis returned less to work than younger patients with poor prognosis.

3.4. Cost–benefit analysis of the impact of treatment

Does right treatment for a particular patient group yield positive net returns for the society?

3.4.1. Cost of treatment

Direct costs at the clinic include operating expenses and wage payments. In 1996, this amounted to NoK (1996) 4.55 million (about US$ 600 000 in 1996 dollars). The costs

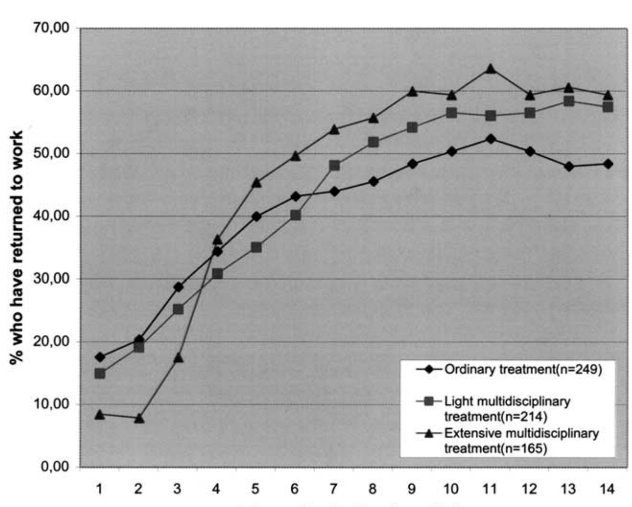

Fig. 2. Treatment results. All treatments. All patients. Number of patients who have returned to work.

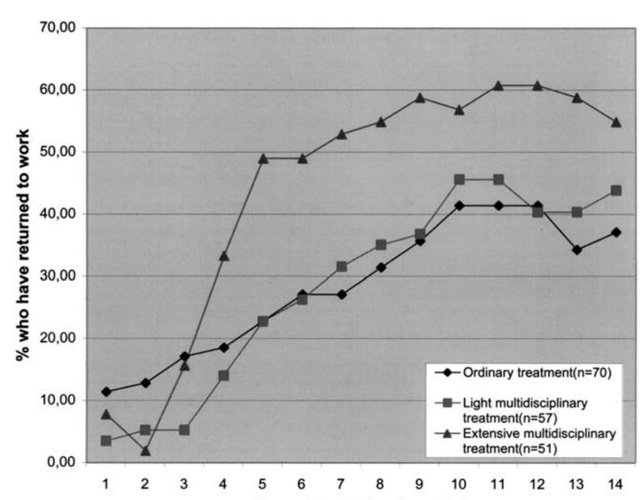

Fig. 3. Effect of ordinary, light multidisciplinary, and extensive multidisciplinary treatment for patients with poor prognosis. Number of patients who have returned to work.

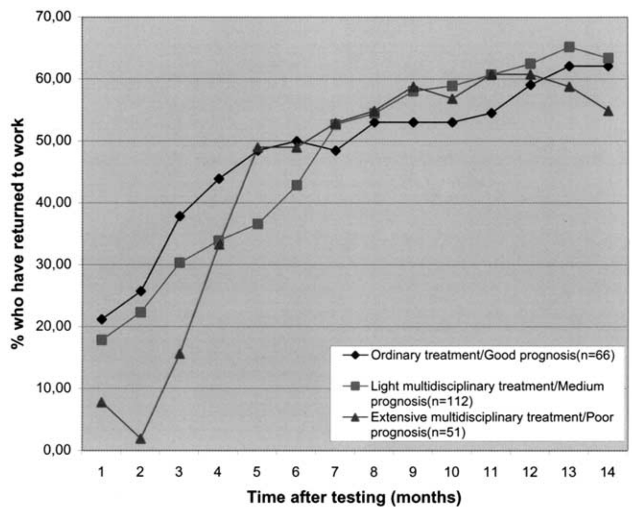

Fig. 4. Right treatment to right patient. Number of patients who have returned to work.

covered screening of all the patients and treatment of patients receiving light multidisciplinary treatment or extensive multidisciplinary treatment. Although more patients would have received one of the treatments at the clinic had the assignment been based on screening results rather than randomization, we also used actual costs in 1996 as proxy of the cost of treatment under normal operating conditions. After the experiment was completed, the clinic continued to treat musculosceletal patients using the screening instrument to assign patients to the different programs. More patients were treated at the clinic than in the experimental period without incurring additional costs.

3.4.2. Benefits of treatment

Central components underlying the calculation of productivity gains from treatment are reported in Table 5.

The economic returns were considered first in the experiment. Based on the experimental treatment effects and the actual number of patients treated with light multidisciplinary treatment or extensive multidisciplinary treatment, the productivity gains were calculated from the overall activity at the clinic to NoK (1996) 2 956 198. Before cost of treatment was subtracted from total benefits, they were multiplied by a factor of 1.2 to adjust for the marginal cost of public funds. Subtracting cost, the experiment yielded a net present value of productivity gains for the first 14 months of negative NoK 2 501 000.

The economic returns were considered next in the clinical case, that is, in a case such that the screening results rather than randomization had been the determining factor for the type of treatment. Then, more patients would have received treatment at the clinic, and the treatment effects obtained from giving multidisciplinary treatment to the patients who benefit most from it, namely the patients with medium or poor prognosis, are considerably larger than those found when prognosis was not accounted for. With treatment assignment according to prognosis, productivity gains would have amounted to NoK 7 332 278. Subtracting costs, adjusted for marginal costs of public funds, yielded net present value of the productivity gains for the first 14 months of NoK 1 875 100 (approximately US$ 235 000, or US$ 800 per treated patient).

4. Discussion

4.1. Research question one: the screening instrument

The initial aim of this randomized study was to investigate whether or not it is possible to identify musculoskeletal patients with different prognosis for return to work by a screening instrument. The answer to this is yes. The patients

Table 5
Components underlying the calculation of benefits of treatment[a,b]

	Experiment		Right treatment to the right patient	
	Light multidisciplinary	Extensive multidisciplinary	Light multidisciplinary	Extensive multidisciplinary
Numbers treated	168	128	241	147
Treatment effect (%)	3.4	5.1	3.4[c]	16.3[d]
Annual post-treatment income	186 800	207 700	184 000	188 400
Gross wage payments	256 900	258 200	228 710	234 181
Value of loss of leisure	35 760	39 750	35 220	36 060
Reduction in public transfers[e]	189 000	210 200	186 210	190 600
Net present value of benefits	1 300 338	1 655 861	1 842 785	5 489 492

[a] A detailed description of the cost–benefit formula used to calculate the economic returns of the treatments at the clinic is provided in Appendix A.
[b] Income, gross wage payments, value of leisure lost, and reduction in public transfers are per individual, NoK (1996).
[c] Average difference between patients with medium prognosis receiving light multidisciplinary treatment and patients with medium prognosis receiving ordinary treatment.
[d] Average difference between patients with poor prognosis receiving extensive multidisciplinary treatment and patients with poor prognosis receiving ordinary treatment.
[e] If individuals work instead of receiving disability pension.

classified to have a poor prognosis, returned to work to a lesser extent than patients with a good prognosis, independent of which type of treatment they were given.

The screening instrument consisted of a combination of psychological, motivational, and physiotherapy factors. The importance of especially psychological factors as predictors for return to work has been supported in many studies (Hasenbring et al., 1994; Klenerman et al., 1995; Hildebrandt et al., 1997; Haldorsen et al., 1998b,c,d). Haldorsen et al. (1998b,c,d) found that patients with poor prognosis for return to work believed that their complaints would be worse if they continued working, they did not believe in personal control over their pain, and they did not expect to be back at work in a couple of weeks. This is in accordance with other studies showing that the patients own prediction of going back to work is a strong predictor for return to work (Sandström, 1986). Pain-related fear, and fear of movement/(re)injury in particular, is also an important predictor for return to work (Linton and Hallden, 1998; Crombez et al., 1999; Vlayen and Linton, 2000). Pfingsten et al. (1997) found that more than 70% of those who did not believe in return to work before starting treatment did not return to work. Among those who returned to work, only 32% expressed the same doubts prior to treatment. The resistance may counteract change in coping dimensions (Pfingsten et al., 1997). In general, lack of trust in one's own coping resources seems to be associated with high levels of subjective health complaints, including muscle pain (Olff et al., 1993; Brosschot et al., 1994).

The screening instrument consists of two parts. Generally, the accuracy of prediction in return to work studies is about 70–80%. As pointed out by Linton and Hallden (1998) screening at this level of accuracy seems appropriate for identification of risk patients. The relative contribution of each of the variables in the total screening battery (parts 1 and 2) remains to be investigated in a discriminate function. It may be possible to further reduce the number of variables.

4.2. Research question two: is there a right treatment for a particular patient group?

The second aim of the study was to investigate if the screening instrument may be used to assign a particular patient group to what was assumed to be the right level of treatment. The results clearly demonstrate that this is possible. The patients with a poor prognosis classification from the screening instrument randomized to extensive multidisciplinary treatment showed significantly better results than those assigned (by random) to ordinary treatment or light multidisciplinary treatment. These patients, therefore, seem to need extensive multidisciplinary treatment for a longer period of time, not ordinary treatment given by the GPs, or a light multidisciplinary treatment program with follow-ups. A recently published study by Becker et al. (2000) also indicates that primary care management models are insufficient for managing chronic pain patients. Other authors express the same view, e.g. Turner (1996).

For patients classified to have medium prognosis a light multidisciplinary treatment program with follow-ups seems sufficient. This treatment results in a higher return to work rate than ordinary treatment given by the GPs, confirming the previous results (Lindström et al., 1992; Indahl et al., 1995, 1998; Loisel et al., 1997; Hagen et al., 2000). The patients classified as having a good prognosis have no additional treatment effect measured by return to work by participating in an extensive multidisciplinary treatment program.

In this study mostly men (61%) were classified as having a good prognosis, while women (71%) were classified as having a medium or poor prognosis. In addition, older patients were to a greater extent found to have a poor prognosis, compared with younger patients. Many studies have shown that musculoskeletal pain is more common among women than men, especially neck and shoulder pain and generalized muscle pain (Wool and Barsky, 1994; Brage et al., 1998). In addition, women report subjective health complaints to a greater extent than men do (Tibblin et al., 1990; Hasvold and Johnsen, 1993; Eriksen et al., 1998). Our finding that musculoskeletal pain increases with age is also supported by several other studies (Hasvold and Johnsen, 1993; Brage et al., 1998; Eriksen et al., 1998). If treatment was given only according to the screening results in the present study, the clinic would have treated more women and older patients in the multidisciplinary programs, as compared with the actual treatment profile under the experimental conditions.

4.3. Research question three: costs vs. benefits

The third aim of the study was to investigate the cost–benefits of giving what was assumed to be the right treatment for a particular patient group. The cost–benefit analysis demonstrates that the combination of screening and assignment of treatment based on screening results is economically beneficial. Our estimates of productivity gains were based on observed outcomes in terms of return to work for the first 14 months after testing. In this experiment costs were incurred during treatment, while benefits accumulate as long as positive treatment effects are upheld. The still positive differences in return to work fractions in favor of the treatments at the end of the observation period indicate that a cost–benefit analysis based on a longer follow-up period will yield an even higher estimate of the economic returns of these programs.

Few previous studies investigating different types of treatments for patients with musculoskeletal pain provide evidence of treatment effects that can be evaluated against costs. Even in studies where such measures are available (e.g. Cherkin et al., 1998) estimates of treatment effects have, to the best of our knowledge, always been too meagre to justify costs.

Our study provides evidence of significant treatment effects for subgroups of patients with predictive characteristics that can easily be identified through a standardized psychological–physiotherapeutic screening instrument. Together, these results give evidence for a better utilization of the resources by performing an easy screening of the patients before treatment, and allocating the patients to adequate treatment.

4.4. Generalizability

Some caution is warranted when generalizing the results, since the response rate is low. Only 33% of those invited agreed to participate in the study. Comparing baseline characteristics for non-participants with participants according to prognostic category show that negative responders on an average are more similar to participants with good prognosis for return to work (see Table 4). Follow-up data regarding the non-participants return to work behavior shows that they return to work at a higher rate than the participants do. From this, we infer that non-participants on an average are healthier than those who volunteered to participate in the experiment. About three-fourth of the negative responders answered in the invitation that they expected to return to work the next month. Self-selection may not be a great problem in the sense that those who dropped out of participation have characteristics that are similar to those who do not benefit from the treatment.

In this study we use the terms good, medium, and poor prognosis. These are only relative terms. Most of the patients (90%) had been sick-listed for at least 8 weeks when they were invited to participate in the study. It is well known that the longer individuals are out of work, the less likely they are to return to work (Lanes et al., 1995; Pfingsten et al., 1997; Bendix et al., 1998b; Hunter et al., 1998).

Return to work has been used as the sole outcome in this study. The fact that no measures of pain or quality of life have been included may be a weakness. However, several Randomized controlled treatment (RCT) studies have shown that multidisciplinary treatment programs have an effect on pain intensity, emotional status, and function other than work (Bendix et al., 1997, 1998a; Haldorsen et al., 1998a,d; Morley et al., 1999; Bendix et al., 2000). As mentioned in Section 1 little is documented of RCT studies concerning the effect on return to work. In a study performed some years ago we found that a multimodal cognitive-behavioral treatment program resulted in better physical and psychological health, but had no effect on return to work, compared to a randomized control group receiving ordinary treatment by the GPs (Haldorsen et al., 1998a). As stated by Turk and Rudy (1993) there is no correct efficacy measure, but each of them must be looked at within its appropriate context. In the present study, our aim was to investigate whether we could get an effect on return to work if treatment was given in a differentiated way, based on the patients prognosis for return to work.

Evaluation of the impact of treatment on measures of pain, functional abilities, etc. would require a follow-up examination, or at least a follow-up survey, of all the participants in the study at some point of time after treatment. Ideally, someone not involved in the treatment program should perform such follow-ups. Measures of health effects are important, and this is also stressed in this article. However, using a design like that would increase the experimental costs considerably.

The experience from the study by Haldorsen et al. (1998a), and from other randomized studies based on follow-up data collected from surveys and/or patient examinations, also show that such data almost always suffer from sample attrition. Sample attrition is not a problem if attrition behavior is random. In practice, attrition is usually stronger among the controls than among the treated. If attrition behavior is endogenous, it will have biased estimates of the treatment effects. In our study, we focus on return to work. This data could be collected from administrative social insurance records (in Norway, all employees are covered by public sickness insurance). Hence, we avoid the problems with sample attrition that most of the randomized follow-up studies in this field suffer from. This also gives us the opportunity to use a longer observation period. The participants in this study will be followed up with data from the social insurance register 5 years after the treatment. In the future, this will allow us to address important issues regarding the duration of the treatment effects. Furthermore, one of the inclusion criteria in this study was that the patients had to be employed, which means that return to work is expected. However, return to work can be influenced by factors other than treatment. As stated by Long (1995), many psychosocial and workforce factors affect return to work rates. It is our opinion that impacts of the insurance system, for example, affect treated and controls equally and therefore is not important for the identification of treatment effects.

Return to work at a certain point of time is a widely used outcome measure. In this study we have used return to work in a whole calendar month as the outcome measure. One alternative would be to use sick leave days. We have spot checked our data concerning this point and also recalculated the cost–benefit analyses by using sick leave days as outcome measure. The results show that the outcome of our calculations vary only by less than 15%. No results or conclusions are altered in either approach.

4.5. Clinical implications

What implications do our results have for treatment of patients with musculoskeletal pain? There can be little doubt that a screening instrument is useful, especially for patients classified to have poor prognosis. Linton and Hallden (1998) who developed a screening questionnaire for predicting outcome in acute and subacute back pain, also confirm this. A screening instrument can be of great value not only for the patient, but also for the health professionals and the society as well. Physicians traditionally evaluate patients using clinical criteria. Medical personnel need to be more concerned with psychological and motivational aspects in order to achieve better treatment effects.

5. Conclusions

The results in this study show that choice of treatment seems especially critical for patients found to have poor prognosis for return to work. Extensive multidisciplinary treatment for these patients seems to be superior both from the patient's point of view, as well as from an economic perspective. Extensive multidisciplinary treatment for patients with good prognosis does not result in higher return to work. Further studies are needed to show if this screening instrument can be used as a classification tool also in primary care settings and to identify risk patients.

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Appendix A

The cost–benefit formula used to evaluate the economic returns of treating patients with the light multidisciplinary treatment program (LM) or with the extensive multidisciplinary treatment program (M) is given by:

$$\mathrm{NPSV} = \sum_{i=1}^{n}\left(\left\{\sum_{t=1}^{T}\frac{(p^i_{\mathrm{LM}_t} - \bar{p}^i_t)(W^i_t - F^i_t + \lambda U^i_t)}{(1+r)^t} + \frac{(p^i_{\mathrm{M}_t} - \bar{p}^i_t)(W^i_t - F^i_t + \lambda U^i_t)}{(1+r)^t}\right\} - (1+\lambda)(C^i - \bar{C}^i)\right) > 0$$

The expression states that in order for the treatments to generate positive net returns the expected net present social value (NPSV) of the programs must be positive when summing overall individual participants $i = 1, \ldots, n$ in the trial from time $t = 1, \ldots, T_i$, where T_i is the time of retirement for individual i. The i could also be interpreted as patient groups. p_{LM} and p_{M} denote the probabilities that person i is working at time t provided that he or she received treatment in one of the programs, while $\bar{p}$ is the corresponding probability for persons receiving ordinary treatment. W denotes the increased social value of production when person i is employed at time t. Assuming efficient markets, W is measured as gross wage payments including employment taxes. F is the social value of leisure time lost by an individual i when working at time t. λ is a positive parameter reflecting the marginal cost of public funds when programs are financed by increased taxes. U denotes the reduction in public transfers to an individual i that works at time t. Finally, C^i refers to the direct costs of treating individual i, whereas $\bar{C}^i$ refers to the cost of alternative treatment received outside the program and financed by public funds.

We let t denote calendar months and calculate benefits obtained during the first 14 months after enrolment. Cost of screening and treatment at the clinic fall shortly after enrolment (within the first 2–3 months), while benefits accumulate as long as the treatment effect given by the difference in the return to probabilities are different from zero. Unfortunately, we cannot measure $\bar{C}^i$ in our data. This term is therefore excluded in the calculation.

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