

Occupational management in the workplace and impact on Workers' Compensation Board claims, duration, and cost: a prospective longitudinal cohort

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Abstract: Few workplaces have prospectively reviewed workplace and worker issues simultaneously and assessed their impact on Workers' Compensation Board (WCB) claims. In January of 2014, each worker in a large workplace in Saskatchewan, Canada, was prospectively followed for 1 year to determine factors that impact injury claim incidence, recovery, and costs. In total, 207 out of 245 workers agreed to complete the baseline survey (84.5%). In 2014, 82.5% of workers had self-reported pain, but only 35.5% submitted a WCB claim. Binary logistic regression was used to compare those with pain who did not submit a WCB injury claim to those with pain who did initiate a WCB claim. Independent risk factors associated with WCB claim incidence included depressed mood (odds ratio [OR] =2.75, 95% confidence interval [CI] 1.44–9.78) and lower job satisfaction (OR =1.70, 95% CI 1.08–10.68). Higher disability duration was independently associated with higher depressed mood (OR =1.60, 95% CI 1.05–4.11) and poor recovery expectation (OR =1.31, 95% CI 1.01–5.78). Higher cost disability claims were independently associated with higher depressed mood (OR =1.51, 95% CI 1.07–6.87) and pain catastrophizing (OR =1.11, 95% CI 1.02–8.11). Self-reported pain, physically assessed injury severity, and measured ergonomic risk of workstation did not significantly predict injury claim incidence, duration, or costs. In January 2015, the workplace implemented a new occupational prevention and management program. The injury incidence rate ratio reduced by 58% from 2014 to 2015 (IRR =1.58, 95% CI =1.28–1.94). The ratio for disability duration reduced by 139% from 2014 to 2015 (RR =2.39, 95% CI =2.16–2.63). Costs reduced from \$114,149.07 to \$56,528.14 per year. In summary, WCB claims are complex. Recognizing that nonphysical factors, such as depressed mood, influence injury claim incidence, recovery, and costs, can be helpful to claims management. **Keywords:** workplace, Workers Compensation Board, injury claim, depressed mood, return-to-work program, job satisfaction

Introduction

Workers Compensation Board (WCB) injuries are complex. As such, treatment-focused programs in isolation have not reduced injury claim incidence, duration, or cost in the workplace.¹⁻³

For example, the Institute for Work and Health (IWH) systematically reviewed injury prevention and loss control. The only intervention to demonstrate a strong level of evidence was proactive return-to-work programs, which included on-site education and offered return to work with modified duties. A moderate level of evidence was found for employee support and daily exercise.⁴

The IWH also performed a second systematic literature review on workplace return-to-work programs. No intervention had high levels of evidence for reducing claim

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incidence, duration, or costs. A moderate level of evidence was found for seven interventions, including 1) immediate contact with the worker and job accommodation; 2) independent ergonomic assessments with the goal of return-to-work coordination; 3) on-site education with supervisors and managers on how to facilitate early return to work; 4) active participation from workers in the return-to-work process; 5) creating conditions of goodwill; 6) avoiding miscommunication; and 7) allowing on-site, independent occupational health professionals to bridge communication between management, workers, and external health care practitioners.⁵

The IWH also performed a third systematic literature review on prognostic factors that negatively influence worker (not workplace) disability time. Strong evidence was found for five prognostic factors, including 1) worker's poor recovery expectations; 2) passive (not active) rehabilitation; 3) worker's self-report high pain intensity; 4) radiating pain; and 5) poor job satisfaction.⁶

Aside from IWH, four systematic literature reviews have also been conducted by the Cochrane Collaboration. One review found that exercise for the treatment of back pain reduces the number of recurrences of back pain.⁷ Similarly, a second review found that advice to stay active after a low back injury was more effective in pain relief and ability to perform work in comparison to bed rest.⁸ A third review found that back education in occupational settings reduced pain, increased function, and improved return-to-work status.⁹ A fourth review found that off-site work hardening programs had no effect on disability duration.¹⁰

There are five additional systematic literature reviews that were not published by either the IWH or Cochrane. One found evidence to support exercise in the prevention of occupational back pain.¹¹ Similarly, another review concluded that there was strong evidence to support exercise for both treatment and prevention of back pain in the workplace.¹² A third review found that advice to keep active was sufficient for acute work injuries, but specific exercises were required for subchronic and chronic occupational back injuries.¹³ A fourth review concluded that the best overall intervention to promote early return to work after an occupational injury was combining clinical interventions with occupational interventions, including modified work duties.¹⁴ Finally, the fifth review concluded that the most effective interventions at promoting return to-work were those that combined employers, employees, and health practitioners working together to implement work modifications.¹⁵

The first objective of the current study was to determine which factors prospectively determined WCB injury claim

incidence, higher duration, and higher costs. The second objective was to determine if a new, comprehensive occupational program reduced injury claim incidence, duration of disability time, and costs. This program included on-site education, ergonomic evaluations, advice to stay active, immediate contact with workers, support from managers and union, enhanced communication, proactive offer of return to work with modified duties, and independent on-site physical and occupational therapists

Methods

In January of 2014, each worker at a large company (meat company with kill floor, processing area, and shipping) in Saskatchewan, Canada, was asked to complete a confidential survey that was voluntary. There was no inclusion or exclusion criteria. Because intervention was requested by both management and the union, the survey was voluntary, results were placed in a sealed envelope with confidentiality and privacy assured by the independent researchers, and the results were stored in the confidential file area of a medical clinic with experience in privacy and health information protection. Because the intervention was jointly requested by the union and its workers as part of a broad proactive health initiative, external ethics review was not required.

Measurement

Based on the literature review, the survey was designed to collect information on demographics, job satisfaction, self-report health, depressed mood, general health status, and pain. Questions addressing drug use, alcohol use, and suicide ideation were prohibited by the union.

Questions on demographics, job satisfaction, and self-report health came from the Canadian Community Health Survey conducted by Statistics Canada.¹⁶ The Beck Depression Inventory II (BDI-II) was used to measure depressed mood.¹⁷ This survey has good internal scale reliability for community-dwelling adults (Cronbach's $\alpha = 0.86-0.92$).¹⁸ Those who scored 11 or higher on the BDI-II were considered to have depressed mood. The Short Form-36 (SF-36) was used to measure general health status.¹⁹ The SF-36 is a commonly used instrument that measures eight dimensions of self-report health, quality of life, and function.

Participants also completed a pain scale and a visual analog scale measuring pain from 0 (no pain) to 10 (as bad as it can be) for 1) average pain and for 2) pain at its worst over the past week.^{20,21} Coping with pain and expectation of recovery was measured with the Pain Catastrophizing Scale. The Pain Catastrophizing Scale is well known, with

established reliability ($r=0.75$) and validity (scale explains 59% of variance in pain).²²

Ergonomic risk of injury included direct measurement of each workstation by an occupational therapist. The occupational therapist used the WorkSmart Ergonomic Systems Specialist program to code all workstations into either low, medium, or high risk of injury. Low risk was defined as only one significant exposure to musculoskeletal injury, moderate risk was two significant exposures, and high risk was three or more significant exposures to musculoskeletal injury.²³

Intervention

In 2014, each worker was asked to present to an on-site occupational therapist for musculoskeletal screening. If the worker had pain, the injury was coded as 1 (pain, stiffness, or tenderness without physical signs), 2 (pain and musculoskeletal signs), 3 (pain and neurological signs), or 4 (pain and fracture or dislocation). The classifications came from the Quebec Task Force for neck and back pain.²⁴

Binary logistic regression was used to compare those with pain who did not submit a WCB injury claim to those with pain who did initiate a WCB claim in 2014. Regression was used to compare higher duration claims (top 50%) to lower duration WCB injury claims (lower 50%) and higher cost claims (top 50%) to lower cost WCB injury claims (lower 50%) in 2014. In total, 24 self-report survey variables, ergonomic workstation risk variables, and direct physical evaluation variables were included for analysis. The unadjusted effect of each covariate was determined and then entered one step at a time based on changes in the -2 log likelihood and the Wald test. The final results are presented as adjusted odds ratios (ORs) with 95% confidence intervals (CIs).²⁵

The management (January 5, 2015) and the union (January 15, 2015) signed a contract for an on-site occupational management program. Any worker with pain or stiffness was encouraged to see the on-site independent occupational therapist or physical therapist for education (ie, stretches), advice to stay active, enhanced communication between the worker and supervisor, and proactive offer of return to work with modified duties. The program did not provide on-site treatment. If a worker had a serious injury, they were advised to go to their family physician. The occupational management intervention was 1 hour a day, 5 days a week, for 1 year. The program was based on an evidence-based review of the literature described previously.⁵⁻¹⁵

Ergonomic evaluations and recommendations on 77 workstations took 154 hours, whereas physical assessments of 207 workers took 69 hours. The WCB results were

analyzed on February 3, 2016 to allow sufficient time for claims adjudication.

Results

In 2014 and 2015, the company had 245 full-time workers. For data collection in 2014, 207 out of 245 workers agreed to complete the questionnaire (84.5% response rate). Job satisfaction was low, with 73.2% not at all satisfied with work. The prevalence of depressed mood was high, with 33.8% reporting mild depressed mood and another 7.2% reporting moderate-to-severe depressed mood (41% with depressed mood). In total, 82.5% of the workforce reported pain at least once per week. The complete results are listed in Table 1.

Ergonomic risk of injury included direct measurement of each of the 77 workstations by an occupational therapist. Low risk was detected at 22 workstations, moderate risk was detected at 46 workstations, and high risk was detected at 9 workstations. The results are listed in Table 2. Among those who completed the survey, the occupational therapist coded the injuries as Level 1 (93% with pain or stiffness or tenderness but without any physical signs) or Level 2 (7% with pain and musculoskeletal signs), with no Level 3 or Level 4 injuries found. Those with musculoskeletal signs were advised to consider seeing their family physician. Three workers with WCB claims refused to be physically assessed by the therapist. This was permitted due to the voluntary nature of the intervention.

For pain catastrophizing, the scores were relatively low, with means ranging from 0.46 to 1.21 out of a maximum score of 4.

Binary logistic regression was used to compare those with pain who did not submit a WCB injury claim to those with pain who did initiate a WCB claim in 2014. Completing a WCB injury claim, in comparison to not initiating a WCB claim, was independently associated with higher depressed mood (OR = 2.75, 95% CI 1.44–9.78) and lower job satisfaction (OR = 1.70, 95% CI 1.08–10.68).

Regression was used to compare higher duration claims (top 50%) to lower duration WCB injury claims (lower 50%) in 2014. Higher disability duration was independently associated with higher depressed mood (OR = 1.60, 95% CI 1.05–4.11) and poor recovery expectation (OR = 1.31, 95% CI 1.01–5.78).

Regression analysis was also used to compare higher cost claims (top 50%) to lower cost WCB injury claims (lower 50% of costs) in 2014. Higher cost disability claims were independently associated with higher depressed mood (OR = 1.51, 95% CI 1.07–6.87) and pain catastrophizing (OR = 1.11, 95% CI 1.02–8.11).

Table I Survey of workers

Variable	Percent
Sex	
Male	69.2%
Female	30.8%
Marital status	
Married or common law	56.1%
Single	43.9%
Education	
University degree or college diploma	7.7%
High school diploma	52.7%
Less than high school diploma	39.6%
Age (years)	
Mean (min, max)	34.7 (18, 64)
Overall, how satisfied are you with your job	
Very satisfied	19.3%
Satisfied	7.5%
Not at all satisfied	73.2%
Overall, how satisfied are you with your supervisors	
Very satisfied	37.6%
Satisfied	57.9%
Not at all satisfied	4.5%
Overall, how satisfied are you with your coworkers	
Very satisfied	24.7%
Satisfied	70.8%
Not at all satisfied	4.5%
Overall, how satisfied are you with levels of communication	
Very satisfied	21.0%
Satisfied	73.7%
Not at all satisfied	5.3%
What are your opportunities for promotion	
Very good	23.4%
Good	56.7%
Not good	19.9%
How likely is it you will leave company in next 12 months	
Very likely	6.2%
Likely	25.6%
Not likely	68.2%
How well did you perform your work duties last year	
Extremely well	40.1%
Well	57.9%
Not at all well	1.9%
Do you do shift work	
Yes	28.9%
No	71.1%
Length of employment at company (months)	
Mean (min, max)	14.4 (1, 240)
In general, would you say your health is ¹⁶	
Excellent	4.8%
Very good	24.5%
Good	53.1%
Fair	16.8%
Poor	0.8%
In general, would you say your mental health is ¹⁶	
Excellent	4.8%
Very good	12.1%
Good	43.5%
Fair	29.0%
Poor	10.6%
Depressed mood score (BDI-II) ^{17,18}	

(Continued)

Table I (Continued)

Variable	Percent
No depressed mood	59.0%
Mild/borderline	33.8%
Moderate/severe	7.2%
During past week, how often have you had physical discomfort or pain	
Never	17.5%
Once or twice	45.3%
Fairly often	29.0%
Very often	7.2%
Every day or almost	3.0%
Circle the number that best describes your pain on average over the past week (0–10) ^{20,21}	
Average pain score (mean)	1.79/10
Circle the number that best describes your pain at its worst over the past week (0–10) ^{20,21}	
Worst pain score (mean)	4.59/10
Do you think your injury (if injured) will	
Get better soon	72.5%
Get better slowly	9.7%
Never get better	11.6%
Do not know	6.2%
Pain catastrophizing and expectation of recovery (PCS survey) ²²	
Worry all the time about whether pain will end	0.49/4
I feel I can't go on	0.46/4
It's terrible and I think it's never going to get better	0.59/4
I feel like I can't stand it anymore	0.52/4
I become afraid that the pain will get worse	0.95/4
I keep thinking of other painful events	0.56/4
I can't seem to get it out of my mind	0.75/4
I keep thinking about how much it hurts	0.71/4
I keep thinking how badly I want the pain to stop	0.59/4
There's nothing I can do to reduce the intensity of the pain	0.31/4
I wonder whether something serious will happen	1.21/4
General health, quality of life, and function (SF-36 survey – mean scores) ¹⁹	
Physical functioning	61.9
Role limitations due to physical health	58.1
Pain	63.8
General health	50.3
Vitality	41.1
Social functioning	68.8
Role limitation due to emotional health	48.1
Emotional well-being	51.1
Times visited family physician last month (mean)	0.92
Times visited hospital last 3 months (mean)	0.39

Notes: n=207/245 or 84.5% response rate; *Answers: 0 – not at all; 1 – to a slight degree; 2 – to a moderate degree; 3 – to a great degree; 4 – all the time; Mean (average) from 0 to 4 reported in table.

Abbreviations: BDI-II, Beck Depression Inventory II; PCS, Pain Catastrophizing Scale; SF-36, Short Form-36, min, minimum; max, maximum.

Through regression analysis, it was found that self-report pain, physically assessed injury severity, and measured ergonomic risk of workstation with an occupational therapist did not significantly predict injury claim incidence, duration, or costs.

The results for all three regression analyses can be found in Table 3. In 2014, there were 87 WCB injuries (28 time loss

Table 2 Ergonomic risk of workstations measured by occupational therapist**A. Low risk – Only one significant exposure to musculoskeletal injury (22 workstations)**

Cryovac area – None; Cut floor – Sort 1, Sort 2, Skins; Shipping and Receiving – Fork lift, Inventory, Loin puller; Cut floor break line – Loin puller; Box room – Box chute; Kill line – Herd chute, stunner; Miscellaneous – Knife room; Red offal room – None; Laperminentierre room – Bander, Bone sorter, Pack off; Cut floor (leg belly line) – None; Cut floor (shoulder line) – None; Kill floor – Bottom shave, Bottom trim, Ear, Jowl, Probe, Tongue, Top shave, Verification, Top trim.

B. Medium risk – Two significant exposures to musculoskeletal injury (46 workstations)

Cryovac area – Box chute, Detection, Labeling, Packaging, Press; Cut floor – Clean up, Carrier, Back fat; Shipping and Receiving – Scale, Palletizing prep, Tenderloin; Cut floor break line – Tenderloin; Box room – Box builder, Box taping; Kill line – Barn, Sticker; Miscellaneous – Roller game room; Red offal room – Upper sort, Lower sort, Conveyor, Box builder; Laperminentierre room – Scale; Cut floor (leg belly line) – Band saw, Belly marker, Belly trimmer, Jowls, Sirloin, Skinner, Tails; Cut floor (shoulder line) – Band saw, Blade bone remover, Neck boner, Picnic boner, Skinner, Shoulder cap wizard, Specialty katurosa, Splitting shoulders, Tenderloin; Kill floor – Brisket saw, Bung, Gutting, Oscillating saw, Pre gut, Red offal harvest, White offal harvest, Clean up.

C. High risk - Three or more significant exposures to musculoskeletal injury (9 workstations)

Cryovac area – Palletizing; Cut floor – None; Shipping and Receiving – Manual loading truck, Palletizing swamper; Cut floor break line – Belly loin breaker, Leg break saw; Box room – None; Kill line – None; Miscellaneous – Gammig, Hog pushing; Red offal room – Packager; Laperminentierre room – Palletizing; Cut floor (leg belly line) – None; Cut floor (shoulder line) – None; Kill floor – None.

Note: Data from Worksmart Ergonomics Ltd.²³

Table 3 Independent risk factors for initiating WCB injury claim, higher injury duration, and higher injury cost

	Odds ratio	95% CI	P-value
Model 1			
Comparing workers with pain and WCB claim to those with pain and no WCB claim			
Depressed mood			
Depressed	2.75	1.44–9.78	0.005
Job satisfaction			
Not at all satisfied with job	1.70	1.08–10.68	0.045
Model 2			
Comparing higher duration claims (top 50%) to lower duration WCB injury claims (lower 50% of duration)			
Depressed mood			
Depressed	1.60	1.05–4.11	0.010
Recovery expectation			
Injury will never get better	1.31	1.01–5.78	0.037
Model 3			
Comparing higher cost claims (top 50%) to lower cost WCB injury claims (lower 50% of costs)			
Depressed mood			
Depressed	1.51	1.07–6.87	0.041
Pain catastrophizing			
I feel I can't go on to a great degree or all the time	1.11	1.02–8.11	0.047

Notes: Reference categories: Model 1 – no depressed mood, satisfied, or very satisfied with job; Model 2 – no depressed mood, injury will get better soon, or injury will get better slowly; Model 3 – no depressed mood, I feel I can't go on – not at all, to a slight degree, to a moderate degree.

Abbreviations: WCB, Workers' Compensation Board; CI, confidence interval.

and 59 no time loss), a combined disability duration time of 403 days and a total cost of \$114,149.07. In January 2015, the workplace implemented a new occupational program. In response, in 2015, there were 55 WCB injuries (15 time loss and 40 no time loss), a combined disability duration time of 169 days and a total cost of \$56,528.14. Computing an injury incidence rate ratio from 2014 to 2015 resulted in a ratio of 1.58 (95% CI 1.28–1.94). Computing a ratio for

disability duration from 2014 to 2015 resulted in a ratio of 2.39 (95% CI 2.16–2.63).

Discussion

Work-related injuries and subsequent WCB claims are complex. For that reason, treatment-focused programs working in isolation have not reduced injury claim incidence, duration, or cost in the workplace.^{1–3}

The current study found that depressed mood was associated with injury claim incidence, longer disability duration, and higher costs. In a systematic literature review of predictors of failure to return to work, the authors concluded that recovery expectation and fear avoidance are predictive of outcome, but that depression, job satisfaction, and psychological strain are not.²⁶ The first two conclusions are consistent with our study, whereas the others are inconsistent. A possible explanation could be that this systematic literature review included only nonchronic cases (less than 3 months), nonspecific back pain, and complete failure to return to work in its inclusion criteria.²⁶ In comparison, our study included acute and chronic cases, specific and nonspecific back pain, as well as all other musculoskeletal injuries. We also included those who returned to work and those who did not.

The finding that job satisfaction impacts recovery has been found in other systematic literature reviews.⁶ In that review, poor job satisfaction was found to delay recovery by 35%.⁶ The impact of recovery expectation is also not new. In a prospective study of 1,566 injured workers looking specifically at the impact of recovery expectations, the authors found that this one variable explained one-sixth of the variation in duration of disability benefits received.²⁷ This finding is consistent with a systematic literature review.⁶

The impact of depressed mood or depression has received less attention. As mentioned previously, one systematic literature review did not find that depression impacted return to work in those with very specific inclusion criteria: nonchronic cases, with nonspecific back pain who never returned to work.²⁶ With more general inclusion criteria, the result may be different. For example, in a large study of 367,900 injured and noninjured workers, injured workers were much more likely (45%) to be suffering from depression than noninjured workers.²⁷

In our study, 84.5% of the workplace had self-report pain, but only 35.5% submitted a WCB claim. In another study of 1,598 injured employees, only 25% of workers with a musculoskeletal injury filed a WCB claim. Factors that impacted the decision to file WCB claims, in comparison to not filing claims, despite the presence of an injury, included shorter employment duration with company, dissatisfaction with coworkers, and lower income.²⁸

Consistent with the evidence, our study found that having an on-site, independent occupational therapist or physical therapist to provide education and advice to stay active, as well as offering return to work with modified duties resulted in a significant reduction in injury claim incidence, duration, and costs.⁵⁻¹⁵

A limitation to our study is that it only included information until February 3, 2016. Given WCB claims adjudication, it is possible that claims that were originally accepted or rejected could be reversed upon appeal in the following year. Second, although injury severity did not influence outcomes, it is possible that musculoskeletal screening had an influence on outcome through a Hawthorne effect (behavior changes as a result of observation). Third, although this was a prospective study, some information was collected at the same time. For example, we could not determine if job dissatisfaction led to depressed mood or if depressed mood led to job dissatisfaction and so on. Fourth, our study did not include a control group. Finally, only 84.5% of workers completed the voluntary survey.

Conclusion

Independent risk factors associated with WCB claim incidence included depressed mood (OR =2.75, 95% CI 1.44–9.78) and lower job satisfaction (OR =1.70, 95% CI 1.08–10.68). Higher disability duration was independently associated with higher depressed mood (OR =1.60, 95% CI 1.05–4.11) and poor recovery expectation (OR =1.31, 95% CI 1.01–5.78). Higher cost disability claims were independently associated with higher depressed mood (OR =1.51, 95% CI 1.07–6.87) and pain catastrophizing (OR =1.11, 95% CI 1.02–8.11).

In January of 2015, the workplace implemented a new occupational prevention and management program. The

injury incidence rate ratio reduced by 58% from 2014 to 2015 (IRR =1.58, 95% CI =1.28–1.94). The ratio for disability duration reduced by 139% from 2014 to 2015 (RR =2.39, 95% CI =2.16–2.63).

In summary, WCB claims are complex. However, it appears that recognizing that nonphysical factors (ie, depressed mood, low job satisfaction, recovery expectations) influence injury claim incidence, recovery, and cost can be helpful to claims management. For example, one systematic literature review suggests that asking a worker about job satisfaction at the start of a WCB injury claim can help identify those at higher risk of delayed recovery and in need of extra attention.⁶ By accepting this finding, evidence-based occupational programming can have a positive impact on the workplace and its workers.

Disclosure

The author reports no conflicts of interest in this work.

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