

# Work Enabling Opioid Management

Robert A. Lavin, MD, MS, Nimisha Kalia, MD, MPH, MBA, Larry Yuspeh, BA,  
Jill A. Barry, BSN, RN, COHN-S, WCCM, Edward J. Bernacki, MD, MPH,  
and Xuguang (Grant) Tao, MD, PhD

**Objective:** This study describes the relationship between opioid prescribing and ability to work. **Methods:** The opioid prescription patterns of 4994 claimants were studied. Three groups were constructed: 1) at least 3 consecutive months prescribed (chronic opioid therapy; COT); 2) less than 3 consecutive months prescribed (acute opioid therapy; AOT); and 3) no opioids prescribed. Variables included sex, age, daily morphine equivalent dose (MED), days opioids were prescribed, temporary total days (TTDs), and medical/indemnity/total costs. **Results:** The COT versus AOT claimants had higher opioid costs (\$8618 vs \$94), longer TTD (636.2 vs 182.3), and average MED (66.8 vs 34.9). Only 2% of the COT cohort were not released to work. Fifty-seven percent of patients in the COT category (64 of 112) were released to work while still receiving opioids. **Conclusion:** COT does not preclude ability to work when prescribing within established guidelines.

The use of opioids has been associated with prolonged workers' compensation claim duration and higher costs.<sup>1–8</sup> Previously published studies attribute poor claims outcomes to early opioid prescribing postinjury, amount of opioid prescribed, and the duration of opioid use. In contrast, few studies have examined whether ongoing prescription opioids preclude claimants from working.<sup>1,9,10</sup> However, one study revealed that 15.9% of injured workers on disability improved their level of function while receiving stable doses of opioids over a 1-year period.<sup>1</sup> Another study indicated that a minority of individuals receiving opioids over a 1-year period (15 of 78) experienced enough improvement in their level of function to be able to return to work.<sup>9</sup> A third study observed that only a minority of injured workers were able to return to work after receiving opioids.<sup>10</sup>

The Johns Hopkins Occupational Injury Clinic was established in 1992 to treat Johns Hopkins Hospital and University employees injured in the course of their employment. Previous papers describe the coordinated approach to the diagnosis, treatment, and management of injured employees at the Johns Hopkins Medical Institutions (JHMI).<sup>11,12</sup> The major components of the program include an initial evaluation and treatment of the injury by nurse practitioners overseen by a Physical Medicine and Rehabilitation (PM&R) physician, referral to surgical specialists for the assessment and treatment of complicated injuries, and close follow-up of all injured individuals by nurse practitioners and PM&R specialist. Ergonomic and job analyses, job placement, and

rehabilitation (eg, physical and occupational therapies) are integrated into all phases of the assessment and treatment process. The program also includes pain management utilizing chronic stable daily doses of opioids for individuals who are compliant with their rehabilitation and medication management programs, and exhibit documented functional improvements. Opioids are considered as a valuable adjunct to injury management. They are part of a multimodal approach to rehabilitating injured workers with the specific goal of improving physical function and facilitating return to work.

In the current study, we describe the relationship between opioid-prescribing patterns, duration of use, and claim cost, as they relate to injured workers receiving prescription opioids for the population treated in the Occupational Injury Clinic.

## METHODS

The Johns Hopkins Workers' Compensation Claims System (JHWCS) is an administrative claims database with information on injured employees at JHMIs. The database contains data on patient demographics, injury diagnosis/treatment, prescription medication, and associated payments. The study cohort for this analysis included all injured lost time workers receiving indemnity payments. From January 1, 1994, to December 31, 2016,  $N = 4994$  patients were treated in the Occupational Injury Clinic. Institutional Review Board approval was not required because this was a secondary claims analysis of de-identified data. From this cohort, three mutually exclusive patient groups were generated on the basis of their opioid prescription patterns. Chronic opioid therapy (COT) was defined as opioid prescriptions lasting for three consecutive months or more.<sup>13</sup> Employees receiving opioids for less than 3 consecutive months were referred to as those on acute opioid therapy (AOT). This analysis summarized claims data at the patient-level rather than the claim-level. For any one individual, one or more injuries may have occurred and multiple opioid prescriptions related to individual claims exist. This approach quantifies continual opioid use in the same patients over time. The time between the first and last opioid prescription was determined and patients were categorized into the following: 1) at least 3 months of consecutive opioid use (COT group,  $N = 112$ ); 2) less than 3 consecutive months of opioid use (AOT group,  $N = 419$ ); and 3) no opioid use ( $N = 4463$ ). The variable "released to work" was used to determine the time point at which lost time was terminated and an employee was capable of returning to work (as adjudicated by practitioners in the Johns Hopkins Occupational Injury Clinic).

The morphine equivalent dosage (MED) for each opioid prescription was calculated. Methods for this conversion have been used and prescribed previously.<sup>14</sup>

## Analysis

Descriptive statistics regarding sex, age, opioid prescriptions/costs, MED (mg), days of supply, temporary total days (TTDs), medical/indemnity/total cost, and return to work (days) are summarized for the three patient groups. In addition, we report the total number of employees and average MED per supply day by months of consecutive opioid usage. We also report the difference between the total number of opioid prescription supply days and TTD. Opioid supply days minus TTD is a surrogate for the number of

From the Department of Neurology, University of Maryland School of Medicine, Baltimore, Maryland (Dr Lavin); Division of Occupational and Environmental Medicine, Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, Maryland (Drs Kalia, Tao); Strategic Risk and Strategy Management, Louisiana Workers' Compensation Corporation, Baton Rouge, Louisiana (Mr Yuspeh); Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, Maryland (Mr Yuspeh, Dr Bernacki); Workers' Compensation Department, Johns Hopkins Health System & Johns Hopkins University, Baltimore, Maryland (Ms Barry); Dell Medical School—The University of Texas at Austin, Austin, Texas (Dr Bernacki).

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Address correspondence to: Xuguang (Grant) Tao, MD, PhD, Associate Professor of Medicine, Division of Occupational and Environmental Medicine, Department of Medicine, Johns Hopkins University School of Medicine, 2024 E Monument St, Suite 1-300, Baltimore, MD 21205 (Xtao1@jhmi.edu)

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**TABLE 1.** General Information of JHWCS Opioid Management Data

Variables	≥3 Consecutive Months	<3 Consecutive Months	No Opioid	Grand Total
Number of injured workers	112	419	4,463	4994
Female	71.4%	68.5%	71.1%	70.9%
Average age	57.3	52.7	53.0	53.1
Ave. number of opioids Prescriptions	58.4	2.6		
Average opioid Cost	\$8,618	\$94		
Opioid cost over total cost	3.61%	0.16%		
Average total MEDs	96,504.0	1,004.6		
Ave. prescription opioid supply days	1,444.4	28.8		
Average MED per supply day	66.8	34.9		
Injured workers not released to work	2	1	3	6
Injured workers released to work	110	418	4,460	4,988
Injured workers Released to work	98.2%	99.8%	99.9%	99.9%
Average TTD	636.2	182.3	56.7	80.2
Ave. medical cost per injured worker	\$121,334	\$23,817	\$5,853	\$9,950
Ave. indemnity Cost per injured worker	\$109,004	\$31,572	\$9,526	\$13,607
Ave. total cost per injured worker	\$238,708	\$57,831	\$16,350	\$24,817
Cost per TTD	\$375	\$317	\$288	\$309
Medical cost of total cost	50.8%	41.2%	35.8%	40.1%
Ave. prescrip. opioid supply Days minus TTD	808.2	−153.5		
Average number of claims	2.9	2.7	1.9	2.0
Average total cost per claim	\$81,510	\$21,539	\$8,798	\$12,715

JHWCS, Johns Hopkins Workers Compensation System; MED, morphine equivalent dose; TTD, total temporary days.

days at work while taking opioid medication. A positive number indicates that the opioid supply days are greater than TTD and is indicative of the worker being released to work while taking opioid medication. Data were obtained retrospectively, so it is not known whether opioids were used as prescribed or whether there was noncompliance with indicated dosing regimens. Drug testing and reliance on the State (Maryland) prescription drug monitoring program were only instituted within the last 2 years, so diversion cannot be excluded before this time. However, reports of early refills and lost prescriptions were extremely rare. The consequence for reported aberrancies was more frequent visits with the prescribing physician and tapering/discontinuation of opioids.

## RESULTS

Among the entire cohort ( $N = 4994$ ), males represented just under 30% of the total claimants. This cohort is similar to the composition of the JHMI workforce, which is approximately 76% female (Table 1). Gender distribution remained similar across all three patient groups (COT; AOT; no opioids). The mean age of the workforce was 53.1 years. The average age of the COT group was slightly older (57.3 years) than the other two groups. The average number of claims filed per individual claimant was similar for the two opioid groups and lower for the nonopioid group. As summarized in Table 1, 99.9% of the nonopioid claimants, 99.8% for the AOT claimants, and 98.2% for the COT claimants were released to work following treatment.

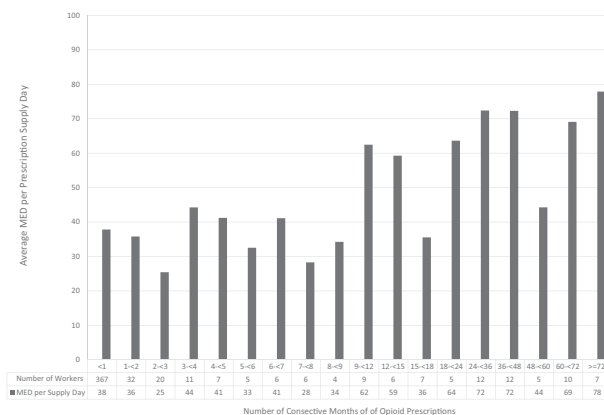
Of the 4994 claimants, 10.6% ( $n = 531$ ) were prescribed opioid medications (Table 1), and approximately one in five claimants prescribed any opioids received COT ( $n = 112$ ; 21.1%). Among the 112 COT claimants, 57.1% ( $n = 64$ ) received opioids for more than 1 year. The longest claim duration was 105 months.

In Table 1, comparing claimants receiving COT versus AOT, substantial differences were observed between the two groups in the average number of opioid prescriptions (58.4 vs 2.6), average opioid costs (\$8618 vs \$94), average total MEDs prescribe (96,504.0 vs 1004.6), and average number of prescription days (1444.4 vs 28.8). The average MED per day for COT claimants (66.8 mg/day) is nearly twice the dose for AOT claimants (34.9 mg/day). Figure 1 shows the distribution of claimants and MED per day by consecutive

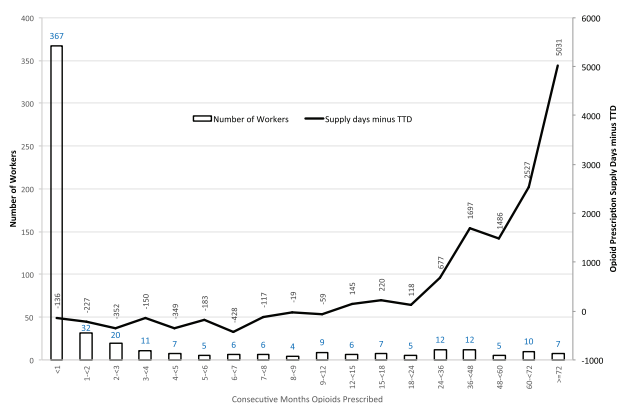
months of prescribed opioids. In general, average MED (per supply day) increased with longer opioid use with a range of 28 to 78 MED for COT employees.

Table 1 indicates that the COT claimants average TTD (636.2) was less than the average days prescribed opioids (1444.4). The TTD may not have been consecutive days because workers with exacerbations or subsequent claims may have taken time off intermittently. However, the average COT claimant had been prescribed opioid medication for 808.2 days after being released for work and the average prescribed dosage was 66.8 MED per day. In contrast, the average AOT claimant was released to work after opioid prescribing had been discontinued because the average TTD (182.3 days) was 153.8 days longer than the average number of days that opioids were prescribed (28.5 days).

Figure 2 presents the distribution of prescription supply days for opioid medications and TTDs by consecutive opioid prescription months. There were 419 (78.9%) of 531 workers who were prescribed opioid medications less than 3 consecutive months, while



**FIGURE 1.** Number of employees and average MED per prescription supply day by number of consecutive months of opioid prescriptions.



**FIGURE 2.** Opioid prescription supply days minus temporary total days. Number of workers. Supply days—TTD.

112 (21.1%) were prescribed opioids for 3 consecutive months or longer (Fig. 2). Of the 112 COT claimants, 57.1% ( $n = 64$ ) received prescription opioids for greater than 12 consecutive months. After a consecutive 12-month period, the number of days that opioids were prescribed was greater than the number of TTDs (shown as “Opioid Prescription Supply Days minus Temporary Total Days”) (Fig. 2). A positive number is indicative of the worker being released to work while taking opioid medication. Thus, these 64 claimants were receiving prescription opioids after they were released to work.

The average total compensation costs were 3.5 times greater for the AOT group than the nonopioid group (Table 1). The average total compensation cost for the COT group was 4.1 times greater than the AOT group. The percentage of medical cost to total cost was 40.1% for the entire cohort, which ranged between 35.8% for the no-opioid group and 50.8% for the COT group. The TTDs increased 3.2-fold for the AOT group compared with the nonopioid group, while the TTD increased 3.5-fold for the COT group compared with the AOT group. However, the cost per TTD increased more modestly for the three claims groups: \$288 for the nonopioid group, \$317 for the AOT group, and \$375 for the COT group. For the AOT and COT groups, the percentages of the average opioid costs were only 0.16% and 3.61% of total costs, respectively.

## DISCUSSION

Our previous studies and other published reports have shown that opioids are a marker for adverse workers’ compensation outcomes,<sup>1,3,8,14–16</sup> characterized by longer duration of disability and higher costs. However, these studies did not follow injured workers released to work while still receiving opioids. This study reveals that almost all the claimants—even those receiving opioids for more than 3 years—were released to work, and the majority of claimants prescribed opioids for 3 months or more were released to work while taking opioids. Therefore, the ongoing prescription of opioids by a trained and experienced clinician does not preclude the employee from working.

The reason that COT claimants were prescribed opioids for a period exceeding their work release was because ongoing medical treatments continued even after TTD ended. It is likely that judicious opioid prescribing (as evidenced by average MED per day within the range recommended by the CDC),<sup>17</sup> in conjunction with ongoing case management and efforts to match injured workers to appropriate occupational activities, played a role in return to work. The Johns Hopkins Occupational Injury Program uses a multimodal approach to manage pain and rehabilitate injured workers, including self-care modalities, physical and occupational therapies, ergonomic modifications, as well as opioid and nonopioid pharmacologic treatments. Consequently, work-facilitating opioids are

utilized as one part of the treatment plan to improve functional outcomes for a select group of injured workers.

Our previous studies in a different group of injured workers who were prescribed opioids have shown that a group of claimants experienced substantial dose escalation and prolonged claims durations.<sup>6,14,18</sup> Other studies have confirmed similar findings.<sup>1,7–9,19</sup> The main findings in these studies are in contrast to the current study wherein average MED per day did not increase dramatically over the duration of the claim and remained within the recommendations of the recent CDC guidelines of less than 90 MED per day.<sup>17</sup> However, three studies documented benefits for a minority of injured workers prescribed long-term opioids whose dose remained stable and function improved.<sup>1,9,10</sup> Aronoff<sup>10</sup> noted that a select group of injured workers applying for/receiving disability payments were able to return to work after experiencing improved analgesia from prescription opioids. Watson et al<sup>9</sup> noted that close to 20% of individuals receiving opioids returned to work, these individuals were more likely to be prescribed lower dose opioids. This study also found that individuals receiving lower doses (<240 mg/day) had significantly better scores on the Short Form 12v2 work interference scale. Franklin et al<sup>1</sup> reported that 15.9% of injured workers experienced a 30% improvement in physical function without opioid dose escalation. In another study, full time employment was inversely associated with misuse of opioids,<sup>20</sup> so injured workers who return to gainful employment may be less prone to opioid misuse.

One concern regarding opioid use in the occupational setting is the effect of opioids on workers’ cognition and safety. There is evidence that long-term opioids, at least for some individuals, can improve pain and mood without impairing cognitive function.<sup>21,22</sup> In contrast to the recent focus on opioids as a source of disability,<sup>7,8,23–29</sup> we have found that the continuation of opioids beyond the TTD in the COT group suggests that opioids do not prevent some claimants from working while receiving opioids.

The most severe injuries are most likely to require strong analgesics, such as opioids, and it is the severity of the injury, not the opioid, that is responsible for prolonged disability.<sup>3</sup> Consequently, it is plausible that COT may actually facilitate continued employment after a severe injury in this population.

This study found that opioids prescribed to injured workers for longer time periods were associated with significantly higher claim costs and claim durations, which is consistent with our previous research and that of others.<sup>1,6,8,14,15,18,30</sup> However, opioid costs and MED did not increase dramatically for longer duration claims. Importantly, opioid costs accounted for less than 4% of the average total costs, although this cost increased up to 14% for the longest duration COT claims. Consequently, opioids did not independently account for higher claims costs. Instead, they are a proxy for higher cost claims presumably due to more severe underlying injury and pain. Opioids may contribute indirectly to higher medical costs by virtue of the increased number of provider visits and medical surveillance costs. Greater claim costs in this study were due to the duration of TTD and number of days that opioids were prescribed.

There are several limitations to this study. First, it is a retrospective study and termination of the disability claim (end of TTD) was defined as “release to work.” It is possible that some injured workers did not return to the same job because they received work accommodations or were assigned to more sedentary jobs. Second, TTDs were not calculated on the basis of consecutive days, as workers may have experienced injury exacerbations or had additional claims leading to nonconsecutive lost time. If the TTDs were nonconsecutive in a claim, then it is likely that the claimant would have returned to work earlier after an injury. Consequently, it is possible that more COT claimants were receiving opioids while working. Third, the claims in this study were not categorized on the basis of type of injury, body part, or occupation. Fourth, the opioid compliance of AOT claimants is uncertain, as they received a



limited number of prescriptions for a short period of time. Fifth, compliance with prescription opioid dosing could not be determined for the entire study period because drug screens were not routinely performed initially. Data abstracted from earlier study years predated use of drug screens as part of routine standard of care. However, during the final 2 years of the study, urine drug screens and the State of Maryland's prescription drug monitoring plan were utilized to assess compliance. There was no evidence of diversion or aberrant activity that lead to discontinuation of opioids during these years. Finally, it is not known whether higher opioid dose and duration can be explained by higher morbidity injuries, and whether there is an association with types of surgeries.

In summary, the vast majority of injured workers in this study were released to work, and received opioid doses consistent with the CDC guidelines (<90 MED per day) and 57% of workers were released to work while continuing to receive opioids. The prescription of opioids for 3 or more consecutive months is associated with higher claim costs and claim durations. However, opioids were observed to be a proxy for more significant injuries, and the cost of opioids was felt to be associated with claim costs, and not a driver of claim costs. Finally, the duration of TTD and the number of days that opioids are prescribed most likely explains higher claim costs.

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### REFERENCES

- Franklin GM, Rahman EA, Turner JA, et al. Opioid use for chronic low back pain: a prospective, population-based study among injured workers in Washington State, 2002–2005. *Clin J Pain*. 2009;25:743–751.
- Franklin GM, Stover BD, Turner JA, et al. Early opioid prescription and subsequent disability among workers with back injuries: the Disability Risk Identification Study Cohort. *Spine (Phila Pa 1976)*. 2008;33:199–204.
- Gross DP, Stephens B, Bhambhani Y, et al. Opioid prescriptions in Canadian Workers' Compensation claimants: prescription trends and associations between early prescription and future recovery. *Spine (Phila Pa 1976)*. 2009;34:525–531.
- Kidner CL, Mayer TG, Gatchel RJ. Higher opioid doses predict poorer functional outcome in patients with chronic disabling occupational musculoskeletal disorders. *J Bone Joint Surg Am*. 2009;91:919–927.
- Mahmud MA, Webster BS, Courtney TK, et al. Clinical management and the duration of disability for work-related low back pain. *J Occup Environ Med*. 2000;42:1178–1187.
- Tao XG, Lavin RA, Yuspeh L, et al. The association of the use of opioid and psychotropic medications with workers' compensation claim costs and lost work time. *J Occup Environ Med*. 2015;57:196–201.
- Volinn E, Fargo JD, Fine PG. Opioid therapy for nonspecific low back pain and the outcome of chronic work loss. *Pain*. 2009;142:194–201.
- Webster BS, Verma SK, Gatchel RJ. Relationship between early opioid prescribing for acute occupational low back pain and disability duration, medical costs, subsequent surgery and late opioid use. *Spine (Phila Pa 1976)*. 2007;32:2127–2132.
- Watson CP, Watt-Watson J, Chipman M. The long-term safety and efficacy of opioids: a survey of 84 selected patients with intractable chronic noncancer pain. *Pain Res Manag*. 2010;15:213–217.
- Aronoff GM. Opioids in chronic pain management: is there a significant risk of addiction? *Curr Rev Pain*. 2000;4:112–121.
- McGrail Jr MP, Tsai SP, Bernacki EJ. A comprehensive initiative to manage the incidence and cost of occupational injury and illness. Report of an outcomes analysis. *J Occup Environ Med*. 1995;37:1263–1268.
- Bernacki EJ, Tsai SP. Ten years' experience using an integrated workers' compensation management system to control workers' compensation costs. *J Occup Environ Med*. 2003;45:508–516.
- Von Korff M, Saunders K, Thomas Ray G, et al. De facto long-term opioid therapy for noncancer pain. *Clin J Pain*. 2008;24:521–527.
- Bernacki EJ, Yuspeh L, Lavin R, et al. Increases in the use and cost of opioids to treat acute and chronic pain in injured workers, 1999 to 2009. *J Occup Environ Med*. 2012;54:216–223.
- Tao XG, Lavin RA, Yuspeh L, et al. Impact of the combined use of opioids and surgical procedures on workers' compensation cost among a cohort of injured workers in the state of Louisiana. *J Occup Environ Med*. 2012;54:1513–1519.
- Tao XG, Lavin RA, Yuspeh L, et al. Natural history of opioid dosage escalation post-injury: a cohort study of injured workers in the State of Louisiana. *J Occup Environ Med*. 2012;54:439–444.
- Dowell D, Haegerich TM, Chou R. CDC guideline for prescribing opioids for chronic pain: United States, 2016. *JAMA*. 2016;315:1624–1645.
- Lavin RA, Tao XG, Yuspeh L, et al. Relationship between opioid prescribing patterns and claim duration and cost. *J Occup Environ Med*. 2016;58:e90–e93.
- Henry SG, Wilsey BL, Melnikow J, et al. Dose escalation during the first year of long-term opioid therapy for chronic pain. *Pain Med*. 2015;16:733–744.
- Perlmutter AS, Conner SC, Savone M, et al. Is employment status in adults over 25 years old associated with nonmedical prescription opioid and stimulant use? *Soc Psychiatry Psychiatr Epidemiol*. 2017;52:291–298.
- Haythornthwaite JA, Menefee LA, Quatrano-Piacentini AL, et al. Outcome of chronic opioid therapy for non-cancer pain. *J Pain Symptom Manage*. 1998;15:185–194.
- Jamison RN, Raymond SA, Slawsby EA, et al. Opioid therapy for chronic noncancer back pain. A randomized prospective study. *Spine (Phila Pa 1976)*. 1998;23:2591–2600.
- Bohner AS, Valenstein M, Bair MJ, et al. Association between opioid prescribing patterns and opioid overdose-related deaths. *JAMA*. 2011;305:1315–1321.
- Chou R, Turner JA, Devine EB, et al. The effectiveness and risks of long-term opioid therapy for chronic pain: a systematic review for a National Institutes of Health Pathways to Prevention Workshop. *Ann Intern Med*. 2015;162:276–286.
- LeResche L, Saunders K, Dublin S, et al. Sex and age differences in global pain status among patients using opioids long term for chronic noncancer pain. *J Womens Health (Larchmt)*. 2015;24:629–635.
- Manchikanti L, Abdi S, Atluri S, et al. American Society of Interventional Pain Physicians (ASIPP) guidelines for responsible opioid prescribing in chronic non-cancer pain: Part I—evidence assessment. *Pain Physician*. 2012;15(3 Suppl):S1–S65.
- Sullivan MD, Howe CQ. Opioid therapy for chronic pain in the United States: promises and perils. *Pain*. 2013;154(Suppl 1):S94–S100.
- Trescot AM, Helm S, Hansen H, et al. Opioids in the management of chronic non-cancer pain: an update of American Society of the Interventional Pain Physicians' (ASIPP) Guidelines. *Pain Physician*. 2008;11(2 Suppl):S5–S62.
- Von Korff MR. Long-term use of opioids for complex chronic pain. *Best Pract Res Clin Rheumatol*. 2013;27:663–672.
- Tao XG, Lavin RA, Yuspeh L, et al. Is early prescribing of opioid and psychotropic medications associated with delayed return to work and increased final workers' compensation cost? *J Occup Environ Med*. 2015;57:1315–1318.