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Promoting Early, Safe Return to Work in Injured Employees: A Randomized Trial of a Supervisor Training Intervention in a Healthcare Setting

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Abstract *Purpose* Supervisors in the healthcare sector have the potential to contribute to disability prevention in injured employees. Published data on the evaluation of return to work (RTW) interventions aimed at direct supervisors are scarce. We sought to determine the effect of a brief audiovisual supervisor training module on supervisor RTW attitudes and knowledge. *Methods* A parallel-group study, using equal randomization, comparing the training module intervention to usual practice in healthcare supervisors at a quaternary care hospital was conducted. Differences between groups in changes in RTW attitude and knowledge survey question scores between baseline and 3 months were assessed using the Mann–Whitney U test. The Benjamini–Hochberg–Yekutieli procedure was used to control for false discovery rate and generate adjusted p values. *Results* Forty supervisors were allocated to the intervention group and 41 to the usual practice group. Attitude and knowledge scores for most questions improved between baseline and immediately after intervention administration. Comparing intervention (n = 33) and usual practice groups (n = 37), there was a trend toward greater increase between baseline and 3 months follow-up in agreement that the supervisor can manage the RTW process (U = 515, adjusted p value = 0.074) and in confidence that the supervisor can answer employees' questions (U = 514, adjusted p value = 0.074) in the intervention group, although these findings were not statistically significant. *Conclusions* The training intervention may have provided the initial tools for supervisors to navigate the RTW process in collaboration with others in the RTW community of practice. A larger study with longer follow-up is needed to confirm results.

Keywords Workers' compensation · Randomized controlled trial · Education · Health personnel · Occupational injuries

Introduction

Studies indicate that direct supervisors play a key role in helping facilitate early, safe return to work (RTW) in injured and ill employees [1, 2]. A longer duration of unnecessary missed work after a work injury can increase the risk of long-term work disability [3]. Of the factors that influence the risk of long-term disability, individual and medical factors may be more difficult to modify than workplace factors [4]. Supervisors often serve as a point of first contact for employees with work-related injuries or illnesses [1]. A supervisor can facilitate finding modified work and access to health resources, interpret workplace policies, monitor the worker's function, and express support. Several studies have demonstrated an association between low supervisor social support and missed work from work-related musculoskeletal disorders [2]. Responsiveness of the supervisor has been described as a major

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determinant in workers' decisions to RTW, and employees with longer work absences may perceive that their supervisors have little interest in RTW and are not supportive of light duty accommodations [5]. In a focus group study of supervisors, front-line supervisors acknowledged their contribution to helping to prevent unnecessary missed work in injured and ill employees, describing their role as "part of a greater whole influenced by social climate and workplace demands and resources" [6].

Supervisors in the healthcare sector have the potential to contribute substantially to disability prevention in injured healthcare workers. The US healthcare sector has considerably higher injury rates than US industries overall. In 2014, US hospitals had a higher recordable nonfatal private industry injury rate compared to private industry overall (4.5 compared to 3.2 cases per 100 full-time workers) [7]. Incidence rates of work-related injuries involving days away from work were also higher in hospitals and nursing/residential care facilities, compared to all industries (1.5 and 2.0 cases per 100 full-time workers, respectively, compared to 1.1). Clinical hospital workers such as nursing assistants are at particularly high risk for nonfatal work-related musculoskeletal disorders (WMSDs) involving days away from work [8].

Washington State hospital injury rates involving days away from work are even higher than rates for US hospitals. In Washington, employers (with several exceptions, including qualified self-insured employers, sole proprietors, those covered under other workers' compensation systems, and household employers with one employee) are required to obtain workers' compensation insurance through the Washington State Department of Labor and Industries (L&I) industrial insurance system, and the L&I State Fund covers approximately two-thirds of Washington workers [9]. In the Washington healthcare sector, WMSDs are responsible for over half of workers' compensation State Fund time-loss (lost work time due to work-related injury or illness after a 3 days waiting period) claims [10]. Between 1997 and 2005, the Washington healthcare sector had the second highest prevention index, a measure of the burden of work-related injuries and illnesses, for WMSDs of the back, neck, and upper extremity [10]. These WMSDs accounted for over two million time-loss days and over $340 million in Washington State Fund costs. Clinical healthcare workers, including registered and licensed practical nurses, were at particularly high risk for WMSDs.

Few published studies have examined the effectiveness of supervisor RTW training on early, safe RTW of injured employees, and none have focused specifically on healthcare supervisors. McLellan et al. [4] reported improvements in supervisor confidence to investigate and modify job factors contributing to injuries, get medical advice, and answer injured employees' questions after a 90 min live RTW training session. In a separate analysis of the same intervention, injured employees of supervisors who underwent training reported a significant decrease in supervisors blaming employees, not taking the condition seriously, and discouraging employees from filing a claim after the training [11]. Although promising, these results are limited by a lack of comparison group and the relative impracticality of the length and format of the training in certain work settings, such as busy hospitals.

To address the substantial burden of work-related injuries in the healthcare sector and the large potential contribution of direct healthcare supervisors to disability prevention, an electronic multimedia supervisor RTW training module was developed and evaluated in a quaternary care hospital in Washington State. The training was hypothesized to improve RTW attitudes and knowledge between baseline and 3 months after the module intervention compared to usual practice alone.

Methods

Training Module and Evaluation Survey Development

Module Content

To develop the content of the training module: (1) the existing scientific literature on risk factors for long-term work disability and interventions to prevent disability was reviewed; and (2) twenty in-person key informant interviews with stakeholders involved in the RTW process at the study site's institution, a state university with several large medical centers, were held. Stakeholders were identified through discussions with institutional workers' compensation claims specialists. Stakeholders included human resources representatives, workers' compensation claims specialists, senior medical center administrative officials, employee health nurses, members of the occupational health services quality improvement program (Center of Occupational Health and Education [COHE] [12–14], and medical center managers/supervisors, the target audience.

The goals of the stakeholder interviews were to define the current RTW process and to discuss the development of the module and module evaluation surveys. To address these goals, members of the research team asked questions covering a pre-specified list of topics when conducting the interviews. These topics included: (1) interviewee role in the RTW process; (2) the current RTW process; (3) barriers to and facilitators of early, safe, RTW; (4) areas for improvement in the RTW process; (5) preferred module and survey content; and (6) preferred module and survey

format. Interviewers recorded written notes during the interviews; interviews were not audio recorded.

Information from the literature review and consensus among stakeholders was combined to identify key topics for inclusion in the module. These topics were: (1) helping injured employees seek appropriate medical care; (2) filling out incident reports; (3) communicating with employees; (4) identifying modified and light duty; and (5) seeking RTW financial incentives. In Washington State, Stay at Work financial incentives are available from the Department of Labor and Industries to eligible State Fund employers to bring injured workers quickly and safely back to light duty/transitional work [15]. Incentives may include reimbursement for a portion of injured employees' base wages for light-duty or transitional work and for training fees, materials, tools, or clothing needed for light-duty or transitional work.

Module Format

Based on stakeholder feedback, a 15–20 min electronic multimedia (audiovisual) module was developed. A longer training was felt by stakeholders not to be practical for the target audience. Social Cognitive Theory (SCT) was used as a framework for the training module, as SCT has been successfully applied in organizational management settings [16] and training contexts [17]. Observational learning, a key SCT concept, was enhanced by including a supervisor avatar character that models best practices, such as appropriate communication with injured workers, in the module. The module also included other characters representing key players in the RTW process, such as the injured employee and human resources consultant. A professional graphic designer developed the module, which included relevant scenarios, using a photo illustration style. The training was produced in a video style using animated PowerPoint with English audio narration. This cost-effective and practical medium for the development of the module was selected with the aim of ultimately integrating the module into hospital learning management systems (LMSs). A common feature of many hospital LMSs is their ability to import certain common file types, including Microsoft PowerPoint and certain video files.

Survey

Baseline and follow-up survey questions were adapted from McLellan et al. [4] and revised with stakeholder input to address content validity. Baseline survey questions covered the following domains: RTW attitudes (six questions), RTW knowledge (two questions), and demographics (five questions). Respondents were asked to grade their responses to attitude questions on a 5- or 4-point scale representing degrees of agreement (e.g. 1 = "strongly disagree", 2 = "disagree", 3 = "neither disagree nor agree", 4 = " agree", 5 = "strongly agree") and confidence (e.g. 1 = "not very confident", 2 = "somewhat confident", 3 = "moderately confident", 4 = "very confident"), respectively. Attitude questions addressed attitudes about managing an injured employee's RTW process and confidence in answering injured employees' questions, identifying/arranging modified/light duty, guiding an injured employee to appropriate medical care, communicating with injured employees, and filling out incident reports. Knowledge questions were multiple choice (four choices, with one correct answer) and assessed knowledge about whom to contact at the institution to help arrange light/modified duty and to seek RTW financial incentives. At the study site, light/modified duty was arranged through Human Resources and RTW financial incentives through the Office of Risk Management. An immediate post-module survey and a 3-month post-module survey included the same attitude and knowledge questions as the baseline survey. The immediate post-module survey also asked for feedback on the module itself. Surveys were delivered confidentially using e-mail hyperlinks to Catalyst, a University of Washington online survey tool [18]. Survey completion dates, times, and duration data were captured by Catalyst.

Beta Testing

Five beta testers for the survey and module were identified in collaboration with senior hospital management at the study site. The beta testers were hospital supervisors or managers in clinical or non-clinical departments who had at least one employee reporting directly to them. Research staff met with the beta testers in person and presented the module and baseline survey in electronic form. Beta testers navigated through the material, offering feedback during and after completion of the module and survey. Research staff took written notes and modified the module and surveys based on this feedback with consensus from the research team. The final version of the module, and supporting materials, were made publically available by the funder after completion of the study [19].

Study Procedures

To evaluate the effect of the intervention, a single center, parallel-group study using equal randomization was performed.

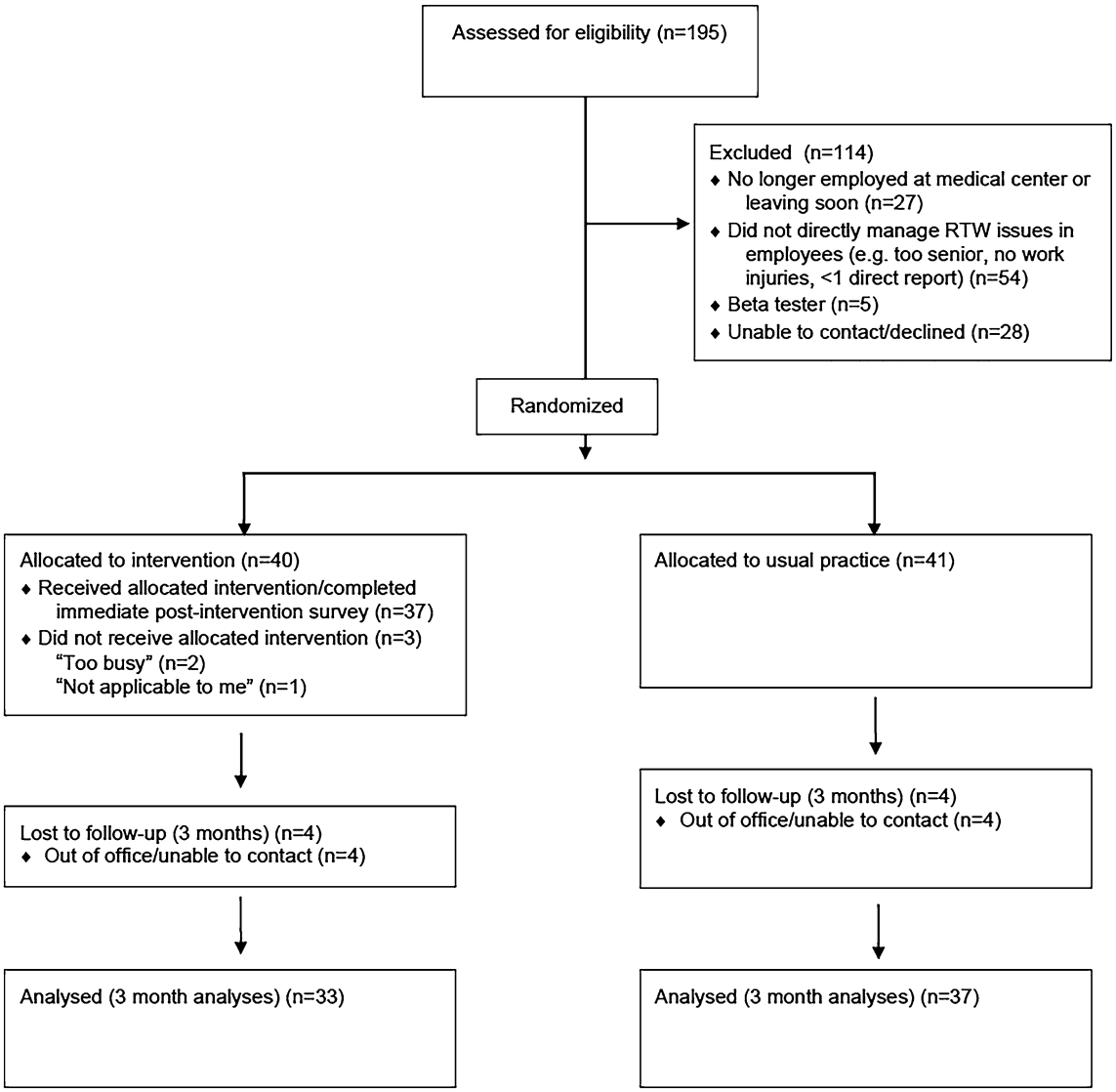

Fig. 1 Study flow

Study Site and Population

The study was conducted at an approximately 400-bed quaternary care hospital, which is administered by academic institution employees, in the Seattle area. The aim was to recruit all supervisors or managers who met the selection criteria in order to maximize the sample size for this single site study. Potential participants at the study site were eligible for inclusion if they were supervisors or managers in clinical or non-clinical (e.g. food services) departments and had at least one employee reporting directly to them. A list of potential participants and their e-mail addresses were identified using a query for "manager" job codes in the medical center's payroll databases. This list initially included 195 potential participants. Participants were excluded if they were no longer employed at the medical center, were senior enough to warrant exclusion (e.g. did not directly manage RTW issues for their employees), had already participated in module beta testing, could not be contacted, or did not meet inclusion criteria. Twenty-eight participants declined to participate or could not be contacted. The final baseline study sample consisted of 81 participants, representing of response rate of 74.3 % among eligible participants. Details of study flow are shown in Fig. 1. All study procedures were approved by the University of Washington Institutional Review Board.

Recruitment and Enrollment

Potential participants were contacted by research staff via e-mail in July 2013 and invited to participate. To enhance

participation, senior administrative officials at the study site sent an e-mail message using their internal manager e-mail distribution lists to inform potential participants of the upcoming study. Participants underwent informed consent and were invited to complete the baseline survey via a hyperlink embedded in an e-mail. One and two weeks after participants were invited to complete the survey, reminder e-mails were sent by study researchers to all potential participants who had yet to complete the survey. Three weeks after the initial invitation, the research team called potential participants who had not yet completed the survey and invited them to complete the survey. All participants who gave informed consent completed the baseline survey in July or August 2013.

Intervention and Follow-Up

Participants were allocated to training module (n = 40) or usual practice alone (n = 41) groups (Fig. 1) using simple randomization procedures. Research staff used a coin-flipper application that employs atmospheric noise to generate randomness [20], and enrolled subjects were allocated one at a time so that research staff remained ignorant of future allocations when assigning a participant to a group. Participants were not informed about which group they were assigned to. Usual practice, which occurred in both groups, included written information sent by surface mail to the injured worker and supervisor by the institution's statutory RTW coordinators about the RTW process and contacts, and the institution's usual RTW procedure [21]. Immediately after randomization, participants in the training module group received an e-mail from study researchers with a hyperlink to the training module and immediate post-intervention survey. The module was housed on an institutional server, downloaded via web browser to participants' work desktop computers, and viewed. E-mail and phone call reminders were conducted to enhance participation, using the same scheme as for the baseline survey. By September 2013, ninety-three percent of participants in the training module group had received the module and completed the immediate post-intervention survey. Upon completion of the module, participants in the training module group were e-mailed information about the RTW resources reviewed in the module.

Approximately 3 months after completing the baseline survey, study researchers sent all participants an e-mail with a hyperlink to the 3-month follow-up survey. A 3-month follow-up period was the maximum possible follow-up period given the limited duration of project funding. E-mail and phone reminders were conducted to enhance survey participation as previously described. The last 3-month survey was completed on 12/5/2013. After completion of the 3-month survey, the module was made available to participants in the usual practice group.

Outcomes

Primary outcomes were determined a priori. The primary outcomes were changes in RTW attitudes and knowledge, as assessed by self-reported survey responses, between baseline and 3 months. Return to work practices (previous 3 months) between baseline and 3 months were also assessed using institutional workers' compensation claims data.

Claims Data

Data on workers' compensation claims for participants' employees were obtained from institutional workers' compensation claims databases. The study site receives workers' compensation insurance through the Washington State Fund [22]. Data were extracted in two batches: the first batch on 11/5/13, for the period covering 4/1/13 to 7/1/13, and the second batch on 12/18/13, for the period covering 7/2/13 to 12/18/13. Variables extracted included the date of injury, the type of claim (medical only or time-loss), claim status (open or closed), department of the injured employee, employee's supervisor, time-loss dates, and dates that the study site was unable to accommodate the injured or ill employee with light or modified duty. Nearly all time-loss claims were musculoskeletal injury claims and were still open at the time of data extraction. Claims were identified if they had a date of injury or illness within one of two time windows: 3 months before the baseline survey, or 3 months before the 3 months follow-up survey. Research staff recorded the number of total claims, the number of time-loss claims, the number of time-loss days, and the number of days the study site was unable to accommodate light or modified duty within the 3 months windows by participating supervisors.

Statistical Analyses

Participant characteristics were summarized using descriptive statistics. Changes in survey responses to attitude questions (ordinal responses) before and immediately after intervention administration were assessed using the sign test, assuming a binomial distribution. Changes in survey responses to knowledge questions (scored in a binary manner as correct or incorrect) before and immediately after intervention administration were assessed using the exact McNemar's test. Control for false discovery rate under positive dependence assumptions was addressed using the Benjamini–Hochberg–Yekutieli procedure [23]

pooled over all attitude and knowledge questions, and adjusted p values using this procedure are reported. A similar procedure was used to compare attitude and knowledge scores in the intervention group between baseline and 3 months.

The Mann–Whitney U test, using a normal approximation, was used to test for differences in baseline attitude outcome variable distributions between the intervention and usual practice groups. The Chi squared test was used to test for differences in baseline binary knowledge outcome variable distributions between the intervention and usual practice groups. The Mann–Whitney U test was also used to test for differences in attitude and knowledge change (3 months minus baseline) scores between the intervention and usual practice groups. The aim was to assess whether improvement in attitude and knowledge scores was greater in the intervention compared to the usual practice group. All statistical tests were two-sided, and p values <0.05 were considered statistically significant. Analyses were performed using Stata 11 (StataCorp, College Station, TX) and R 3.2.1 (R Foundation, Vienna, Austria) [24]. Diverging stacked charts were produced with the HH package for R, version 3.1-19.

Results

Study Population

Forty participants allocated to the intervention group and 41 participants allocated to the usual practice group completed the baseline survey (Fig. 1). Three participants allocated to the intervention group did not receive the intervention because they were "too busy" or felt the intervention was not applicable to them, leaving 37 participants who received the module and completed the post-intervention survey. Four participants in both the intervention and the usual practice groups were lost to follow up; these eight individuals were out of the office or otherwise unreachable. Three month follow-up data from 33 intervention and 37 usual practice participants were available for analysis.

Baseline participant characteristics by group are shown in Table 1. The majority of participants (46 %) were between 46 and 55 years of age. Sixty percent of participants worked in clinical departments, and 58 % reported manager/supervisor, versus nurse manager, director, and other, job titles. The median length of employment as a supervisor or manager at a healthcare institution was 10 (interquartile range four to 15) years. Participants reported a median of 30 employees reporting directly to them (interquartile range eight to 70). In general, participants in the intervention and usual practice groups were comparable.

Institutional workers' compensation claims data indicated that approximately one-third of participating supervisors at baseline had at least one employee workers' compensation claim in the past 3 months. Having at least one employee workers' compensation claim was more common for supervisors in clinical departments (32 %) compared to supervisors in nonclinical departments (22 %).

Attitudes and Knowledge in the Intervention Group

Baseline to Immediately After Intervention

A summary of baseline responses to RTW attitude and knowledge survey questions is included in Fig. 2. At baseline, participants already had a high level of confidence in filling out an incident report and guiding an injured employee to appropriate medical care (median score of 4 = "very confident"). Attitude and knowledge scores between baseline and immediately after intervention, and between baseline and 3 months post-intervention, are described in Online Resource 1. Immediately after intervention compared to baseline, 41 % of participants reported higher compared to lower (8 %) confidence in guiding injured employees to medical care (adjusted $p = 0.027$), 49 % of participants reported higher compared to lower (3 %) confidence in communicating with injured employees (adjusted $p = 0.001$), 57 % of participants reported higher compared to lower (8 %) confidence in identifying/arranging modified duty (adjusted $p = 0.001$), and 68 % of participants reported higher compared to lower (8 %) confidence in answering injured employees' questions (adjusted $p < 0.001$). Improvements in confidence in filling out an incident report (14 % of participants reported higher scores, and 3 % reported lower scores, adjusted $p = 0.595$) and agreement that the participant can manage the RTW process (51 % of participants reported higher scores, and 19 % reported lower scores, adjusted $p = 0.090$) immediately after intervention compared to baseline were not statistically significant. Immediately after intervention compared to baseline, 35 % of participants reported gains compared to losses (0 %) of knowledge about whom to contact to help arrange modified duty (adjusted $p = 0.001$), and 49 % of participants reported gains compared to losses (3 %) of knowledge about whom to contact to arrange RTW incentives (adjusted $p = 0.001$). Results from a sensitivity analysis that excluded participants who did not complete the 3-month survey, and a sensitivity analysis that excluded participants with any employee workers' compensation claims in the 3 months before baseline, were similar to results from main analyses, except that improvement between baseline and

Table 1 Participant characteristics at baseline

Participant characteristic[a]	Intervention group (n = 40)	Usual practice group (n = 41)
Age group		
<46	12 (30 %)	9 (22 %)
46–50	9 (23 %)	9 (22 %)
51–55	9 (23 %)	10 (24 %)
≥56	9 (23 %)	9 (22 %)
Prefer not to answer	1 (3 %)	4 (10 %)
Department type		
Clinical	25 (63 %)	24 (59 %)
Nonclinical	15 (38 %)	17 (41 %)
Job title		
Manager/supervisor	25 (63 %)	22 (54 %)
Nurse manager	5 (13 %)	5 (12 %)
Director	7 (18 %)	11 (27 %)
Other	3 (8 %)	3 (7 %)
Years worked in healthcare as a supervisor/manager	10 (4,14)	10 (4,15)
Number of direct reports	19 (7,71)	33 (10,70)
Number of employee workers' compensation claims in the past 3 months		
1	5 (13 %)	8 (20 %)
≥2	5 (13 %)	5 (12 %)

[a] n (%) or median (interquartile range)

immediately after intervention in confidence in guiding injured employees to medical care was no longer statistically significant (adjusted $p = 0.077$ and adjusted $p = 0.129$, respectively).

Baseline to 3 Months

Three months after intervention, compared to baseline, there was improvement in scores on agreement that the participant can manage the RTW process (58 % of participants reported higher scores, and 6 % reported lower scores, adjusted $p = 0.004$). There was also improvement in scores on confidence to answer employees' questions after 3 months (61 % of participants reported higher scores, and 9 % reported lower scores, adjusted $p = 0.005$). Improvements in other attitude and knowledge questions after 3 months were not statistically significant. Inferences from a sensitivity analysis that excluded participants with any employee workers' compensation claims in the 3 months before baseline and in the 3 months before the 3-month follow-up were similar.

Attitudes and Knowledge from Baseline to 3-Months Comparing Intervention and Usual Practice Groups

Changes in attitude and knowledge scores from baseline to 3 months in the intervention and usual practice groups are shown in Fig. 2 and Table 2. Median increases in scores of agreement that the supervisor can manage the RTW process at 3 months compared to baseline were 1 in the intervention group and 0 in the usual practice group, and there was borderline difference in the distributions of change scores between the two groups (Mann–Whitney $U = 515$, $p = 0.007$, adjusted $p = 0.074$). Median increases in scores of confidence that the supervisor can answer employees' questions at 3 months compared to baseline were 1 in the intervention group and 0 in the usual practice group, and there was borderline difference in the distributions of change scores between the two groups (Mann–Whitney $U = 514$, $p = 0.006$, adjusted $p = 0.074$). There was no difference in change scores on other attitude and knowledge questions comparing the intervention and usual practice groups. Results from a sensitivity analysis that excluded participants with any employee workers' compensation claims in the 3 months before baseline and in the 3 months before the 3-month follow-up were similar to main results.

Practice

Intervention Group

At baseline, approximately 13 % of supervisors (n = 5) in the intervention group had one employee workers' compensation claim in the past 3 months, and 13 % (n = 5)

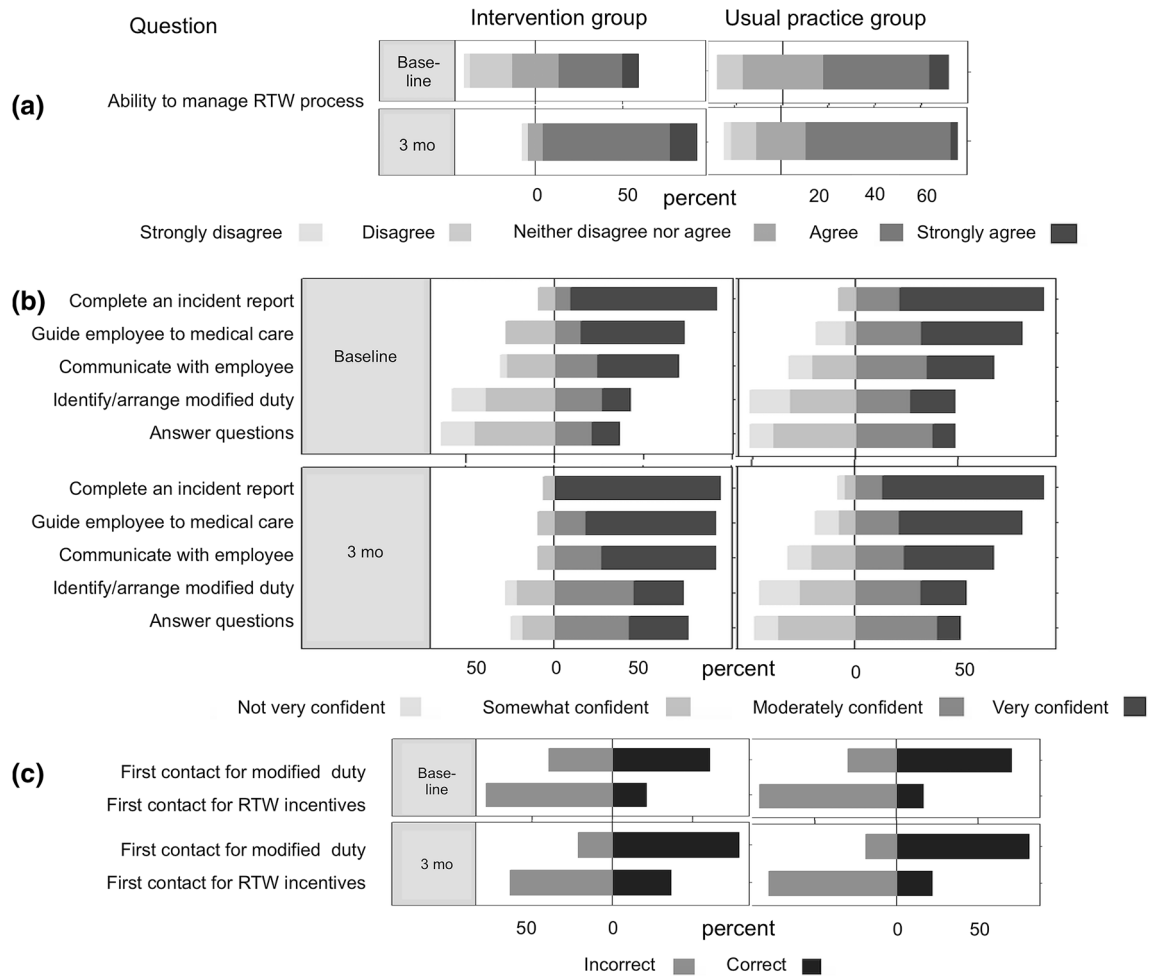

Fig. 2 Participant responses to attitude (**a**, **b**) and knowledge (**c**) survey questions at baseline and 3 months in the intervention group (n = 33) and in the usual practice group (n = 37)

had two claims. Of these 15 claims, seven (47 %) were time-loss claims with 69 total days of time-loss. For these claims, the study site could not accommodate job restrictions for a total of 53 days. At 3 months, approximately 5 % of supervisors (n = 2) in the intervention group had one employee workers' compensation claim in the past 3 months, and 13 % (n = 5) had two or more claims. Of these 14 claims, five (36 %) were time-loss claims with a total of 78 days of time-loss. For these claims, the study site could not accommodate job restrictions for a total of 16 days.

Usual Practice Group

At baseline, approximately 20 % of supervisors (n = 8) in the usual practice group had one employee workers' compensation claim in the past 3 months, and 12 % (n = 5) had two or more claims. Of these 31 claims, four (13 %) were time-loss claims with 85 total days of time-loss. For these claims, the study site could not accommodate job restrictions for a total of 34 days. At 3 months, approximately 12 % of supervisors (n = 5) in the intervention group had one employee workers' compensation claim in the past 3 months, and 22 % (n = 9) had two or more claims. Of these 41 claims, 25 (61 %) were time-loss claims with a total of 78 days of time-loss. For these claims, the study site could not accommodate job restrictions for a total of 16 days.

Discussion

In this single site randomized study of a brief multimedia supervisor training module to promote early, safe RTW in injured employees, supervisors exhibited meaningfully improved confidence in communicating with injured employees, identifying/arranging modified duty, and answering injured employees' questions immediately after

Table 2 Effect of intervention on change in return to work attitudes and knowledge from baseline to 3 months comparing the intervention group and the usual practice group

Outcome	Intervention[a]	Usual practice[b]	Mann–Whitney U	Unadjusted *p*	Adjusted *p*[c]
Attitude					
	n^+, n^{-e}	n^+, n^{-e}			
Ability to manage RTW process[d]					
Baseline to immediate post	19, 7	–			
Baseline to 3 months	19, 2	11, 9			
			515	0.007	0.074
Complete an incident report[f]					
Baseline to immediate post	5, 1	–			
Baseline to 3 months	4, 1	7, 3			
			615	0.909	1.000
Guide employee to medical care[f]					
Baseline to immediate post	15, 3	–			
Baseline to 3 months	10, 3	8, 6			
			579	0.364	1.000
Communicate with employee[f]					
Baseline to immediate post	18, 1	–			
Baseline to 3 months	15, 5	14, 8			
			578	0.356	1.000
Identify/arrange modified duty[f]					
Baseline to immediate post	21, 3	–			
Baseline to 3 months	14, 3	12, 11			
			549	0.081	0.585
Answer questions[f]					
Baseline to immediate post	25, 3	–			
Baseline to 3 months	20, 3	11, 9			
			514	0.006	0.074
Knowledge[g]					
	n^+, n^{-h}	n^+, n^{-h}			
First contact for modified duty					
Baseline to immediate post	13,0	–			
Baseline to 3 months	10,4	6, 2			
			634	0.498	1.000
First contact for RTW incentives					
Baseline to immediate post	18, 1	–			
Baseline to 3 months	6, 1	4, 2			
			644	0.334	1.000

[a] n = 37, baseline to immediate post; n = 33, baseline to 3 months

[b] n = 37

[c] Controlled for false discovery rate under positive dependence assumptions using the Benjamini–Hochberg–Yekutieli procedure pooled over all knowledge and attitude questions

[d] Respondents were asked to score their responses on a 5-point scale (1 = "strongly disagree", 2 = "disagree", 3 = "neither disagree nor agree", 4 = "agree", 5 = "strongly agree")

[e] n^+ = number of participants for which score for increased over time, n^- = number of participants for which score decreased over time

[f] Respondents were asked to score their responses on a 4-point scale (e.g. 1 = "not very confident", 2 = "somewhat confident", 3 = "moderately confident", 4 = "very confident")

[g] Responses were scored as correct or incorrect

[h] n^+ = number of participants for which score went from incorrect to correct over time, n^- = number of participants for which score went from correct to incorrect over time

the intervention. Knowledge about whom to contact to help arrange RTW financial incentives and modified duty also improved immediately after intervention. After 3 months, there was a trend toward improvement in confidence to answer employees' questions and improvement in overall confidence to manage the RTW process in the intervention compared to the usual practice group, but these findings were not statistically significant.

The approach taken in the intervention in this study was an introduction to principles of early, safe RTW coupled with convenient access to RTW resources for use in an on-demand fashion (e.g. when an employee becomes injured or ill). In particular, in addition to providing a basic framework of RTW best practices using observational learning, the training intervention also provided resources to facilitate communication between direct supervisors and others in the RTW community of practice, such as human resources representatives and claims specialists, when needed. The results of this study raise the question of whether—for supervisors for whom working with injured employees is one of many other day-to-day responsibilities—this approach may be a more effective component of disability prevention strategies as compared to encouraging sustained recall of all of the details of a complex RTW process. The observed effect in this study may have been even more pronounced if the training module had further leveraged technology [25], such as interactive RTW simulations, which are efficient, do not require in-person trainers, and are flexible with respect to timing and location [25]. This type of training could be delivered either preemptively (e.g. at new supervisor orientations and annual trainings) or on-demand.

Supervisors demonstrated increased confidence and awareness about most specific RTW principles directly after the module intervention, but this effect diminished over 3 months of follow-up. During the intervention module development phase, a complex and evolving RTW process involving multiple stakeholders with different areas of expertise, including human resources representatives, workers' compensation claims specialists, and occupational health professionals, became apparent. Although the Washington State Labor and Industries Stay at Work financial incentive program is a tremendous advance in disability prevention [15], utilization of this relatively new initiative added additional administrative steps to the RTW process. Yet stakeholders—including supervisor representatives—voiced a desire for brief and efficient training, in part due to the substantial time spent fulfilling the other day-to-day responsibilities of medical center supervisors, relative to time spent working with injured workers.

Although the study site was the main driver of time-loss days and dollars at the study institution, employee workers' compensation claims per participating supervisor were not overwhelmingly high. For example, only 10 and 13 supervisors in the intervention and usual practice groups, of 40 and 41 total supervisors, respectively, had at least one employee workers' compensation claim in the 3 months prior to the study baseline. The electronic module was only 15–20 min long and focused on key topics identified through stakeholder consensus, rather than all details of the RTW process. It is possible that a longer training, or periodic re-enforcement, may have led to better retention of specific principles. McLellan et al.'s [4] 90 min in-person RTW training—studied without the benefit of a comparison group—resulted in modest improvements in identifying and resolving job factors contributing to disability, dealing with human resources issues, and answering employees' questions that persisted after 1 year. Implementation of lengthier trainings or streamlining the RTW process itself at the study site would require additional employer support and resources.

Although initial confidence in and awareness of specific RTW principles queried via survey diminished over the 3-month follow-up period, a trend toward an increase in agreement that the supervisor can manage the RTW process emerged over time. The training may have inadvertently laid the groundwork for situated learning, where learning takes place as supervisors navigate through actual RTW situations in collaboration with others in the RTW community of practice [26], including human resources representatives and claims specialists. These colleagues have tacit knowledge that is imparted in a more efficient manner during actual practice than explicit knowledge obtained from reading policies and manuals [26]. Using this approach, the focus is on supervisors learning how to manage the RTW process and find answers to employees' questions given the tools provided, rather than on abstract knowledge about RTW best practices.

The participatory approach to the development of module content, examples, and format used in this study could be adapted to other common RTW scenarios in other working populations and settings. The current module was geared toward the more common and straightforward employee musculoskeletal injuries at the study site and did not cover complex topics that supervisors are more likely to encounter with employees suffering from occupational illnesses, such as delays in claim determination status. But the module's approach to encourage the identification of resources and building of relationships within the RTW community of practice during common RTW scenarios may provide a foundation that allows supervisors to request additional support and resources from these colleagues when more complex situations arise.

At baseline, supervisors' confidence in filing incident reports, an element of primary prevention, was generally

stronger than confidence about elements related to the prevention of disability progression. The influence of non-medical factors on occupational disability has been well-documented [27, 28], and organizational support and financial incentives directed at healthcare providers to address such factors as timeliness of workers' compensation claim filing and communication between stakeholders have been shown to reduce work disability and associated costs in the Washington workers' compensation system [13]. The Washington Department of Labor and Industries' Stay at Work program addresses another key barrier to disability prevention—lack of job accommodations—through financial incentives for eligible employers. Importantly, at the study institution, these incentives flow back to the accommodating department, thus providing financial incentives for job accommodation directly to supervisors. The results of this study suggest that, even with such incentives in place, additional resources and training could help facilitate utilization of these incentives and more firmly embed early, safe RTW into the culture of supervisors.

Strengths and Limitations

This study has several important strengths, including its randomized design and inclusion of a comparison group. Multiple techniques were used to stimulate participation throughout the process of survey creation and completion [29], including: the survey was developed with input from a diversity of institutional stakeholders; institutional leaders provided pre-notification about the project; and the survey was evaluated for content validity and usability prior to delivery. These techniques contributed to a high participation rate, minimizing the risk of nonresponse bias.

The study also has important limitations. Since the training module and accompanying resources were distributed via e-mail, it is possible that participants did not fully engage with the material or distributed the materials to participants in the usual practice group. Participant data were analyzed according to the allocated group, and such crossover would have resulted in more conservative effect estimates. In addition, although all eligible supervisors in clinical and non-clinical departments at the study site were included, the sample size was relatively small, and it is therefore difficult to determine whether there was sufficient power to detect changes in all outcomes.

The small number of workers' compensation claims and relatively short duration of follow-up, with the majority of workers' compensation claims still open at 3 months, prevented hypothesis testing of outcomes based on objective workers' compensation claims data. The workers' compensation claims analysis in this study demonstrated the feasibility of obtaining these data from healthcare employers in future larger studies with longer-term follow-up. Incorporation of these data into primary outcome metrics in future studies will require a better understanding of any differences between employer and insurer claims data and capture of other factors that could affect disability outcomes at the worker level. Worker level factors associated with disability outcomes were not systematically addressed in the present study, in which the primary unit of analysis was the supervisor.

Although participants were not informed about which group they were assigned to, study investigators were aware of group assignments and may have introduced bias. In addition, although evaluation surveys were based on surveys used in published studies [4] and were assessed for content validity by members of the target population, they were not formally validated. Importantly, the study also did not evaluate the effect of the supervisor training intervention on workers supervised. Future intervention studies should explore companion RTW training for workers, in addition to supervisor training. Finally, the study was performed at a single healthcare site in a state with unique disability prevention incentive programs, thus limiting the generalizability of results beyond the state of Washington.

Conclusions

In this single center randomized study of a brief multimedia supervisor training module to promote early, safe RTW in injured employees in a healthcare setting, supervisor RTW attitudes and knowledge generally improved between baseline and immediately after intervention administration. There was a trend toward improvement in attitudes about managing the RTW process and answering employees' questions at 3 months follow-up, although these findings were not statistically significant. This pattern of immediate improvement followed by decline of certain attitude and knowledge scores suggests that just-in-time (i.e. when a worker is injured) reminders of relevant resources, in addition to basic supervisor pre-emptive training, may be a promising approach in certain settings for reducing unnecessary work disability in injured employees. Such an approach may optimize supervisors' abilities to successfully navigate RTW situations in collaboration with others in the RTW community of practice. Larger studies of such approaches with longer follow-up periods that include primary analyses of worker-level outcomes such as satisfaction with the RTW process and disability outcomes are needed, with an ultimate aim of preventing unnecessary work disability in healthcare workers.

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