Work 26 (2006) 107-114
IOS Press

A controlled case study of supervisor training to optimize response to injury in the food processing industry

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Received 22 August 2004

Accepted 29 September 2004

Abstract. The role of supervisors to aid injured workers, access health care, and provide reasonable accommodation may prevent prolonged disability among workers reporting musculoskeletal pain. Although supervisor training has been a common element of broad-based ergonomic interventions to prevent injuries, the impact of supervisor training alone to improve injury response has not been studied. In a controlled design, 11 supervisors in an intervention group and 12 supervisors in a delayed intervention control group from the same plant were provided a 4-hour training workshop. The workshop emphasized communication skills and ergonomic accommodation for workers reporting injuries or health concerns. Workers' compensation claims data in the 7 months before and after the workshop showed a 47% reduction in new claims and an 18% reduction in active lost-time claims versus 27% and 7%, respectively, in the control group. Improving the response of frontline supervisors to employees' work-related health and safety concerns may produce sustainable reductions in injury claims and disability costs.

Keywords: Supervisor training, work injuries, disability management

1. Introduction

Work and organizational factors have been shown to influence the frequency and disability duration associated with common workplace injuries [20], and this has led to growing interest among employers to improve disability management practices [1,8,16,21]. Although modified duty programs and proactive return to work policies have been shown to reduce disability costs [11, 12,23], methods for obtaining supervisor support and participation in these activities have not been studied. Although workers expect their supervisors will play a major role in maintaining communication and providing needed accommodations in the event of injury [24], many workers experience indifference or hostility from supervisors after they report musculoskeletal pain and discomfort [26]. The objective of this controlled study was to assess the effectiveness of a supervisor training workshop to improve the responses of supervisors to workers' health and safety concerns and to reduce workforce disability in the food processing industry.

The importance of supervisor response to injury has been supported by a number of studies. Low support

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from one's supervisor has been shown as a risk factor for developing low back pain, especially when paired with relatively high levels of support from a closest colleague [4]. Supervisor and co-worker support has been shown to reduce disability among workers with chronic pain [17] and mental health disorders [9]. Supervisors are involved in return-to-work processes by modifying work, facilitating access to corporate and medical resources, monitoring the worker's health and function, and communicating a positive message of concern and support [8,24]. Workers with disabling conditions list responsiveness of their supervisors as a major determinant in their decision to return to work [2].

Low back sprains and other soft-tissue injuries, which account for half of all lost-time work injuries [3, 15], may be particularly challenging for supervisors. These disorders can have chronic or recurrent symptoms, variable treatment and course of recovery, and persistent functional limitation [20]. There is evidence that supervisors may view workers with musculoskeletal problems in a negative way because of reduced productivity or the need for special attention and support [14,26]. This may inadvertently lead to alienating workers during a time when they anticipate an outpouring of employer support. Negative employer response and lack of employer contact while on disability leave have been cited by several authors as correlates of prolonged disability [1,25].

Improving supervisory practices to respond optimally to work injuries may require specialized training. Merely involving supervisors in employee safety training programs has not been successful to decrease musculoskeletal disability [19]. Training specifically designed to improve supervisors' communication and accommodation efforts may be more effective. Although such supervisor training has been included as a component of several large-scale employer-based injury prevention efforts [5,6,18], the success of supervisor training alone to prevent disability has not been studied. For musculoskeletal conditions, organizational approaches to disability prevention may help to overcome the inadequacies of a strictly biomedical, curative approach [7].

This article reports the results of a controlled study of supervisor training workshops designed to optimize supervisors' responses to workers' health and safety concerns with a focus on preventing musculoskeletal disorders and associated disability. The experimental workshops were developed by the authors [18,22] and provided to departments of a food processing plant in two waves staggered by seven months. Our principal hypotheses related to whether such training would result in changes to injury claim rates and workers' compensation indemnity costs for lost work time.

2. Method

2.1. Participants

Participants were 23 supervisors (22 male, 1 female) representing the primary production departments of a food processing plant in the northeastern United States. Departments were selected for inclusion by on-site safety and health managers if the department included at least 10 line employees, if the work of the department involved significant ergonomic challenges, and if at least one workers' compensation claim for a musculoskeletal injury had been filed in the previous year. This resulted in the inclusion of 28 departments representing nearly all tasks involved in meat cutting, preparation, and packaging. All supervisors from these departments were invited to participate. Ages of supervisors ranged from 24 to 53 *(M* = 40.6, *SD* = 7.7). Supervisors' tenure with the employer ranged from 3 months to 34 years *(M* = 18.2, *SD* = 8.6). All but two supervisors had worked as production line employees at the same company before being promoted to supervisory positions.

2.2. Procedure

All supervisors and managers in the plant were first asked to complete an anonymous survey of managerial practices relating to workplace safety and disability. This information, in addition to a series of interviews with workers and supervisors [24] and other needs assessment strategies provided a basis for design of the workshops. Content of the workshop program is described below. Departments selected for the study were randomly divided into two groups. This provided two groups of supervisors *(n* = 11, *n* = 12) responsible for a workforce of approximately 400 employees in each group. One group of supervisors was randomly chosen to participate in the first workshop program, while the other served as a (7-month delayed intervention) cross-over control group. There were no statistically significant differences between the two groups on age or job tenure (two-tailed t-test, $p > 0.05$).

Supervisors in the first group were sent notices from their senior managers inviting them to participate in the workshop program and providing a brief rationale and business relevance. The stated goal of the training workshops was to help optimize the response of supervisors to work injuries and employees' reports of pain and discomfort. All invited supervisors in the first group attended workshop sessions scheduled in the fol-

Table 1 Training agenda for supervisor workshops to optimize injury response

Section	Time allocated	Description of training experience
Training session I:		
1	10 minutes	Introductory remarks from management and workshop facilitators
2	10 minutes	Pre-seminar survey of disability attitudes and knowledge
3	10 minutes	Icebreaker activity: Brainstorm factors affecting disability
4	1 0 minutes	Rationale for improved supervisor response to injury
5	20 minutes	Responding effectively to health and safety concerns of workers
6	30 minutes	Understanding musculoskeletal pain and discomfort
7	30 minutes	Problem solving to provide ergonomic work modifications
Total	120 minutes	
Training session II (several days later):		
8	1 0 minutes	Review of Session I material, question/answer
9	20 minutes	Maintaining communication after injury
10	20 minutes	Reintegration and return to work
1 1	50 minutes	Case simulations and group presentations
12	10 minutes	Question/answer period
13	10 minutes	Post -seminar survey of disability attitudes and knowledge
Total	120 minutes	

lowing weeks. Seven months later, supervisors in the second (control) group were similarly invited and attended training workshop sessions. The seven-month lag was set to provide a reasonable, short-term evaluation of program effectiveness while avoiding periods of peak plant production.

2.3. Training workshops

Training workshops were held in two 2-hour sessions separated by 4 to 7 days. Workshops were led and facilitated by two of the authors (WSS, MMR). The company's safety manager and loss prevention consultant were also present to address any questions that might arise regarding specific corporate policies and initiatives. Multiple workshop sessions were available to provide optimal group sizes for discussion (no more than 8 supervisors per workshop). A schedule and agenda for the workshops by topic area are shown in Table 1.

Although much of the workshop was guided by a facilitator and slide presentation, the workshop followed an adult education format whereby supervisors participated by interjecting examples, tying workshop principles to their specific organizational needs and practices, and suggesting possible solutions. Videotapes demonstrating positive and negative models for supervisor behavior were used, and laminated hand-outs highlighted recommendations for work modifications and outlined communication strategies. The overarching message of the facilitators was that supportive, proactive, and collaborative communications with employees about ergonomic risk factors and musculoskeletal pain and discomfort would likely reduce disability costs and improve employee morale, productivity, and retention. Primary elements of the training workshops are described below:

Background and rationale: After a group exercise of brainstorming potential factors affecting the ability to manage workplace disability, participants were provided national statistics illustrating the high cost of work injuries, especially for work-related musculoskeletal conditions. Also, research supporting the key role of supervisors to prevent disability was presented.

Communicating with workers about pain and injury: Using videotaped examples of supervisor/employee interactions, presenters stressed the importance of encouraging early reporting and facilitating health care access, and ways to improve interactions with employees about health and safety concerns. This included scheduling a private and confidential meeting, using active listening skills, expressing support and willingness to help, and including a specific plan for follow-up. Participants provided examples, discussed potential barriers (e.g., time constraints, performance issues, production demands), and generated possible solutions.

Understanding the nature of musculoskeletal pain and discomfort: Facilitators presented information about the variable course of recovery from musculoskeletal conditions, the lack of accurate tools for precise medical diagnosis in many cases, the broad range of treatment and provider types, and the frustration of those suffering from persistent or recurring pain. Participants provided examples to illustrate treatment and outcome variations among their employees and dis-

cussed ways to facilitate appropriate medical care for musculoskeletal symptoms.

Problem solving using ergonomic principles: Facilitators presented a 6-step problem solving process for choosing and planning accommodations with injured workers and the ergonomic principles that might guide this process. Stages of the problem solving process were: (1) identifying the problem; (2) analyzing the problem; (3) generating potential solutions; (4) selecting and planning the solution; (5) implementing the solution; and (6) evaluating the solution. Ergonomic principles included anthropometric differences, common workplace risk factors in the food processing industry, and recommended work modifications for both upper extremity and low back discomfort. Both formal accommodations (physician restrictions) and informal accommodations (other supervisor efforts to temporarily ease physical demands) were included.

Maintaining communication: Using videotaped examples of supervisor/employee interactions, presenters stressed the importance of maintaining supportive contact with employees who cannot resume their normal work after an injury. Group discussion was directed toward the timing, mode, and content of specific interactions that might improve employee morale and accommodation efforts. Facilitators provided some specific recommendations, for example, referring all medicolegal issues to others, providing a supportive message ("we want you back") and focusing on functional ability rather than medical etiology and diagnosis.

Workforce re-integration: Using videotaped examples of supervisor/employee interactions, presenters stressed the importance of holding an initial return-to-work meeting of supervisor, employee, and on-site health nurse to clarify job restrictions and modifications, address worker concerns, and make plans for regular follow-up.

Case simulations: Participants were divided into small groups (2 to 4 per group) to review the circumstances of a simulated case and provide suggestions for preventing workplace disability in each case. Small groups designated a spokesperson who then presented the case description and results of the small group discussion to the larger group. Sample cases included: (a) a worker with a poor performance record who experiences a shoulder injury after being denied a job transfer; and (b) a worker who is reluctant to report back pain to her supervisor because she fears this will affect her future with the company.

2.4. Outcome measures

Outcomes for Group I (treatment group) and Group II (delayed-treatment control group) were compiled from workers' compensation claims data maintained by the company's insurance carrier. Summary variables included number of workers' compensation claims (both new and existing), injury types, and total indemnity costs. Indemnity costs included both temporary total disability (TTD) and temporary partial disability (TPD) payments. TTD payments are provided when a worker is unable to work in any capacity, and TPD payments provide supplemental income for workers who are able to work, but at a reduced capacity (fewer hours than normal or in a temporary position with less pay). Outcome measures were aggregated for three time periods: (1) seven months prior to the Group I training, (2) seven months between the Group I and II trainings, and (3) seven months following the Group II training. This provided concurrent 21 -month claims histories for both groups.

2.5. Statistical method

Hypotheses were tested using nonparametric statistical tests, either a 2 x 2 Chi-square (for testing group differences between injury claim rates) or a median test (for testing group differences in indemnity costs). A conservative alpha significance criterion of p — 0.01 was chosen for the comparisons of claim frequencies to account for the multiple comparisons by group and time. A significance criteria of 0.05 was applied for all other statistical analyses.

3. Results

Gender was the only employee demographic variable available from claims data for comparing groups. These analyses reflected a greater number of injured female employees in Group I than in Group II (30% versus 7%, respectively in Period 1; 22% versus 10% in Period 2; 26% versus 9% in Period 3), and this reflected differences in the underlying worker populations. Group II was comprised of more second-shift departments that had a smaller proportion of female employees.

Between Time Periods 1 and 2, reductions in injury claim rates were statistically significant for the treatment group receiving the supervisor training but not for the control group. Results for new and existing

Table 2 Claims and indemnity costs for lost-time work injuries for treatment and control groups after a supervisor workshop intervention.

	Time Period 1: Months 1-7 (pre-intervention)				Time Period 2: Months 8-14 (post-intervention Group I)				Time Period 3: Months 15-21 (post-intervention Group II)			
	Claims	Lost time claims	%	Indemnity cost ($)	Claims	Lost time claims	%	Indemnity cost ($)	Claims	Lost time claim	%	Indemnity cost (S)
Group 1 (treatment group):												
New claims	120	8	6.7	21,317	64	5	7.8	16,086	69	3	4.4	3,782
Recent claims (< 1 year)	23	11	47.8	53,510	20	4	20.0	42,666	24	4	16.7	29,658
Older claims (> 1 year)	23	12	52.2	89,337	24	14	58.3	99,985	23	12	52.2	83,123
Total active claims	166	31	18.7	164,164	108	23	21.3	158,737	116	19	16.4	116,563
Group 2 (delayed treatment control group):												
New claims	96	7	7.3	14,650	70	7	10.0	16,303	57	4	7.0	10,481
Recent claims « I year)	18	7	38.9	28,804	19	2	10.5	5,819	26	5	19.2	7,049
Older claims (> 1 year)	17	8	47.1	64,402	20	7	35.0	42,118	16	4	25.0	15,864
Total active claims	131	22	16.8	107,856	109	16	14.7	64,240	99	13	13.1	33,394

Notes: Indemnity cost = paid time for temporary partial and temporary total disability; new claims = claims initiated in 7-month period shown; recent claims = active claims filed in prior 12 months; older claims = active claims older than 12 months.

claim frequencies are shown in Table 2. The number of active existing claims remained fairly constant across all three time periods in both groups. Group I experienced a reduction (47%) in new claims between Periods 1 and 2, coincident with program implementation, and this improvement was statistically significant, $X^2 = 22.13$, $p < 0.01$ for $df = I$. New claims for Group I remained low in period 3 (no statistically significant change, $X^2 = 0.23$, $p > 0.01$ for $df = 1$). There was a parallel improvement in total active claims for Group I between Periods 1 and 2 ($X^2 = 18.67$, $p < 0.01$ for $df = 1$) and no change between Periods 2 and 3 ($X^2 = 0.40$, $p > 0.01$ for $df = 1$).

In the absence of supervisor training, Group II showed a 27 percent improvement in the number of claims between Time Periods 1 and 2, but this level of improvement did not reach statistical significance, $X^2 = 5.14$, $p > 0.01$ for $df = 1$. Therefore, the control group failed to show the level of improvement observed in the experimental group during the same time period. In a test of the cross-over effects of supervisor training, Group II showed additional improvement between Periods 2 and 3 (a 19% reduction in new claims), but this improvement failed to meet our statistical significance criteria, $X^2 = 1.58$, $p > 0.01$ for $df = 1$. Therefore, the supervisor training failed to provide the same level of benefit when crossed over to the delayed treatment control group.

A second hypothesis of the study was whether the supervisor training would reduce workers' compensation indemnity costs paid for lost work days. Lost-time claims were defined by indemnity payment charges to cover lost work days, a benefit provided after an initial 7-day waiting period. Lost-time claims comprised seventeen percent of all claims initiated during this period. Among new claims only, lost-time indemnity charges were less frequent (7%). The frequency of new lost-time claims during the study period did not differ significantly by group or time period, chi-square tests, $p > 0.01$ (see Table 2).

Total indemnity costs by Group and Time are shown in Table 2. Group I experienced a reduction in indemnity costs (25%) among new claims between Periods 1 and 2. This was followed by a much larger decrease (76%) in Period 3. Based on the total number of employees in these departments, the annual indemnity payments per employee covered dropped from $53 to $9. As hypothesized, Group II showed no improvement between Periods 1 and 2 (an 11 % increase in costs) and substantial improvement between Periods 2 and 3 (a 36% reduction in indemnity costs) after the workshops were implemented. Although a median test was planned to compare average indemnity costs, the small numbers of lost time claims (3-8) prevented such statistical comparisons.

Injury types are listed in Table 3. Over half of injuries were work-related soft-tissue disorders including sprains, strains, inflammations, carpal tunnel syndrome, and other cumulative trauma. Other common work injuries were contusion, laceration, fracture, and crushing. A chi-square contingency test of percentage soft-tissue injuries reflected no statistically significant differences between Groups I and II in Period 1 ($X^2 = 0.14$, $p > 0.05$) or between the groups in Period 2 ($X^2 = 0.04$, $p > 0.05$). There were also no statisti-

Table 3 Types of injuries for treatment and control groups after a supervisor training workshop intervention

Injury type	Group 1 (treatment group)			Group 2 (delayed treatment control group)		
	Months 1-7 (pre-intervention)	Months 8-14 (post-intervention)	Months 15-21 (post-intervention)	Months 1-7 (pre-intervention)	Months 8-14 (pre-intervention)	Months 15-21 (post-intervention)
Strain	83 (50.0%)	55 (50.9%)	55 (47.4%)	65 (49.6%)	69 (63.3%)	56 (56.6%)
Contusion	16(9.6%)	12(11.1%)	9 (7.8%)	24(18.3%)	9 (8.3%)	9(9.1%)
Laceration	16 (9.6%)	6 (5.6%)	5 (4.3%)	12(9.2%)	1 (0.9%)	2 (2.0%)
Puncture	12 (7.2%)	0 (0.0%)	0 (0.0%)	3 (2.3%)	2(1.8%)	1 (1.0%)
Inflammation	9 (5.4%)	14(13.0%)	14(12.1%)	6 (4.6%)	5 (4.6%)	8(8.1%)
Burn	6 (3.6%)	1 (0.9%)	1 (0.9%)	1 (0.8%)	1 (0.9%)	0 (0.0%)
Sprain	6 (3.6%)	3 (2.8%)	5 (4.3%)	1 (0.8%)	2(1.8%)	5(5.1%)
Hernia	4 (2.4%)	1 (0.9%)	1 (0.9%)	4(3.1%)	0 (0.0%)	1 (1.0%)
Respiratory disorders	3(1.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2(1.8%)	0 (0.0%)
Carpal tunnel syndrome	3(1.8%)	3 (2.8%)	3 (2.6%)	1 (0.8%)	0 (0.0%)	1 (1.0%)
Crushing	2(1.2%)	4 (3.7%)	3 (2.6%)	0 (0.0%)	1 (0.9%)	3 (3.0%)
Fracture	2(1.2%)	1 (0.9%)	2(1.7%)	2(1.5%)	9 (8.3%)	5(5.1%)
All other	2(1.2%)	4 (3.7%)	5 (4.3%)	6 (4.6%)	4 (3.7%)	1 (1.0%)
Amputation	1 (0.6%)	0 (0.0%)	0 (0.0%)	1 (0.8%)	1 (0.9%)	1 (1.0%)
Infection	1 (0.6%)	0 (0.0%)	2(1.7%)	0 (0.0%)	1 (0.9%)	0 (0.0%)
Other cumulative injury	0 (0.0%)	0 (0.0%)	3 (2.6%)	3 (2.3%)	2(1.8%)	5(5.1%)
Foreign body	0 (0.0%)	4 (3.7%)	8 (6.9%)	2(1.5%)	0 (0.0%)	0 (0.0%)
Concussion	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.0%)
Total	166(100.0%)	108(100.0%)	116(100.0%)	131 (100.0%)	109(100.0%)	99(100.0%)

cally significant changes in the mix of injuries as a result of training workshops (Group I: $X^2 = 1.75$, $p > 0.05$; Group II: $X^2 = 0.28$, $p > 0.05$).

4. Discussion

This controlled case study has shown evidence of a substantial reduction in injury claim frequency and disability after implementing a training workshop to improve responses to health and safety concerns of workers for supervisors in the food processing industry. Although more research is needed to examine relationships between specific supervisory approaches and workers' experiences after injury, this study suggests that improved communication between supervisors and workers about work-related health concerns may be an effective secondary prevention strategy for employers in industries with high physical work demands. Potential mediating explanations for program effectiveness are that the program: (1) prevented the escalation of musculoskeletal symptoms to disabling levels, (2) increased general awareness of potential workplace hazards and risk factors, or (3) led to better accommodation for those with lost work time.

The intervention group showed a marked reduction (47%) in the number of new workers' compensation claims filed after the supervisor training workshops. Supervisors' increased willingness to address reports of minor discomfort may have prevented symptoms to escalate to disabling levels requiring medical treatment. Also, employees may have viewed their supervisors as more flexible and helpful to overcome minor discomfort, thus reducing the perceived need of validation by filing a workers' compensation claim. A third possibility is that the ergonomic component of the training led to increased efforts among supervisors to address ergonomic risk factors, thus reducing the frequency of musculoskeletal problems. However, decreases in injuries were evident for both soft-tissue and other injury categories; thus, benefits of the training appeared to have a more global effect on health and safety.

After the training program, supervisors may have publicized concerns about health and safety in their departments, thus creating increased attention to safety risk factors. As early reporting and prompt medical treatment were themes of the workshop program, it's unlikely that supervisors would have discouraged the filing of workers' compensation claims to reduce claim count in their departments. Future studies should include a more direct assessment of employees to elucidate mediating factors for reduced disability costs. The data suggest that improved collaborative problem solving efforts may have circumvented the perceived need for filing a workers' compensation claim and improved accommodation efforts to reduce lost time.

In contrast with new claims, the number of active existing claims remained fairly constant across all three time periods in both groups. This suggests that for more established claims (presumably more serious in-

juries involving longer disability duration), supervisor training and communication may have less impact on disability costs. Another possible interpretation is that supervisors have only a narrow window of opportunity for establishing a supportive role after injury - the role cannot be initiated several months later.

Indemnity costs for new claims, but not older claims, showed improvement in Group I far exceeding that of the control group. This suggests that improved supervisor communication had a greater influence on return to work early in the injury and workplace reintegration process. Early involvement of supervisors in disability management efforts can be reinforced by informing supervisors of clinical treatment plans and progress, encouraging supervisors to maintain supportive communication with employees in the first days after injury, and expanding the role of supervisors to plan and implement workplace accommodations. Supervisors' ability to prevent disability may dissipate with long-lasting claims that become medically complex, that involve legal representation, or that lead to worker disengagement and frustration.

Benefits of the supervisor training workshop were similar in magnitude to those reported for more extensive workplace intervention efforts. The Chelsea Back Program, introduced at a manufacturing plant in 1980, resulted in a 50 percent reduction in lost-time back injuries [5,6]. Components of the Chelsea Back Program were customized worker education, an in-house conservative treatment program (8-10 days), and management sensitivity training to improve attitudes about back pain. Another study [27] reported a 60 percent reduction in lost-time back injuries after an employee education in proper lifting techniques and administrative changes were instituted. Administrative changes in that study included immediate contact with injured workers, 10-day follow-up calls, monitoring of long-term claims, supervisor contact before return to work, and improved documentation. Overall, workplace-based efforts to prevent disability after injuries have been more successful than clinic-based efforts, which sometimes show no measurable effect [10,13].

One limitation of the study was potential for cross-contamination of intervention effects, as supervisors and employees from both groups worked in the same production facility. Other limitations of the study are short-term follow-up (14 months), small sample size, the possible confounding effect of gender and organizational changes within the host company, and the limited generalizability of these results to other industries and employers. Another limitation was inherent in TPD payments, which do not encompass all cases of work modification and restriction, only those requiring salary adjustments.

Although research of disability duration and return to work after occupational injuries has demonstrated the importance of workplace physical and psychosocial factors, there is a dearth of controlled studies employing workplace strategies for disability prevention. This study has shown preliminary support for supervisor training as one strategy for the secondary prevention of disability associated with work-related health concerns. More research is needed to understand the processes by which workers and supervisors routinely deal with health and safety concerns to prevent disability.

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