

A Comparison of Opioid Use Between WCB Recipients and Other Manitobans for Knee, Shoulder, Back, and Carpal Tunnel Release Procedures

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Background *This study's objectives were to evaluate whether WCB claimants with conditions requiring certain surgical procedures are more likely to be prescribed outpatient opioids than other Manitobans and whether those prescribed opioids are more likely to still be on opioid medications 6 months post procedure.*

Methods *We compared 7,246 WCB claims for a number of surgical procedures to 65,032 similar procedures performed in other Manitobans. Logistic regression was used to explore the association between being a WCB claimant and being prescribed opioids, while controlling for type of surgical procedure and other potential confounders.*

Results *WCB claimants were more likely than other Manitobans to be prescribed opioids (adjusted OR 1.38; 95%CI 1.30–1.47). Amongst those prescribed opioids, the odds of being still on opioids 6 months post-procedure were not significantly elevated for WCB claimants (adjusted OR 1.09 95%CI 0.97–1.23).*

Conclusions *WCB claimants are prescribed opioids more often than non-claimants for similar procedures. Am. J. Ind. Med. 59:257–263, 2016. © 2016 The Authors. American Journal of Industrial Medicine Published by Wiley Periodicals, Inc.*

KEY WORDS: *Workers Compensation Board; surgery; opioids; Manitoba*

INTRODUCTION

The use of prescription opioids is a growing concern in North America [Furlan et al., 2010; MMWR 2012]. Prescription opioids have been associated with increased mortality and morbidity in the general [Calcaterra et al., 2013; Cerda et al., 2013] and Workers Compensation Board (WCB) populations [Franklin et al., 2012; Fulton-Keheo et al., 2013]. We have recently shown that a WCB claimant population is more likely to be prescribed higher doses of opioids and that these drugs are prescribed for longer durations than population based controls [Kraut et al., 2015]. Limitations of this work were that it did not control for the indication of opioid use, and only compared opioid use amongst people who were prescribed opioids as opposed to evaluating all individuals with the condition including those who were not prescribed this type of medication.

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The purposes of this study are two fold, first to address the limitations in our previous work by comparing out patient opioid use for conditions that were severe enough to require a variety of surgical procedures between a WCB population and one covered by a single payer government funded health plan, and secondly to determine whether WCB coverage is associated with a greater odds of still being prescribed opioid medications 6 months post selected surgical procedures amongst people who were prescribed opioids.

METHODS

The study was based in Manitoba, Canada that has a government funded health care system that covers nearly all provincial residents. Approximately 60% of the 1.2 million provincial residents reside in Winnipeg, its largest city. Generally all health care including listed surgical procedures are provided free of charge with no deductible to Manitoba residents. WCB claimants who have authorized surgical procedures have these procedures covered by the board and have no out of pocket costs associated with medical procedures. WCB claimants also have their outpatient medication costs and allied health services like physiotherapy covered by their claim. The government plan covers outpatient drug costs after a deductible is reached. Services such as physiotherapy are generally not covered out of hospital and are either covered out of pocket by the individual or by private insurance if the person should have coverage.

We identified all claims for a number of surgical procedures performed on WCB claimants from April 1, 1999 to March 31, 2011, among individuals age 16–65. The specific procedures identified through procedure codes were

concentrated in four major areas; knee, shoulder, and back operations and carpal tunnel releases (Table I). These claims were linked with the administrative data collected by Manitoba Health, Healthy Living and Seniors, housed in de-identified form at the Manitoba Centre for Health Policy (MCHP) in the MCHP repository as previously described [Kraut et al., 2015; Shafer et al., 2015]. The administrative data contain comprehensive health-related information, outpatient pharmacy prescription drug data since April 1, 1997, and have been linked to other data including census-based socioeconomic information, and vital status. Socioeconomic status (SES) was determined as previously described [Kraut et al., 2015]. Linkage between WCB and Manitoba population data were approximately 99% successful. Other Manitobans age 16–65 having the same procedures during the same time period were identified from the MCHP Repository. These procedures were linked to incidents of outpatient opioid use by matching unique personal identifier and the start and end date of the opioid prescriptions [Kraut et al., 2015; Shafer et al., 2015]. An incident of opioid use was defined as continuous prescriptions of opioids with no more than a 2 months gap between the end of one prescription and the start of the next. If a procedure occurred during an incident of opioid use that procedure was associated with the incident of opioid use. Procedures for which there was no opioid use for 30 days on either side of the date of the procedure were deemed to not be associated with any opioid use. Mean and maximum morphine equivalent use per day (ME/day) during the incident of opioid use were then calculated [Kraut et al., 2015; Shafer et al., 2015]. All procedure codes and procedures in the same group, that is, knee, shoulder, back or carpal tunnel, within 1 month were classified as a single condition, and were analyzed as one unit (e.g., one record in regression analysis).

TABLE I. Manitoba Health and Healthy Living Tariff Codes Utilized

Grouping	Tariff codes and explanations
Knee	1008 arthotomy or capsulotomy
	1082 dislocation, meniscectomy-excision Of semilunar cartilage
Shoulder	1027 arthroscopy with therapeutic intervention including debridement, removal of loose body, drilling
	1029 subacromial decompression
	1037 rotator cuff repair
	1038 rotator cuff repair and or superior labrum anterior–posterior (SLAP) repair and/or anterior glenohumeral stabilization and/or posterior glenohumeral stabilization
	1141 arthroplasty, plastic or reconstructive operation
	1040 shoulder stabilization with bone and/or tendon graft (allograft, autograft)
	1042 rotator cuff repair with tendon graft–allo/autograft or synthetic
Back	1654 repair, supraspinatus tendon or musculotendinous cuff
	1073 excision of more than one lumbar intervertebral disc
	1074 excision of one lumbar intervertebral disc
	5205 laminectomy for decompression of the spinal cord or nerve
Carpal tunnel	5235 decompression Median nerve at carpal tunnel, simple

Our first analyses sought to determine if WCB payment source was associated with a greater odds of being prescribed opioids. In this work, incidents of opioid use associated with multiple procedures, were not included due to inability to assign the outcome measure to a specific procedure, the unit of analysis used in the study. Including individuals with multiple procedures in this analysis is also complicated by the fact that individuals who were not prescribed opioids could not have multiple procedures as described above.

In a second analysis we evaluated whether WCB status was associated with outpatient opioid prescriptions 6 months after the procedure for all procedures in which opioids were prescribed. This analysis included individuals who had multiple procedures during the opioid incident and controlled for procedure type, number of procedures, and pre-procedure opioid use, amongst other variables. In opioid incidents that covered multiple procedures, pre and post procedure opioid usage was determined before the first and after the last procedure in the incident.

Table II lists the demographic variables for all of the procedures in the entire cohort. On average the WCB claimants accounted for 10% of the total of the selected procedures done in the study population in the province. This

ranged from 6.8% of the back procedures to 17.4% of the shoulder procedures. The WCB paid for procedures more commonly in men, individuals age 35–54 years, and in Winnipeg residents.

In our first analysis addressing whether WCB status is associated with a greater likelihood of being prescribed opioids, we compared 5,632 WCB claimant surgical procedures to 51,627 procedures in other Manitobans. These procedures were performed in 44,882 individuals. In the second analysis to determine if WCB status is associated with being prescribed opioids 6 months after the procedure in individuals prescribed opioids, we compared 4,472 opioid incidents (some with multiple procedures associated with them) in WCB claimants to 37,660 opioid incidents in other Manitobans.

Adjusted odds ratios with 95% confidence intervals (AOR; 95%CI) were the reported measure of association in both analyses. We also examined whether WCB claimants prescribed opioids were more likely to be prescribed high dose opioids, defined as ≥ 80 ME/day. Comparisons of means were analyzed with t-tests and comparison of proportions with Fisher exact testing. All data were analyzed using SAS version 9.3 (Cary, NC). This research project was approved by the Research Ethics Board of the University of Manitoba and the Health Information Privacy Committee of the Manitoba Government.

TABLE II. Demographic Comparisons of Workers Compensation Board (WCB) Paid for and Non-WCB Paid for Procedures in Manitobans Having Conditions Associated With Selected Surgical Procedures

	Payment source	
	WCB	Manitoba ^a
Total (n)	7,249	65,032
Knee (n)	3,139	37,301
Shoulder (n)	2,305	10,974
Back (n)	410	5,639
Carpal tunnel release (n)	1,395	11,118
Winnipeg resident n, (%)	4,164 (57.5%)	34,480 (53.02%)
SES 4–5 n, (%) [*]	13,230 (20.35%)	1,594 (21.99%)
Male n, (%)	4,925 (68.01%)	29,876 (45.94%)
Age group		
16–24	2.73%	7.80%
25–34	11.79%	11.78%
35–44	25.52%	21.78%
45–54	38.20%	31.96%
55–64	21.75%	26.67%
Year of procedure		
1999–2001	17.30%	23.29%
2002–2004	19.24%	24.99%
2005–2007	25.12%	22.53%
2008–2011 ^b	38.33%	29.19%

^aManitoba health, healthy living, and seniors.

^bEnding March 31, 2011.

^{*}Higher two socioeconomic status quintiles.

RESULTS

Amongst conditions associated with single procedures, WCB claimants were more likely to be prescribed opioids (all sites 66.6% vs. 60.9%) ($P < 0.0001$) (Table III). Site specific analysis revealed that for all sites with the exception of back surgery, WCB recipients were more likely to be prescribed outpatient opioids ($P < 0.001$). The maximum monthly average opioid dose per day (11.25 ME SD 50.6 vs. 10.48 ME SD 64.5 $P = 0.39$) was similar for WCB claimants and other Manitobans.

In adjusted analysis, WCB claimants were about 1.4 times more likely to be prescribed opioids (AOR 1.38; 95% CI 1.30–1.47) than other Manitobans (Table IV). Higher SES was associated with increased odds of being prescribed opioids, while male sex was associated with lower odds of being prescribed these drugs. Back and shoulder procedures had lower adjusted odds of being prescribed opioids compared to carpal tunnel (CT) release procedures. Although people with back surgeries may be less likely to be prescribed any opioids, they were over seven times as likely to be prescribed ≥ 80 ME/day using CT surgeries as the reference (OR 7.22; 95%CI 6.56–7.95). The odds ratio for being prescribed ≥ 80 ME/day was not elevated for WCB claimants in age, sex, surgical site, and SES adjusted analysis (OR 1.10 95%CI 0.88–1.38).

TABLE III. Out-Patient Prescription of Opioids According to Area of Procedure and Payment Source

Area of procedure	Payment source ^a	Number of procedures			P-value ^b
		Total	Any morphine equivalents prescribed (n, %)		
Shoulder	WCB	1416	835	59.0%	<0.0001
	MB	6759	3216	47.6%	
Knee	WCB	2686	1904	70.9%	<0.0001
	MB	30845	19673	63.8%	
Back	WCB	229	145	63.3%	0.330
	MB	3583	2149	60.0%	
Carpal tunnel	WCB	1301	866	66.6%	<0.0001
	MB	10440	6416	61.5%	
All sites combined	WCB	5632	3750	66.6%	<0.0001
	MB	51627	31454	60.9%	

^aWCB, Workers Compensation Board; MB, Manitoba health, healthy living, and seniors.

^bFisher exact tests.

Amongst incidents of opioid use associated with a variety of surgical procedures, WCB recipients appeared to be more commonly prescribed opioids 3 months before their initial procedure than other Manitobans (18.9% WCB (n = 844), versus, 15.7% other Manitobans (n = 5,903)). At 6 months post procedure or post last procedure for incidents with

multiple procedures, 447 WCB recipients (10.00%) were still being prescribed opioids while 9.24% (n = 3,478) of the provincial comparison group were still on these medications. In adjusted analysis, WCB payment source was associated with a non-significantly increase odds of being prescribed opioids 6 months post procedure (AOR 1.09; 95%CI 0.97–1.23). Male sex, age older than 34, higher SES, pre procedure opioid use, all procedure sites, number of procedures, and date of the first procedure post 2005 were all associated with 6 month post procedure opioid use (Table V).

TABLE IV. Adjusted Odds Ratios for Receiving any Outpatient Opioids for Conditions Associated With Selected Surgical Procedures^a

	Odds ratio	95%CI
WCB payment source	1.38	1.30–1.46
Male	0.88	0.85–0.92
Age (years) at surgery		
16–24 (reference)	1.00 (ref)	
25–34	2.02	1.87–2.19
35–44	1.91	1.78–2.05
45–54	1.60	1.50–1.71
55–64	1.36	1.27–1.46
Winnipeg resident	1.01	0.98–1.05
Socioeconomic status quintiles 4–5	1.04	0.99–1.08
Procedure site		
Carpal tunnel (reference)	1.00 (ref)	
Knee	1.09	1.05–1.15
Shoulder	0.56	0.53–0.60
Back	0.85	0.79–0.92
Year of surgery		
1999–2001 (reference)	1.00 (ref)	
2002–2004	1.18	1.12–1.24
2005–2007	1.08	1.03–1.14
2008–2011 ^b	0.77	0.73–0.81

^aReference groups Manitoba health, healthy living, and seniors payment source, female sex, non-Winnipeg resident, lower three socioeconomic status groups.

^bEnding March 31, 2011.

DISCUSSION

These procedure specific results show that WCB claimants are prescribed opioids more often than non-claimants for similar procedures. They are consistent with our previous findings [Kraut et al., 2015] that WCB claimants are prescribed more opioids than other Manitobans. We did not find that WCB claimants were more likely to be prescribed ≥ 80 ME/day than other Manitobans for similar procedures. The higher differences in prescription of ≥ 80 ME/day for back versus carpal tunnel syndrome surgeries is consistent with the intensity of the surgery. Although WCB claimants may have a slightly elevated risk of being prescribed opioids 6 months post procedure than the provincial controls, this association and evidence was weak (OR 1.09, 95%CI 0.97–1.23). Based on descriptive analysis, they may be more likely to be on these medications 3 months pre-procedure. For this reason, the duration of pre-procedure opioid use was controlled for in our work. These results suggest that WCB status may influence the likelihood of being prescribed opioids, but once prescribed the likelihood of ongoing opioid prescriptions both for duration and extent for WCB recipients is similar to other Manitobans.

TABLE V. Adjusted Odds Ratios for Being on Continuous Opioids at 6 Months Post-Procedure for Conditions Associated With Selected Surgical Procedures^a

	Odds ratio	95%CI
WCB payment source	1.09	0.97–1.23
Male sex	1.19	1.10–1.29
Age (years) at surgery		
16–24 (reference)	1.00 (ref)	
25–34	1.19	0.94–1.51
35–44	1.68	1.35–2.08
45–54	1.65	1.33–2.05
55–64	1.75	1.41–2.18
Winnipeg resident	1.02	0.94–1.10
Socioeconomic status (quintiles 4–5)	1.59	1.45–1.73
Procedure site ^b		
Carpal tunnel	1.69	1.50–1.91
Knee	1.49	1.37–1.62
Shoulder	1.39	1.30–1.50
Back	1.84	1.68–2.02
Year of (first) surgery		
1999–2001 (reference)	1.00 (ref)	
2002–2004	1.10	0.98–1.24
2005–2007	1.27	1.13–1.42
2008–2011 ^c	1.16	1.04–1.31
Duration of pre-surgery opioid use (per month) ^d	1.17	1.17–1.18

^aReference groups Manitoba health, healthy living, and seniors payment source, female sex, non-Winnipeg resident, lower three socioeconomic status groups.

^bThe ORs are for each one of the specified procedure type. For example, an individual with two knee procedures would have $1.49^2 = 2.22$ the odds of continuous opioid use 6 months post (last) procedure, compared with an individual with 0 knee procedures. Note that no reference is needed because each procedure type can have 0, 1, 2, . . . or more.

^cEnding March 31, 2011.

^dThe ORs are per month. For example, a person with 5 months of pre-(first)-surgery opioid use would have $1.17^5 = 2.19$ times greater odds than a person with no (0 months) of pre-surgery opioid use, of continuous opioid use 6 months post (last) procedure.

A number of studies have been performed comparing outcomes between WCB recipients with non-WCB patients for a variety of surgical procedures. WCB recipients fared more poorly than control groups after lumbar fusion operations [Carreon et al., 2010] even when compared to people receiving other forms of long term disability coverage [Gum et al., 2013]. Although shoulder surgery in WCB recipients has been associated with worse outcomes in a number of studies [Lopez et al., 2000; Cuff and Pupello, 2012; Kim et al., 2014; Morris et al., 2014], Balyk et al. [2008] reported that the differences that they observed were no longer significant when preoperative patient characteristics in the WCB population was included in the analysis. Nicholson [2003] did not observe a difference in outcomes for a WCB population having arthroscopic acromioplasty for

subacromial impingement syndrome, although this group did have a longer time off work, possibly having to do with their heavier work demands. WCB recipients, although worse at baseline and in the early post-operative period on self-reported symptom and function scores after carpal tunnel release procedures, were no different at 3 months in these measures than a control population [Cagle et al., 2014], but did have worse outcomes in another study [Duncan et al., 2010]. WCB coverage was shown to be associated with worse outcomes after total knee arthroplasty in a WCB population in Ontario [de Beer et al., 2005]. While a study of anterior cruciate ligament reconstruction surgeries from Mississippi reported more symptoms post surgery in WCB recipients than non-WCB recipients [Barrett et al., 2001]. Although the results of the above studies, consistent with our work, are mixed, many report worse outcomes in WCB claimant populations.

WCB recipients may have poorer post-surgical outcomes [Harris et al., 2005] and be at risk for increasing opioid prescription for a variety of reasons. Cuff and Pupello (2012) reported WCB recipients who had rotator cuff repairs that were less likely to be compliant with a post-operative protocol of shoulder immobilization and physical therapy. Atlas et al. [2007] suggested that differences in socioeconomic characteristics may explain the different outcomes in WCB patients with lumbar radiculopathy. Pain and Oswestry Disability Index scores have been shown to correlate with workers compensation and litigation status in a study of patients with spinal disorders [Prasarn et al., 2012]. WCB recipients with spinal disorders were reported to score lower in a variety of measures in the Short Form Health Survey (SF-36) that was attributed by the authors to psychological factors [Hee et al., 2001]. Legal representation in WCB claims has been associated with poorer outcomes for back surgery [Anderson et al., 2015] and carpal tunnel releases [Katz et al., 2001].

Prescription opioids usage is a significant issue in WCB populations. A number of studies have shown various outcomes including increased work disability, time loss, and claim cost in workers' compensation populations prescribed opioids [Webster et al., 2007], [Franklin et al., 2008], [Parks et al., 2010; Volinn et al., 2009]. Dependence and addiction are common consequences of chronic opioid therapy, which can occur in up to one-third of patients [Juurlink & Dhalla 2012].

Our study has a number of limitations. We did not control for mental health, which may influence opioid use and outcomes [Cheng et al., 2013; Parhami et al., 2012]. Second, we lack information about level of function in people prescribed opioids. As we looked at only four procedure sites, our results cannot be extrapolated to other conditions treated with opioids. Finally, we have no information on in-hospital patient usage of opioids for those procedures inpatient admission, since admission in the

immediate post-operative period, when pain would likely be maximal, may influence the need for outpatient pain control a few days later.

The major strength of our study is that we are able to compare opioid use in large numbers of WCB recipients having conditions associated with four different types of surgeries, to a population based control group, while controlling for a variety of potential confounding factors including age, sex, area of residence and SES. Our study had around 200 to over 2,500 WCB covered procedures depending on the site. By comparison most other studies comparing WCB to non WCB populations that reported the number of WCB cases in their study had fifty or less [Lopez et al., 2000; Barrett et al., 2001; Nicholson 2003; de Beer et al., 2005; Balyk et al., 2008; Duncan et al., 2010; Cuff and Pupello, 2012; Gum et al., 2013; Kim et al., 2014; Morris et al., 2014] with one study including 60 WCB claimants [Carreon et al., 2010]. We also had detailed information for opioid prescriptions from a comprehensive source to allow for accurate calculation of the prescribed amount of ME/day. In addition, as WCB recipients in Manitoba receive care from their usual medical providers, our results are unlikely to be biased by WCB claimants only seeing select physicians who may have different prescribing habits than other physicians in the area.

In summary, our results show that WCB claimants having conditions associated with a variety of surgical procedures are more likely to be prescribed opioid medications than other Manitobans. However amongst those prescribed opioids, WCB claimants are not more likely to be on these medications 6 months after their procedure than other Manitobans after adjusting for pre procedure opioid use and other confounding variables. Ensuring that the appropriate pain medications and doses are used in this population is extremely important to limit potential adverse outcomes [Franklin et al., 2012].

AUTHORS' CONTRIBUTIONS

AK and LS had substantial contributions to the conception or design of the work; all authors were involved in data acquisition, LS performed the analysis, all authors were involved in the interpretation of data for the work; AK drafting the work; all authors revising it critically for important intellectual content, gave final approval of the version to be published and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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DISCLOSURE (AUTHORS)

The authors report no conflict of interest.

DISCLOSURE BY AJIM EDITOR OF RECORD

Steven Markowitz declares that he has no competing or conflicts of interest in the review and publication decision regarding this article.

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