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A Health System Program To Reduce Work Disability Related to Musculoskeletal Disorders

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Background: **Musculoskeletal disorders (MSDs) are a frequent cause of work disability, accounting for productivity losses in industrialized societies equivalent to 1.3% of the U.S. gross national product.**

Objective: **To evaluate whether a population-based clinical program offered to patients with recent-onset work disability caused by MSDs is cost-effective.**

Design: **Randomized, controlled intervention study. The inclusion and follow-up periods each lasted 12 months.**

Setting: **Three health districts in Madrid, Spain.**

Patients: **All patients with MSD-related temporary work disability in 1998 and 1999.**

Intervention: **The control group received standard primary care management, with referral to specialized care if needed. The intervention group received a specific program, administered by rheumatologists, in which care was delivered during regular visits and included 3 main elements: education, protocol-based clinical management, and administrative duties.**

Measurements: **Efficacy variables were 1) days of temporary work disability and 2) number of patients with permanent work disability. All analyses were done on an intention-to-treat basis.**

Results: **13 077 patients were included in the study, 7805 in the control group and 5272 in the intervention group, generating 16 297 episodes of MSD-related temporary work disability. These episodes were shorter in the intervention group than in the control group (mean, 26 days compared with 41 days; $P < 0.001$), and the groups had similar numbers of episodes per patient. Fewer patients received long-term disability compensation in the intervention group ($n = 38$ [0.7%]) than in the control group ($n = 99$ [1.3%]) ($P < 0.005$). Direct and indirect costs were lower in the intervention group than in the control group. To save 1 day of temporary work disability, $6.00 had to be invested in the program. Each dollar invested generated a benefit of $11.00. The program's net benefit was in excess of $5 million.**

Limitations: **The study was unblinded.**

Conclusions: **Implementation of the program, offered to the general population, improves short- and long-term work disability outcomes and is cost-effective.**

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Musculoskeletal disorders (MSDs) are prevalent and potentially disabling conditions (1) that consume a large proportion of health care resources (2–4) and together are the leading cause of functional loss in adults (3–8). The social costs of MSDs are enormous, often overshadowing those of other chronic conditions (9, 10).

In industrialized societies, MSDs are one of the most common causes of temporary work disability and the chief cause of permanent work disability (11), accounting for productivity losses equivalent to 1.3% of the U.S. gross national product (12). Work disability related to MSDs is a challenge to employability, business productivity, and the capacity of health and social security systems.

Various strategies for addressing MSD-related work disability have been promoted in the field of occupational health, including strategies involving legislation, risk management, ergonomics, prevention, education, and social work (13). However, the role of health systems remains ill-defined in this field. The purpose of this study was to evaluate whether an intervention program, integrated into the health system and offered to the working population, could reduce the impact of recent-onset MSD-related temporary work disability.

METHODS

Setting

Of the 5.5 million persons in Madrid, Spain, 98% receive health coverage from the Instituto Madrileño de Salud. Care is organized into 11 health districts. Patients have direct access to primary care physicians, who refer patients to specialized care if needed. Disability compensation payments are made by the Instituto Nacional de la Seguridad Social (INSS), a division of the Ministry of Work. Any worker who requires sick leave is given a temporary work disability initiation form that states the diagnosis made by the primary care physician and entitles the worker to receive INSS compensation payments. The form

See also:

Print

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Summary for Patients I-30

Web-Only

Conversion of figures and tables into slides

Context

Nonoccupational musculoskeletal disorders account for a large proportion of work disability and represent a major financial burden on society.

Contribution

A voluntary, randomized, controlled intervention study consisted of avoidance of bed rest, early mobilization, avoidance of splints, stretching exercises, ergonomic training, provision of educational booklets, and suggestions for optimal levels of physical activity. Although return to work was never forced, temporary work disability, long-term disability, and costs were significantly decreased in the intervention group.

Implications

The personal and financial impact of work disability due to musculoskeletal disorders (not related to work injury) may be mitigated by a voluntary program of education and rehabilitation.

–The Editors

is renewed weekly by the primary care physician until the worker 1) recovers and receives an ending form, 2) reaches a maximum of 18 months of temporary work disability, or 3) receives a proposal for evaluation for permanent work disability. Proposals for permanent work disability are evaluated by the INSS, which determines the need for and type of long-term compensation. Inspection services in each health district oversee all administrative aspects of these processes.

Design

We did a randomized, controlled study, unblinded for both patients and physicians, to test whether a clinical intervention could improve the outcome of patients with recent-onset MSD-related temporary work disability. The study began in March 1998 in health district 7 and in March 1999 in health districts 4 and 9. Selection and randomization of patients was done during the first year of the study in each district. Follow-up lasted for another year.

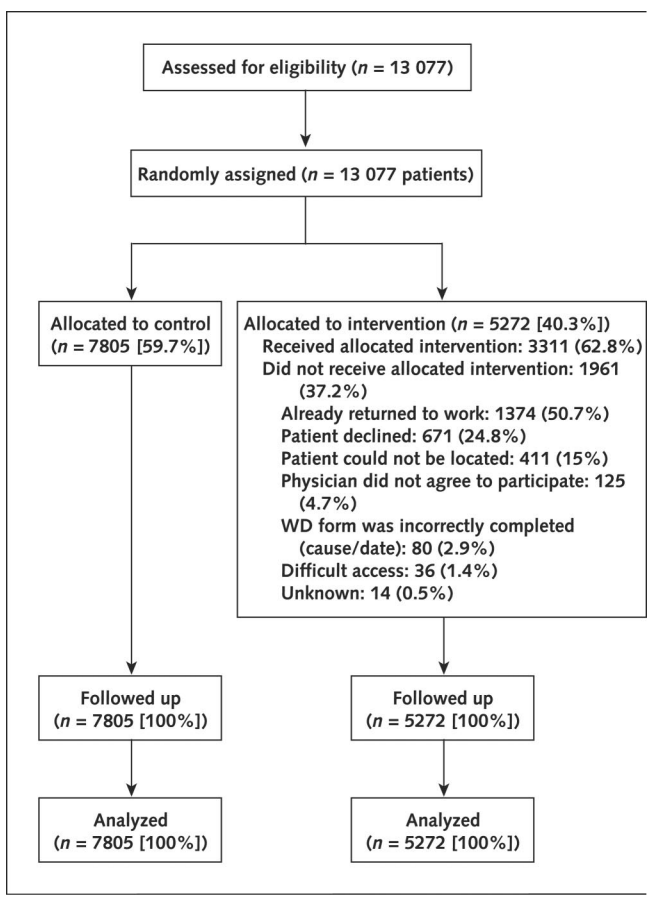
Patients and Selection Criteria

Health districts 4, 7, and 9 were chosen. Health district 4 had a total population of 508 249 persons and an active working population of 192 939 persons; health district 7 had a total population of 522 742 persons and an active working population of 179 155 persons; and health district 9 had a total population of 371 294 persons and an active working population of 135 475 persons (14). The inclusion criterion was the issue of a "common diseases" temporary work disability initiation form, with an MSD-related cause reported by the primary care physician, within the inclusion period. The MSD-related causes included all arthropathies, connective tissue disorders, back disorders, soft-tissue rheumatisms, bone and cartilage disorders, musculoskeletal pain not caused by cancer, and nerve entrapment syndromes. Patients were excluded if they had a "common diseases" temporary work disability form with an MSD-related cause resulting from trauma or surgery. They were also excluded if they had "work accidents" or "professional diseases" noted on the temporary work disability initiation form. Work accidents are primarily sudden, external, violent causes of disease occurring at work or during travel to work, and they represent less than 27% of cases of temporary work disability. Professional diseases include silicosis, asbestos-related mesothelioma, and noise-induced hearing loss, and they represent less than 1% of cases of temporary work disability.

Randomization

All temporary work disability initiation forms meeting the selection criteria were collected daily by a study rheumatologist and coded. The patients associated with the forms were randomly assigned to either the intervention group, which received a specific care program, or the control group, which received standard care (**Figure 1**). Computer-generated lists of pseudorandom numbers were produced for each district. Group assignments were randomly done in blocks of 50 patients with intervention:control ratios of 1:1 in district 7 and 2:3 in districts 4 and 9. This

Figure 1. **Flow diagram of the study.**



WD= work disability.

Table 1. **Baseline Characteristics of the Study Groups***

Characteristic	Health District 4			Health District 7		
	Control Group (n = 3045)	Intervention Group (n = 1845)	P Value	Control Group (n = 1557)	Intervention Group (n = 1474)	P Value
Female sex, %	46.6	47.8		48.5	48.1	
Mean age, y	40.9	40.7		42.7	41.4	<0.01
Self-employed, %	4.7	4.6		5.8	3.9	
Cause of musculoskeletal disorder–related temporary work disability, %†						
Back pain	30.6	32.2		25.7	32.0	
Sciatica	17.0	16.4		19.7	15.3	
Tendonitis	24.8	23.0		26.6	24.0	
Neck pain	11.1	11.8		7.7	10.8	
Joint or muscle pain	7.3	8.2		6.7	7.3	
Inflammatory disease	5.6	7.5		6.8	8.0	
Peripheral osteoarthritis	2.4	0.5	<0.01	3.8	1.4	<0.01
Knee pain with no osteoarthritis	0.7	0.2		2.3	0.6	<0.01
Other	0.5	0.1		0.6	0.4	

* The Table shows P values only if they are ≤ 0.05.
† The causes of disability included the following: Of patients categorized as having back pain, 90% had low back pain and 10% had thoracic back pain. Of patients categorized as having sciatica, 8% had discopathies and 92% had sciatica. Of patients categorized as having tendonitis, 46% had tendonitis/bursitis, 36% had peripheral sprains, 14% had tenosynovitis, and 4% had ganglions. Of patients categorized as having joint or muscle pain, 57.2% had contractures, 36.7% had joint pain without arthritis, 4.2% had fibromyalgia, and 1.9% had other muscle disorders. Of patients categorized as having inflammatory disease, 15% had autoimmune diseases, including rheumatoid arthritis, spondylarthritis, systemic lupus erythematosus, and vasculitis; 37% had microcrystalline arthritis; and 48% had undifferentiated arthritis. Of patients categorized as having other causes, 60.6% had carpal tunnel syndrome, 13% had avascular necrosis, 10.4% had osteoporosis, 5.6% had other neuropathies, 4% had Sudeck disease, 1.6% had infections, 1.6% had fractures, 0.8% had tumors, 0.8% had Paget disease, 0.8% had joint contractures, and 0.8% had osteomalacia.

was done so that similar numbers of patients would be seen by the rheumatologists in all areas. The ratios were based on the number of episodes of MSD-related temporary work disability registered in previous years. Patients maintained their group assignments in successive episodes of MSD-related temporary work disability during follow-up.

Care in the Intervention Group

A secretary contacted all patients assigned to the intervention group by telephone or mail as soon as possible after the initiation form was issued, offering them an appointment in the program. Patients who voluntarily decided to enter the program were attended by 2 rheumatologists in each district who worked full-time for the study. Patients were seen as often as necessary until the episode of temporary work disability was resolved or recovery was deemed unrealistic. Patients who were assigned to the intervention group but were unable or unwilling to participate, were already working, or could not be located were considered to be assigned to the intervention group throughout the study for statistical purposes. Within the intervention program, care was delivered in regular visits and included education, clinical management, and administrative duties.

Education

At the first 45-minute visit, patients received a specific diagnosis, reassurance that no serious disease was present, instructions on self-management, instructions on taking medications on a fixed schedule, and information on indications for return to work before complete symptom remission. Return to work was negotiated with patients and was never forced on them. Instructions on self-management included instructions to avoid bed rest, instructions to promote early mobilization of the painful regions, restrictions on the use of splint and neck collars, training in stretching and strengthening exercises (15–18), teaching of ergonomic care (19), delivery of booklets in instances of back or neck pain (19), and information on optimal levels of physical activity (20). Patients with higher degrees of disability or abnormal pain behavior received immediate extra reassurance, information on pain-relieving positions, and a telephone call or second visit within 72 hours.

Specific protocols were created for low-back (21), neck, shoulder, arm and hand, knee, and foot pain (19, 22–25) and included the 3-level clinical-management system described later. Moving a patient from the lower to the upper levels of the system implied the need for further diagnostic or therapeutic procedures and was indicated 1) after a patient spent a predefined period at the lower level without return to work or substantial clinical improvement or 2) by the clinical judgment of the rheumatologist.

At the first level of the system, patients received the clinical management started at the first visit, including a diagnosis based on clinical criteria, pharmacologic treatment of pain and inflammation, pharmacologic treatment of anxiety and depression, peripheral intra- and periarticular injections (26), and education. Time spent at the first level averaged 2 to 6 weeks. At the second level, patients received maintenance of therapy plus referral for formal rehabilitation and laboratory tests, radiography, computerized tomography, magnetic resonance imaging, and electromyography. After 4 to 8 weeks with no improvement at the second level, patients were moved to the third level and received further diagnostic procedures or referral for surgi-

Table 1—Continued

Health District 9		All Districts Combined	
Control Group (n = 3203)	Intervention Group (n = 1953)	Control Group (n = 7805)	Intervention Group (n = 5272)
58.6	57.9	51.9	51.7
38.0	38.4	40.0	40.0
6.1	5.2	5.5	4.6
34.3	34.3	31.1	32.9
14.0	12.6	16.3	14.7
23.7	22.1	24.7	23.0
8.0	8.6	9.2	10.3
10.3	11.2	8.4	9.1
7.4	8.0	6.6	7.8
1.1	1.8	2.1	1.2
0.5	0.7	1.0	0.5
0.6	0.7	0.5	0.5

cal or other specialized care. "Red flags" were defined, including age older than 50 years for patients with axial pain, previous trauma, cancer, serious medical illness, inflammatory pain, night pain, drug abuse, corticosteroid use, fever, weight loss, progressively deteriorating function, and progressive neurologic deficit. The presence of a red flag precluded the use of the level system, and the patient in question was managed according to clinical criteria, with a focus on excluding serious illness.

Treatment Failures

Patients who did not respond to interventions at the second level of the system were examined for the presence of "yellow flags," which included psychiatric illness, family problems, sociolabor conflicts, unemployment, and occupational causes of disability. The presence of a yellow flag warranted a conservative approach to the more aggressive therapeutic procedures. If the problem was deemed nonmodifiable and full recovery was unrealistic, the patient stayed on temporary work disability and follow-up was done by the patient's primary care physicians.

Administrative Duties

The program incorporated administrative duties (usually completed by primary care physicians), such as writing prescriptions for free medication, renewing temporary work disability forms each week, filling out temporary work disability end forms, and preparing disability reports for Inspection Services and INSS.

Care in the Control Group

Patients in the control group received standard care, in which the primary care physician was the main health care provider who could refer patients to specialist consultants. Primary care physicians could order routine laboratory tests and plain radiography, and in some instances they had physiotherapists integrated into their teams.

Program Implementation

Meetings were held with primary and specialized care staff, and with the inspectors of the health districts involved, to guarantee their acknowledgment of and agreement with the study protocol. Primary care physicians who were not willing to have their patients participate in the program agreed to have their patients randomly assigned to study groups but not contacted. Primary care physicians and inspectors received a note for each patient attended in the program, as well as periodic reports. All of the rheumatologists met weekly for the duration of the study to ensure that criteria were uniform.

The study protocol was approved by the institutional review board of the Hospital Clínico San Carlos and reviewed by the Fondo de Investigaciones Sanitarias (the research agency of the Ministry of Health).

Measurements

Episodes of MSD-related temporary work disability were defined by a beginning (the day the initiation form was issued) and an end (the day the end form was issued). These dates were available for all patients. Efficacy was defined as the differences between groups in 1) the duration of all episodes of MSD-related temporary work disability, 2) the number of episodes of MSD-related temporary work disability per patient, and 3) the number and outcome of proposals for permanent work disability. Relative efficacy is expressed as the percentage of days on temporary work disability saved per patient and as the total number of days on temporary work disability saved in the intervention group: (number of episodes in the intervention group $\times$ [mean duration of episodes in the control group $-$ mean duration of episodes in the intervention group]). Cost-efficacy was defined as the amount of money required to save 1 day of temporary work disability. Cost-benefit was defined as dollars invested divided by dollars saved. Net benefit was defined as dollars saved minus dollars invested.

Patient age, patient sex, the cause and dates of temporary work disability, and the data related to proposals for permanent work disability were obtained from Inspection Services and the INSS for both study groups.

Costs were obtained as follows. First, the costs of specialized care; emergency department, medical, and surgical admissions; diagnostic tests; physiotherapy; and rehabilitation were obtained from the Information System of Specialized Care for both groups. Second, information on patients who participated in the program while receiving medications, joint aspirations, or joint injections were obtained from clinical records. Third, information on patients who did not participate in the program, in either group, and on time spent receiving primary care, medications, joint aspirations, or joint injections was extrapolated

Table 2. **Short-Term Efficacy of the Program: Temporary Work Disability***

Variable	Health District 4				Health District 7				Health District 9			
	Control Group	Intervention Group	*P* Value	Efficacy	Control Group	Intervention Group	*P* Value	Efficacy	Control Group	Intervention Group	*P* Value	Efficacy
Patients, *n*	3045	1845			1557	1474			3203	1953		
Patients with 1 episode of TWD, %	80	78			84	82.5			83	81		
Patients with 2 episodes of TWD, %	15	16			11	13			14	14		
Patients with 3 episodes of TWD, %	3	4			3	3			3	3		
Patients with 4 episodes of TWD, %	1	1			1	1			0	1		
Patients with 5 or more episodes of TWD, %	1	1			1	0.5			0	1		
Total episodes of TWD, *n*	3835	2362			1906	1833			3910	2451		
Mean duration of episodes of TWD, *d*	43	29			52	23			35	24		
Median duration of episodes of TWD (25th, 75th percentile), *d*	12 (6, 31)	11 (5, 24)	<0.001		16 (8, 39)	11 (7, 20)	<0.001		11 (5, 26)	9 (4, 19)	<0.001	
Total days of TWD	163 755	68 498			99 112	41 609			136 068	59 804		
Days of TWD per 1000 patients	53 803	37 076			63 686	28 249			42 582	30 787		
Days of TWD saved by the program				32 359				53 707				25 490
Relative efficacy of the program, %				32				56				30
Relative rate to return to work (95% CI)			1.26 (1.19–1.33)†				1.27 (1.20–1.35)‡				1.31 (1.24–1.36)	

* The Table shows *P* values only if they are ≤ 0.05. TWD = temporary work disability.
† Adjusted for cause.
‡ Adjusted for age and cause.

from personal structured interviews in a random sample of 450 patients from the 3 health districts. The interviews were done after the inclusion period with persons who had MSD-related temporary work disability and were not included in the study. Costs related to diseases other than MSDs or complications during follow-up were disregarded in all groups. Monetary values were assigned to each cost item on the basis of the Instituto Madrileño de Salud reference prices, the National Institute of Statistics, the INSS, and the National Pharmacotherapeutical Catalogue and were converted into 2003 U.S. dollars. Costs were classified as direct (health system costs) and indirect. To estimate indirect costs, we multiplied the number of sick leave days by the average daily wage in 2003 ($51.43). Intervention costs were $189 314 per district (for 2 full-time rheumatologists for 2 years, a half-time secretary, and bookkeeping costs).

Patient Satisfaction with and Perception of Care

A random sample of 500 patients in districts 4 and 9 was mailed a self-administered, anonymous questionnaire 6 months after the program started. There were 2 sets of questions: The first addressed satisfaction with care received (answers could be "very poor," "poor," "fair," "good," and "excellent"), and the second analyzed the patient's perception of the process of care received (answers were yes or no).

Statistical Analysis

All patients who were randomly assigned to study groups received follow-up, and their data were analyzed on an intention-to-treat basis (**Figure 1**). Differences between groups in baseline characteristics were tested by using the Student *t*-test and contingency tables. The number of episodes of temporary work disability was tested with the Mann–Whitney U test. The distribution of proposals for permanent work disability between groups was tested by using chi-square analysis. The differences in duration of temporary work disability were tested by survival techniques (the log-rank test). Kaplan–Meier curves were set to account for correlation in duration of temporary work disability within patients, as in a Poisson model. Cox regression analyses were done to adjust for variables that were unevenly distributed between groups at baseline and had an association with outcome. In these models, the dependent variable is the number of days off work, and the results are expressed as the hazard ratio (or relative rate to return to work) in the intervention group compared with the control group (the reference rate in the control group is 1). The economic evaluation was done from a societal perspective. Differences in costs were tested by linear regression, which also permitted adjustment for variables with differences between groups at baseline. Whenever data from the 3 districts were combined, the analyses were also adjusted by district. Analyses were done with Stata 7.0 (Stata Corp., College Station, Texas). For all comparisons, a two-tailed *P* value less than 0.01 was considered to indicate statistical significance. A sensitivity analysis was done to determine the best and the worst scenarios for duration of temporary work disability, costs, and cost-efficacy of the

intervention. The limits chosen for the sensitivity analysis, above and below the estimated values, were 40% for efficacy and 30% for direct costs.

Role of the Funding Source

The funding source had no role in the design, conduct, or reporting of the study or in the decision to submit the manuscript for publication.

RESULTS

A total of 13 077 patients were included in the study, representing 3% of the working population. These patients generated 16 297 episodes of MSD-related temporary work disability during the 2 years of the study. On average, patients were randomly assigned to a study group 3 days after starting their first episode of temporary work disability. Of the 5272 patients assigned to receive the intervention, 3311 (62.8%) participated in the program. The main reason for nonparticipation was that the patient was already back at work (**Figure 1**). The median time to program visit from the issue of the temporary work disability initiation form was 5 days (25th, 75th percentiles: 2, 7 days; range, 1 to 477 days). Mean follow-up was similar in the two groups (555 days [SD, 109] in the control group and 554 days [SD, 109] in the intervention group; $P > 0.2$).

Patients

Most patients were middle-aged men or women and were not self-employed (**Table 1**). The most common causes of MSD-related temporary work disability were back pain, tendonitis, and sciatica. Approximately 9.6% of patients had forms of arthropathies, including inflammatory diseases, peripheral osteoarthritis, and knee pain. The control and intervention groups were similar with regard to sociodemographic characteristics in the 3 districts, with 2 exceptions: Districts 4 and 7 showed an unbalanced distribution in low-prevalence causes, and patients in the intervention group in district 7 were 1 year younger than the controls, on average. We accounted for these differences in the regression analyses.

Short- and Long-Term Efficacy

One fourth of the patients had more than 1 episode of MSD-related temporary work disability during follow-up, with no differences between groups in the number of episodes per patient (**Table 2**). Episodes of temporary work disability were significantly shorter in the intervention group than in the control group in all districts (**Table 2**). The mean duration of temporary work disability per patient in the intervention group was similar in all districts, but the average episode of temporary work disability in the district 7 control group was significantly longer than that in the other districts. The estimated relative efficacy of the program was 39% after

Figure 2. **Survival curves showing the rate to return to work during a 1-year period, by study group, in each district and combined.**

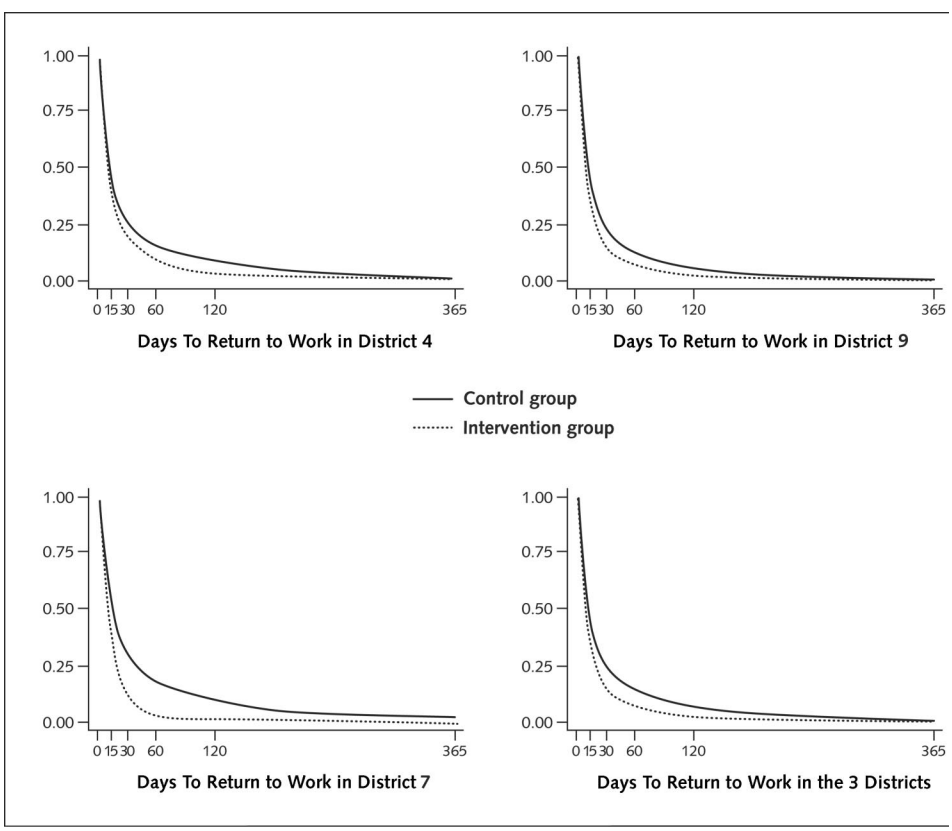


Table 3. **Long-Term Efficacy of the Program: Permanent Work Disability 4 Years after Completion of the Study***

Variable	Health District 4			Health District 7			Health District 9			All Districts Combined		
	Control Group (n = 3045)	Intervention Group (n = 1845)	*P* Value	Control Group (n = 1557)	Intervention Group (n = 1474)	*P* Value	Control Group (n = 3203)	Intervention Group (n = 1953)	*P* Value	Control Group (n = 7805)	Intervention Group (n = 5272)	*P* Value
Patients proposed for PWD, *n (%)*	70 (2.3)	20 (1.1)	<0.005	39 (2.5)	20 (1.4)	<0.05	61 (2.0)	19 (1.0)	<0.05	170 (2.2)	59 (1.1)	<0.005
Results of all proposals, *n (%)*												
Proposal rejected	26 (37)	9 (45)		18 (46)	6 (30)	<0.05	21 (35)	6 (32)	<0.05	65 (38)	21 (36)	<0.005
Patients with absolute PWD accepted†	5 (7)	0		4 (10)	3 (15)		6 (10)	2 (11)		15 (9)	5 (8)	
Patients with total PWD accepted‡	30 (43)	9 (45)		15 (38)	10 (50)		25 (41)	6 (32)	<0.05	70 (41)	25 (42)	<0.005
Patients accepted for early retirement§	9 (13)	1 (5)		1 (3)	1 (5)		4 (6)	3 (16)		14 (8)	5 (8)	
Patients claiming or without accessible data	0	1 (5)		1 (3)	0		5 (8)	2 (11)	<0.05	6 (3)	3 (5)	
Patients receiving any kind of compensation, *n (%)*	44 (1.4)	11 (0.6)	<0.05	21 (1.3)	14 (0.9)		40 (1.3)	13 (0.7)		99 (1.3)	38 (0.7)	<0.005

* Data obtained from the Instituto Nacional de la Seguridad Social. PWD = permanent work disability.
† Absolute PWD is defined as the inability to have any kind of employment.
‡ Total PWD is defined as the inability to work in actual employment.
§ Early retirement is defined as retirement before age 65 years.

we adjusted for age, district, and cause of temporary work disability to account for differences at baseline. The total number of working days saved by the program was 104 808.

The survival curves differed markedly between the intervention and control groups, and all *P* values were less than 0.001 (**Figure 2**). Most patients returned to work within the first 2 months. Patients returning to work after 6 months were unusual, and many of them were off work for the complete 18-month period allowed by the administration, a pattern that is similar to experiences in other settings (27). The effect of the program is shown in the sharpening of the curve in the first 2 months. The difference between groups in the area under the curve illustrates the efficacy of the program.

The program also had a positive effect on permanent work disability: Fewer patients in the intervention group than in the control group entered the permanent work disability evaluation process and received any form of long-term disability compensation or early retirement (**Table 3**). Compared with a patient in the intervention group, a patient in the control group had twice the probability of receiving permanent compensation payments 4 years after the trial ended ($P < 0.01$).

Economic Evaluation

Direct and indirect costs were significantly lower in the intervention group, with savings ranging from 58% to 88% depending on the type of cost and the district (**Table 4**). Individual categories of costs differed slightly between districts, illustrating variations in accessibility to tests and specialized care.

To save 1 day of temporary work disability, a maximum of $8 had to be invested in the program. In terms of cost-benefit, every dollar invested in the program produced savings between $8 and $20 at the end of the second year. The net benefit of the program was in excess of $5 million, without including the economic effect on permanent work disability.

The sensitivity analysis (**Table 5**) showed, in the worst scenario, a cost-efficacy of $13 invested to save 1 day of MSD-related temporary work disability, a cost-benefit of $4 returned per $1 invested, and a net benefit of $1.5 million. In the best scenario, it showed a cost-efficacy of $5 invested to save 1 day of MSD-related temporary work disability; a cost-benefit of $15 returned per $1 invested; and a net benefit of $7.8 million.

Patient Satisfaction with and Perception of Care

A total of 495 questionnaires were answered and returned (49.5%). The results (**Table 6**) show that patients in the intervention group had significantly higher satisfaction than patients in the control group. When analyzed, the answers "very poor," "poor," "fair," and "good" were always statistically favorable to the intervention group.

DISCUSSION

Our results show that among patients with recent-onset MSD-related work disability, those receiving a specific and specialized care program were able to return to work earlier and progressed less often to permanent work disability than those following the current care system, which involves primary care and referral to specialized care. Moreover, the outcomes of the program were obtained

with decreased health care utilization, increased patient satisfaction, and a positive cost-benefit ratio.

Patients in the study represented well the general population of workers with MSD-related work disability: The typical patient was a middle-aged man or woman, employed by others, with back pain or soft-tissue rheumatism (28). The differences between districts with regard to age, sex distribution, and baseline length of episodes of MSD-related work disability reflected both different sociodemographic characteristics and variations in health care delivery or Inspection Services. In fact, and in order to test our program under different conditions, we intentionally selected heterogeneous districts.

The intervention showed a good response in patients with the most common causes of MSD-related work disability, with an efficacy at least as great as that of the more successful previous interventions for specific MSDs or specific industrial settings (7, 15, 17, 27, 29–33). The intervention yielded similar results in all districts, with the differences in efficacy and costs due primarily to differences in the baseline time to return to work of the control groups. This consistency and reproducibility have been confirmed in 4 additional districts in which the program has been run since 2000 (data not shown).

The program had beneficial effects not only on individual episodes but also on the transition from short- to long-term work disability: Less than half of the intervention group entered the permanent disability evaluation process or received any kind of long-term compensation. The decrease in long-term work disability is very relevant because workers who reach that point rarely recover and become unable to attain full employment or future economic independence (34–36). This reduction in permanent work disability overshadows the other health benefits of our program, given its cumulative effect over time and given that MSDs account for more than 30% of cases of permanent work disability in most developed countries (11).

The improved health results achieved in the intervention group were accompanied by a decrease in use of the health system, thereby reducing health costs substantially.

Table 4. **Economic Evaluation of the Program***

Variable	Health District 4			Health District 7			Health District 9		
	Control Group	Intervention Group	Economic Results	Control Group	Intervention Group	Economic Results	Control Group	Intervention Group	Economic Results
Mean cost per patient, $									
Primary care physician	33	11		68	15		55	20	
Rheumatologist time	NA	30		NA	26		NA	22	
Specialist time	13	9		24	14		3	2	
Diagnostic tests	7	8		16	14		38	17	
Pharmaceuticals	96	61		158	66		65	66	
Medical admissions	82	74		82	67		44	37	
Surgical admissions	173	128		221	101		40	24	
Rehabilitation	184	62		228	33		81	27	
Direct	587	384		797	336		326	216	
Indirect	2767	1908		3276	1450		2191	1584	
Total	3354	2292		4073	1786		2517	1800	
Costs in all patients, $									
Direct	1 788 726	707 980		1 241 544	494 661		1 044 849	421 229	
Indirect	8 424 994	3 520 224		5 100 680	2 137 699		7 017 244	3 093 521	
Total	10 213 720	4 228 204		6 342 224	2 632 360		8 062 093	3 514 750	
Savings per patient in the intervention group compared with the control group, $ (%)									
Direct costs			204 (35)			462 (58)			111 (34)
Indirect costs			859 (31)			1826 (56)			607 (28)
Savings in all patients, $									
Direct costs			375 830			680 700			215 858
Indirect costs			1 584 575			2 691 076			1 185 180
Total saved, $			1 960 405			3 371 775			1 401 038
Intervention costs, $			189 314			189 314			189 314
Cost-efficacy (amount needed to save 1 day of TWD), $			6			4			8
Cost–benefit (amount saved per amount invested), $			11			20			8
Net benefit (total amount saved − total amount invested), $			1 771 091			3 182 462			1 211 724

* All monetary amounts are given in 2003 U.S. dollars. For a detailed explanation of costs and their sources and measures of economic evaluation, see text. NA = not applicable; TWD = temporary work disability.

Table 5. **Sensitivity Analysis of the Efficiency of the Program***

Variable	Worst-Case Scenario			Actual			Best-Case Scenario		
	Control Group	Intervention Group	Efficacy	Control Group	Intervention Group	Efficacy	Control Group	Intervention Group	Efficacy
Patients, *n*	7805	5272		7805	5272		7805	5272	
Direct costs per patient, $	369	400		527	308		685	215	
Indirect costs per patient, $	1899	1471		2109	1338		2320	1204	
Duration of temporary work disability, *d*	37	29		41	26		45	23	
Efficacy, %			22			37			48
Cost-efficacy, $			13			6			5
Cost–benefit, $			4			11			15
Net benefit, $			1 517 950			5 033 823			7 792 036

* Direct costs in the worst-case scenario were reduced 30% in the control group and increased 30% in the intervention group, in relation to actual. In the best-case scenario, direct costs were increased 30% in the control group and reduced 30% in the intervention group, in relation to actual. The efficacy, in terms of reduction of days of temporary work disability, was reduced and increased 40% in each group (in opposite directions, depending on the scenario). The economic evaluations in the best-case and worst-case scenarios were calculated directly from the figures obtained above.

In fact, the savings generated by reducing drug use and the use of physiotherapy more than financed the intervention. As a consequence of both lower direct costs and fewer days of work disability, the economic evaluation of the program showed positive and consistent results, with an investment return between 800% and 2000% at 2 years.

Data on the full economic evaluation of intervention programs in work disability are scarce, and methodologic approaches vary, making it difficult to compare previous results with our own (2, 37, 38). Moreover, the great differences between the European and U.S. health systems might suggest different costs for implementation of the program and, as a consequence, different economic results. However, although coverage systems may differ, the advantage of an early return of workers to their jobs transcends compensation systems, legal formulations, or national boundaries.

We believe that the following factors contributed to the efficacy of our program. First and foremost, in our opinion, is that we have considered work disability to be a relevant health problem (10, 39–41) requiring a specific clinical intervention. That workers on sick leave are not as healthy as those who remain active might seem obvious (42, 43), but this idea is often overshadowed by concurrent administrative or occupational factors (44). Moreover, lack of a clear definition of the health system's role in the work disability process facilitates both the "invisibility" of the problem in routine clinical practice and the provision of inadequate or delayed responses. This is suggested by the fact that the intense use of specialized care resources, including standard rheumatologic care, did not result in early recovery from work disability in the control group (45).

Second, the program consisted of a simple but profound reengineering of the health care process. This allowed the integration, early in the process, of protocol-based clinical management, education, promotion of self care, and administration into a "1-step" scheme, avoiding the inherent inefficiencies of multiple care providers interacting at different levels.

Our study design does not permit quantification of the

Table 6. **Patient Satisfaction with and Perception of Care***

Variable	Health District 4			Health District 9		
	Control Group (*n* = 116), %	Intervention Group (*n* = 153), %	*P* Value	Control Group (*n* = 94), %	Intervention Group (*n* = 132), %	*P* Value
Patients whose satisfaction with the following categories of care was "excellent"						
Information given	5	28	<0.001	9	14	<0.001
Treatment of health problem	8	21	<0.001	4	13	<0.001
Overall results of treatment	10	15	0.003	8	14	0.001
Patients who answered "yes" to the following questions related to perception of care						
Was a detailed history of the cause of TWD taken?	39	71	<0.001	37	56	0.004
Was a careful examination of the cause of TWD performed?	35	66	<0.001	35	57	0.001
Was the cause of the problem clearly explained?	46	72	<0.001	38	62	<0.001

* TWD = temporary work disability.

percentage of efficacy that could be accounted for by the 1-step nature of the program compared with the clinical expertise of the rheumatologists (8, 46–50). In our opinion, the program could be adapted for use by either primary care physicians or specialists working in various health care settings. However, careful planning and monitoring are warranted to ascertain the benefit of modifications of the program compared with standard care.

Third, the intervention was well accepted both by the professionals of our National Health Service and the patients. The former supported full implementation of the program; 97.5% of more than 1000 primary care physicians allowed their patients to participate in the intervention group. Of the patients in the intervention group, less than 15% of those who were on sick leave when contacted declined to participate in the program. The intervention group also had better satisfaction with, and a better perception of, care than the control group, although it should be noted that this result was shown by a survey with a 50% response rate.

Our results show that recent-onset MSD-related temporary work disability is a strategic target in the complex process that leads from the worker with self-limited symptoms to the noncoping patient with long-term disability. The strong positive effect of our intervention in the disability process supports the rationale for including work disability among health system priorities. Moreover, our study shows that it is possible to develop disability-oriented programs in a highly cost-effective manner.

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