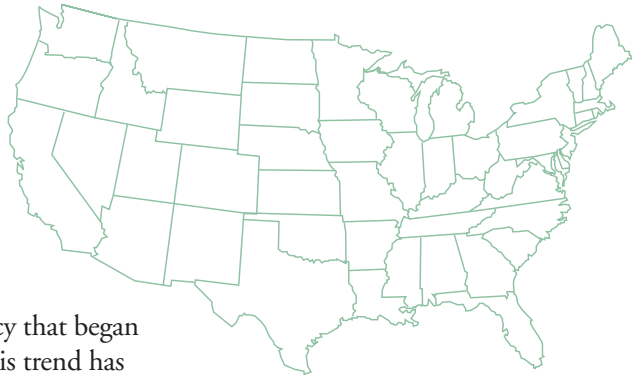
NATIONAL ACADEMY OF·SOCIAL INSURANCE

UNDERSTANDING OPIOIDS

in the context of Workers' Compensation

by Jay Patel



Introduction

Since 1999, nearly 450,000 people have died from an opioid-related overdose in the United States, with over 200,000 of those deaths attributable to prescription opioids.[1] Opioid-related overdose deaths (ORODs) are seen as a major contributing factor, along with alcohol-related illnesses and suicide, to the alarming trend of decreasing U.S. life expectancy that began in 2014. Coined by some researchers as "deaths of despair," this trend has devastated the country, with particular regions and segments of the population hit hardest.

At the beginning of the crisis, ORODs were most heavily concentrated among low-income whites. From 2000-2013, middle-aged white, non-Hispanic Americans saw an increase in mortality of 200 percent from alcohol and drug overdoses that drove the decrease in their life expectancy.[2*] This crisis was closely linked to educational attainment, with much higher rates of mortality by opioids, alcohol, and suicide among those holding a high school diploma or less, than among people with higher education.[3]

Understanding the relationships among workers' compensation programs, opioids, and workplace overdose is important not only for worker safety, but also for the U.S. economy and society more broadly.

The trend did not remain limited to this demographic, however. Between 2010 and 2017, "deaths of despair" increased among those considered to be in the prime years of life, ages 25 to 44, across all racial groups and education levels, reducing overall U.S. life expectancy.[4] Although 2018 saw a very small reversal, with an increase of 0.1 percent in life expectancy from 2017,[5] and a decrease in overall ORODs,[6] the 2018 Occupational Safety and Health Administration report on occupational fatalities[7] reveals that, for the sixth consecutive year, unintentional overdoses accounted for a larger share of work-related fatalities than in the prior year (305 in 2018, up 11 percent from 272 in 2017).[8]

Despite caution against such practices from clinical guidelines, injured workers are routinely treated with high doses of, and long-term prescriptions for, opioids, especially when they are administered through the workers' compensation system.[9] Increased opioid dispensing increases the risk for opioid-related morbidity – dependence, abuse, and overdose. This abuse and dependence are linked with both more costly workers' compensation claims and reduced work productivity. Understanding the relationships among workers' compensation programs, opioids, and workplace overdose is important not only for worker safety, but also for the U.S. economy and society more broadly.[10]

NATIONAL ACADEMY OF·SOCIAL INSURANCE

At the National Academy of Social Insurance, **Jay Patel** is a Research Assistant for Income Security Policy. The Academy gratefully acknowledges **Les Boden** and **Elaine Weiss** for their contributions to this spotlight.

* The opioid crisis hitting white, rather than Black communities, is likely a reason that it has garnered more public attention than prior drug crises, such as crack, and that the government's reaction has been geared toward treatment and rehabilitation rather than punishment and incarceration. See Hansen and Netherland (2016) on how race created divergent representations in media coverage and policy responses.

Workplace injuries and opioids

There is a substantial body of literature on the associations among opioid prescriptions, injured workers, and workers' compensation programs. A review of this research indicates that injured workers are widely prescribed opioids for pain management through the workers' compensation system.[11] A study of Washington's State Fund claims, for example, found that more than one third of patients received opioids for lower back pain, with more than half of those patients being prescribed opioids on their first visit to a doctor.[12] Rates were even higher among workers with lost-time injuries of more than seven days. Data from 27 states shows that between half and well over three quarters (52-85 percent) of workers whose doctors prescribed medication for the treatment of pain were prescribed opioids.[13] Injured workers who file claims through workers' compensation are also more likely to receive higher doses of opioids, compared to workers who receive treatment via private insurance claims.[14]

The exact reasons for these prescribing patterns are unknown, but research points to economic insecurity among injured workers as one potential reason. Workers may receive higher doses of opioids to enable them to continue to work despite pain or to return to work more quickly.[15] This hypothesis is supported by an exploration of occupational patterns; workers employed in positions with lower job security and fewer days of paid leave were more often prescribed opioids than other workers.[16] This suggests that these workers might not be able to afford to stay out of work, as the workers' compensation cash benefits they receive may not be adequate, and their potential to lose their jobs is high.[17] Indeed, interviews conducted by the Mystic Valley Public Health Commission reveal the pressure workers faced "to work in pain and the common use of opioids, both prescribed and those obtained without a prescription." (It is unclear whether workers request higher doses, or if workers' compensation-associated physicians generally prescribe them.) Another possible reason for the prescribing patterns may be the nature of workers' compensation claims: workplace injuries are often severe, in some cases debilitating, and until recently opioids have been the standard go-to medications for pain management of major surgeries and traumatic injuries.[18]

The strongest risk factor for persistent opioid use is not a patient's characteristics, but rather, the physician's prescribing pattern.

Characteristics

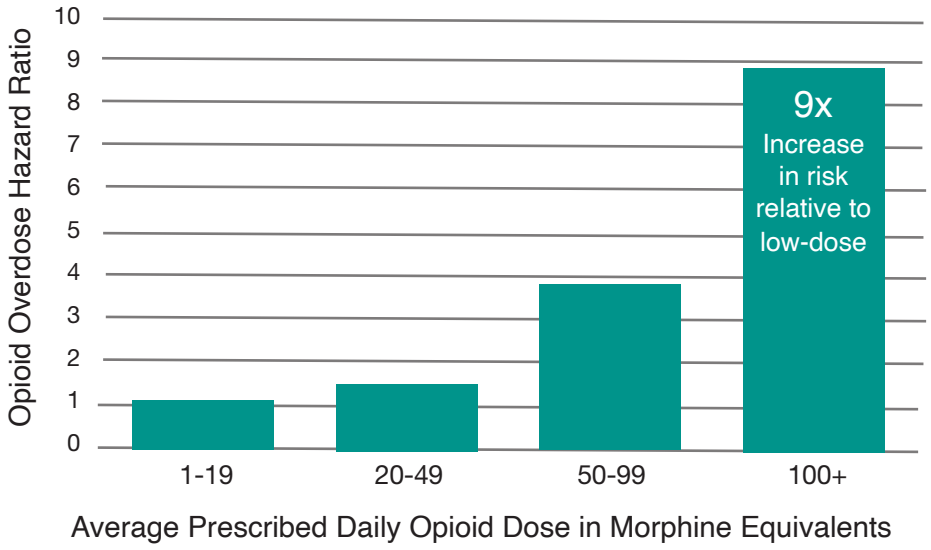
Workers in industries that are physically demanding were much more likely to be prescribed high doses of opioids and given long-term prescriptions.[19] Construction workers stood out in several studies.[20] Other workers at a heightened risk include those in mining and extraction industries; farming, fishing, and forestry; and manufacturing.[21] Opioids are also prescribed at significantly higher rates for musculoskeletal and chronic pain injuries, especially those that are back-related, than for soft-tissue injuries.[22] Moreover, these two factors are related to each other. Of the injuries incurred by workers in the industries noted above, a large share are musculoskeletal and chronic-pain injuries.[23] Finally, older workers (i.e., those ages 40 and over) were also generally more likely to receive opioids for workplace injuries than their younger counterparts.

Persistent opioid use (i.e., filling a prescription or taking opioids for 90 days or more after injury date) is a predictor of opioid-related morbidity. Other links include pre-injury incomes of $60,000 and greater; older age; white race; chronic pain injuries; and part-time employment.[24] (While chronic pain and part-time employment mesh with the patterns described above, it is less clear why white and higher-income workers are more likely to have problematic opioid use.)

The strongest risk factor for persistent opioid use is not a patient's characteristics, but rather, the physician's prescribing pattern. Patients who receive 20 or more days' supply in their initial prescription are more likely to use opioids long term, compared with those whose doctors provided smaller initial supplies.[25] Some studies use morphine milligram equivalents (MME) instead of number of days' supply to better gauge the relative potency

of different opioids and assess their impact. Patients who receive high initial doses of opioids face a nine-fold increase in overdose risk (see Figure 1 below).[26]

Figure 1. Higher Prescribed Dose Increases Overdose Risk



Many patients do not use their entire dose, leaving them with an excess. A study conducted by the American Pain Society found that 85 percent of patients had unused pills, with the average being 30 from a prescribed dose of 80 pills.[27]

Workplace overdoses and injuries: Multiple connections and serious risks

The drivers of the relationship between workplace injuries and workplace opioid overdoses is not well understood, but recent research suggests several connections between these injuries and opioid-related overdose deaths.

While injured workers are at an overall increased risk of developing opioid-related morbidity, the risk is especially pronounced among workers who incur lost-time injuries.

While injured workers are at an overall increased risk of developing opioid-related morbidity, the risk is especially pronounced among workers who incur lost-time injuries. They are almost three times as likely to develop such conditions compared to those with medical-only injuries.[28†] Compounding this risk is these workers' increased likelihood of developing injury-related morbidities, with post-injury depression among the most common and well-documented illnesses afflicting injured workers.

Post-injury depression may be triggered by one or more of several factors including chronic pain; long-term earnings loss; the financial burden caused by the injury; and the logistical challenges of pursuing a workers' compensation claim.[29] Almost half of the workers surveyed in one study, who had no prior diagnosis of depression, suffered from depression-related symptoms up to one year after their injury, and one in ten was diagnosed with depression in the same period.[30] Depressed patients initiate opioid therapy more often than non-depressed patients and are twice as likely to transition to long-term use.[31] At the state level, for every one percent increase in reported depression, there is about a five percent increase in opioid-related overdose deaths.[32]

† See Bertke et al. (2020) for a discussion on work disability, self-harm, and mortality from opioid overdoses.

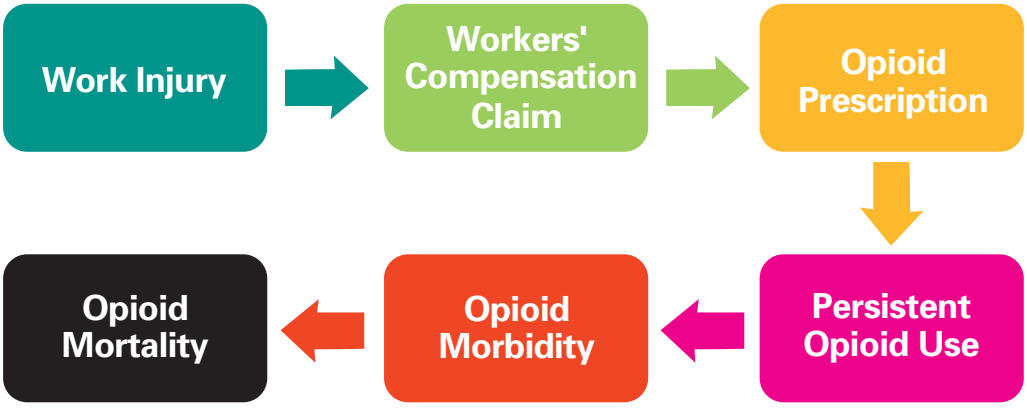
Depression is also an opioid-related morbidity. In one of the largest cohort studies examining opioids and depression, researchers found that 10 percent of 100,000 patients prescribed opioids developed depression after one month of use.[33] These patients had no prior diagnosis of depression and were being treated for five conditions including back pain and musculoskeletal pain, both common work-related injuries.

The link between opioid use and depression is bidirectional, as suffering from one increases the risk for the others,[34] creating two distinct pathways from workplace injury to opioid-related overdose deaths.

Individuals with other opioid-related morbidities, such as dependence, are also at an elevated risk of mortality from overdoses.[35] The death rate for people with opioid dependence is seven times greater than that of the general population.[36] Once again, the construction industry stands out, as it has both a higher rate and total number of ORODs compared to all other industries.

Direct evidentiary links to workplace overdoses and workplace injuries are sparse. Until recently, ORODs tracked with the rise in opioid prescriptions, but state policy interventions that began in the 2010s successfully reduced the number of opioid prescriptions written both overall[37] and within the workers' compensation system.[38] Even so, fatal workplace overdoses increased by at least 25 percent from 2012-2017, with opioids accounting for 44 percent of those deaths.[39] Results from a report conducted by the Massachusetts Department of Public Health found that the average age of workplace OROD victims in Massachusetts was 39 years old,[40] much younger than the workers 60+ years old who are more likely to persistently use opioids.

Figure 2. Pathway from Work Injury to OROD



Understanding the various connections among these factors – workplace injuries, opioid use and abuse, and the rising trend of workplace overdoses – is difficult, due to the limits of available research. For example, while studies attempt to explore the connections between two specific data points, they do not generally assess the broader, interconnected factors.

Massachusetts, which has made a concerted effort to identify workplace instances of opioid overdoses, offers the best insights.[41] A recent study, which examined all recorded fatal injuries in Massachusetts from 2016 to 2017, found that unintentional opioid overdoses accounted for 25 percent of fatalities at work in this period. However, the researchers did not clarify/know whether workers who suffered overdoses at work had already been prescribed opioids or had been injured at work and, if so, whether they were treated through workers' compensation or private insurance. These limitations prevent even this study from establishing direct links between workers' compensation and ORODs in the workplace, presenting a gap in research that future studies can address.

Conclusion

There is substantial evidence that work-related injuries lead to increased levels of opioid morbidity, especially when the workers' compensation system is involved. Workers with lost-time occupational injuries have an increased risk of drug-related mortality, possibly related to post-injury depression and pain. Research to-date shows that workers in physically demanding industries, such as construction and mining, are among those at the highest risk. Economic vulnerability, arising from job insecurity, lack of paid leave, and inadequate cash benefits, along with opioid prescribing patterns that fail to meet medical safety guidelines, further increase the risk of opioid morbidity and mortality.

Many of the problems that increase the risk for opioid-related morbidity and mortality may be reduced through new policies, legislation, and regulation, as well as improving worker safety. In addition, a 2018 Centers for Disease Control and Prevention report highlights other effective strategies to prevent opioid overdose. These include increased access to naloxone and medication-assisted treatment; prescription drug monitoring programs; and evaluation of prescribing practices and patient review in state-run programs (such as workers' compensation). Washington State, where state agencies, medical providers, and community stakeholders have collaborated to maximize the impact of policy interventions, provides a promising model.‡ Adopting such multifaceted approaches might provide a significant boost to both local communities and the economy as a whole,§ and ensure that workers' compensation – one of the first social insurance programs in the U.S. – will continue to adequately protect workers and their families.

Notes

1 Centers for Disease Control and Prevention. (2020). Understand the Epidemic. Accessed 14th December 2020, from https://www.cdc.gov/drugoverdose/epidemic/index.html; National Institute on Drug Abuse. (2020). Overdose Death Rates. Accessed 14th December 2020, from https://www.drugabuse.gov/drug-topics/trends-statistics/overdose-death-rates

2 Case, A. & Deaton, A. (2015). Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century. Proceedings of the National Academy of Sciences of the United States of America, 112(49), 15078-15083.

3 See note 2 above.

4 Schoomaker, H.& Woolf, S.(2019). Life Expectancy and Mortality Rates in the United States, 1959-2017. JAMA. 322(20).

5 Arias et al. (2020). *Mortality in the United States, 2018*. NCHS Data Brief 355. Accessed 14 December 2020, from https://www.cdc.gov/nchs/products/databriefs/db355.htm

6 See note 1 above.

7 Occupational Safety and Health Administration. (2019). OSHA Trade Release. Accessed 14 December 2020, from https://www.osha.gov/news/newsreleases/trade/12172019-0

8 U.S. Bureau of Labor Statistics. (n.d.). Fatal work injuries from unintentional overdose increased on average 24 percent per year, 2011–18. Accessed 14th December 2020, https://www.bls.gov/opub/ted/2020/fatal-work-injuries-from-unintentional-overdose-increased-on-average-24-percent-per-year-2011-18.htm

9 Anderson et al. (2014). Opioid Prescribing: A Systematic Review and Critical Appraisal of Guidelines for Chronic Pain. *Annals of Internal Medicine*, 160 (1), 38-47; Davis et al. (2019). Opioid−related Overdose Deaths by Industry and Occupation — Massachusetts, 2011−2015. *American Journal of Industrial Medicine*, 62(10), 815− 825.

10 Herman et al. (2018). Factors Associated With Persistent Opioid Use Among Injured Workers' Compensation Claimants. *JAMA Network Open 2018*,1(6).

11 Lui, T. & Thumal, V. (2018). Correlates of Opioid Dispensing (WC-18-48). Workers' Compensation Research Institute. Accessed 01 December 2020, from https://www.wcrinet.org/images/uploads/files/wcri8394.pdf

12 Egan et al. (2006). Factors associated with early opioid prescription among workers with low back injuries. *The Journal of Pain*, 7(10), 718–725.

13 See note 11 above.

‡ See Banta-Green et al. (2015) and our State Spotlight: Washington's Multi-Faceted Approach, for further information on Washington's successful policy interventions fueled by collaboration

§ Society of Actuaries (2019), Economic Impact of Non-Medical Opioid Use in the United States

14 Davis et al. (2019). Opioid−related Overdose Deaths by Industry and Occupation — Massachusetts, 2011−2015. *American Journal of Industrial Medicine*, 62(10), 815− 825.

15 See note 14 above.

16 See note 14 above.

17 Asfaw A. & Boden L. (2020). Impact of workplace injury on opioid dependence, abuse, illicit use and overdose: a 36-month retrospective study of insurance claims. Occupational and Environmental Medicine, 77, 648-653.

18 AM Trust Financial. (n.d.). Exploring the Link between Workers' Compensation and Opioid Addiction. Accessed 14 December 2020, from https://amtrustfinancial.com/blog/agents/workers-comp-and-opioid-addiction

19 See note 14 above.

20 See note 11, 14, 17 above.

21 See note 11, 14, 17 above.

22 See note 14 above.

23 Heberger, J. (2018, June 12). Demonstrating the Financial Impact of Mining Injuries Using Workers' Compensation Data with the 'Safety Pays in Mining' Web Application [Conference Presentation]. Palm Beach County Convention Center, Palm Beach, FL, United States. https://cste.confex.com/cste/2018/meetingapp.cgi/Paper/9266; Schneider, S. (2001). Musculoskeletal Injuries in Construction: A Review of the Literature. Applied Occupational and Environmental Hygiene, (16)11, 1056-1064.

24 See note 10 above.

25 Durand et al. (2019). Prevalence and Risk Factors Associated With Long-term Opioid Use After Injury Among Previously Opioid-Free Workers. *JAMA Network Open* 2019, 2(7).

26 Banta-Green et al. (2010). A comprehensive approach to address the prescription opioid epidemic in Washington State: milestones and lessons learned. *American Journal of Public Health*, 105(3), 463–469.

27 Melville, N. (2017). *Opioid Oversupply Common After Surgery.* Accessed 01 December 2020, from https://www.medscape.com/viewarticle/880413

28 See note 17 above.

29 Applebaum et al. (2019). Suicide and drug-related mortality following occupational injury. *American Journal of Industrial Medicine*, 62(9), 733–741.

30 Carnide, N. (2016). Feelings of Depression After a Physical Work Injury: Six-month period after injury a potential "window of opportunity" to identify and address mental health problems. *Visions Journal*, 11(3), 8-10.

31 Sullivan, M. (2018). Depression Effects on Long-term Prescription Opioid Use, Abuse, and Addiction. The *Clinical Journal of Pain*, 34(9), 878-884.

32 Foley, M. & Schwab-Reese, L. (2018). Associations of state-level rates of depression and fatal opioid overdose in the United States, 2011–2015. Social Psychiatry Psychiatric Epidemiology, 54, 131–134.

33 Ahmedani et al. (2016). Prescription Opioid Duration, Dose, and Increased Risk of Depression in 3 Large Patient Populations. *The Annals of Family Medicine January 2016*, 14 (1), 54-62.

34 Blanco et al. (2012). Mood and anxiety disorders and their association with non-medical prescription opioid use and prescription opioid-use disorder: longitudinal evidence from the National Epidemiologic Study on Alcohol and Related Conditions. *Psychological Medicine*, 42(6), 1261-1272; Lohoff et al. (2020). Prescription Opioid Use and Risk for Major Depressive Disorder and Anxiety and Stress-Related Disorders. JAMA Psychiatry, Published Online November 11 2020.

35 National Academies of Sciences, Engineering, and Medicine. (2017). *Pain Management and the Opioid Epidemic: Balancing Societal and Individual Benefits and Risks of Prescription Opioid Use*. Washington, DC: The National Academies Press.

36 See note 17 above.

37 See note 14 above.

38 National Institute for Occupational Safety and Health. *Opioids in the Workplace*. Accessed 14 December 2020, from https://www.cdc.gov/niosh/topics/opioids/data.html

39 Castillo et al. (2020). Drug Overdose in the Workplace and the Role of Opioids. Accessed 14 December 2020, from https://blogs.cdc.gov/niosh-science-blog/2020/02/03/drug-overdose-work/#_edn3;
U.S. Bureau of Labor Statistics. (2020). National Census of Occupational Injuries in 2019 [News Release]. Accessed 16 December 2020, from https://www.bls.gov/news.release/pdf/cfoi.pdf

40 Massachusetts Department of Public Health. (2019). Fatal Injuries at Work: Massachusetts Fatality Update 2016-2017. Accessed 14 December 2020, from https://www.mass.gov/doc/massachusetts-fatality-update-2016-2017/download

41 See note 1 and 40 above.

Bibliography

Ahmedani, B., Bucholz, K., Burroughs, T., Copeland, L., Lustman, P., Salas, J., Scherrer, J., Schneider, D., Stock, E., & Sullivan, M. (2016). Prescription Opioid Duration, Dose, and Increased Risk of Depression in 3 Large Patient Populations. *The Annals of Family Medicine January 2016*, 14 (1), 54-62.

AM Trust Financial. (n.d.). *Exploring the Link between Workers' Compensation and Opioid Addiction*. Accessed 14 December 2020, from https://amtrustfinancial.com/blog/agents/workers-comp-and-opioid-addiction

Anderson, L., Capua, P., Chou, R., Diamant, A., Doyle, B., Nuckols, T., & Popescu, I. (2014). Opioid Prescribing: A Systematic Review and Critical Appraisal of Guidelines for Chronic Pain. *Annals of Internal Medicine*, 160 (1), 38-47.

Applebaum, K., Asfaw, A., Boden, L., Busey, A., O'Leary, P., & Tripodis, Y. (2019). Suicide and drug-related mortality following occupational injury. *American Journal of Industrial Medicine*, 62(9), 733–741.

Arias, E., Kochanek, K., Murphy, S., & Xu, J. (2020). *Mortality in the United States, 2018*. NCHS Data Brief 355. Accessed 14 December 2020, from https://www.cdc.gov/nchs/products/databriefs/db355.htm

Asfaw A. & Boden L. (2020). Impact of workplace injury on opioid dependence, abuse, illicit use and overdose: a 36-month retrospective study of insurance claims. *Occupational and Environmental Medicine*, 77, 648-653.

Banta-Green, C., Campbell, C., Dunn, K., Merrill, J., Psaty, B., Saunders, Silverberg, M., K., Sullivan, M., Rutter, C., & Von Korff, M. & Weisner, C. (2010). Opioid prescriptions for chronic pain and overdose: a cohort study. *Annals of Internal Medicine*, 152(2), 85–92.

Banta-Green, C., Baumgartner, C., Franklin, G., Jones, C., Mai, J., Neven, D., Sabel, J., & Tauben, D. (2015). A comprehensive approach to address the prescription opioid epidemic in Washington State: milestones and lessons learned. *American Journal of Public Health*, 105(3), 463–469.

Bertke, S., Jin, C., Martin, C., Pinkerton, L., and Yiin, J. (2020). Increased overall and cause-specific mortality associated with disability among workers' compensation claimants with low back injuries. *American Journal of Industrial Medicine*, 63(3), 209-217.

Blanco, C., Fenton, M., Keyes, K., Martins, S., Storr, C., & Zhu, H. (2012). Mood and anxiety disorders and their association with non-medical prescription opioid use and prescription opioid-use disorder: longitudinal evidence from the National Epidemiologic Study on Alcohol and Related Conditions. *Psychological Medicine*, 42(6), 1261-1272.

Bohnert, A. & Ilgen, M. (2019). Understanding Links among Opioid Use, Overdose, and Suicide. *New England Journal of Medicine*, 380, 71-79.

Carnide, N. (2016). Feelings of Depression After a Physical Work Injury: Six-month period after injury a potential "window of opportunity" to identify and address mental health problems. *Visions Journal*, 11(3), 8-10.

Case, A. & Deaton, A. (2015). Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century. *Proceedings of the National Academy of Sciences of the United States of America*, 112(49), 15078-15083.

Castillo, D., Fiore, M., Sparer-Fine, E., Tiesman, H., & Wurzelbacher, S. (2020). *Drug Overdose in the Workplace and the Role of Opioids*. Accessed 14 December 2020, from https://blogs.cdc.gov/niosh-science-blog/2020/02/03/drug-overdose-work/#_edn3

Caverly, M., Davenport, S., & Weaver, A. (2019). *Economic Impact of Non-Medical Opioid Use in the United States.* Society of Actuaries. Accessed 14th December 2020, from https://www.soa.org/globalassets/assets/files/resources/research-report/2019/econ-impact-non-medical-opioid-use.pdf

Center for Disease Control and Prevention. (2020). *Understand the Epidemic*. Accessed 14th December 2020, from https://www.cdc.gov/drugoverdose/epidemic/index.html

Davis, L., Hawkins, D., Laing, J., & Roelofs, C. (2019). Opioid related Overdose Deaths by Industry and Occupation — Massachusetts, 2011 2015. *American Journal of Industrial Medicine*, 62(10), 815 825.

Durand, Z., Hurwitz, L., Krishnaswami S., McPheeters M., Nechuta, S. (2019). Prevalence and Risk Factors Associated With Long-term Opioid Use After Injury Among Previously Opioid-Free Workers. *JAMA Network Open 2019*, 2(7).

Egan, K., Franklin, G., Fulton-Kehoe, D., Gluck, J., Kaufman, J., Sheppard, L., Stover, B., Turner, J., Wickizer, T. (2006). Factors associated with early opioid prescription among workers with low back injuries. *The Journal of Pain*, 7(10), 718–725.

Foley, M. & Schwab-Reese, L. (2018). Associations of state-level rates of depression and fatal opioid overdose in the United States, 2011–2015. *Social Psychiatry Psychiatric Epidemiology*, 54, 131–134.

Franklin, G., Fulton-Kehoe, D., Haight, J., Mai, J., Sears, J., & Wickizer, T. (2020). Changes in early high-risk opioid prescribing practices after policy interventions in Washington State. *Health Services Research*, 2020 Oct 04.

Hansen, H. & Netherland, J. (2016). The War on Drugs that Wasn't: Wasted Whiteness, "Dirty Doctors", and Race in Media Coverage of Prescription Opioid Misuse. *Culture, Medicine, and Psychiatry*, 40(4), 664-686.

Heberger, J. (2018, June 12). *Demonstrating the Financial Impact of Mining Injuries Using Workers' Compensation Data with the Safety Pays in Mining Web Application* [Conference Presentation]. Palm Beach County Convention Center, Palm Beach, FL, United States. https://cste.confex.com/cste/2018/meetingapp.cgi/Paper/9266

Herman, A., Kwok, A., O'Hara, L., O'Hara N., Pollak A., Slobogean, G., Welsh C. (2018). Factors Associated With Persistent Opioid Use Among Injured Workers' Compensation Claimants. *JAMA Network Open 2018*, 1(6).

Lohoff, F., Rosoff, D., & Smith, G. (2020). Prescription Opioid Use and Risk for Major Depressive Disorder and Anxiety and Stress-Related Disorders. *JAMA Psychiatry*, Published Online November 11 2020.

Lui, T. & Thumal, V. (2018). *Correlates of Opioid Dispensing* (WC-18-48). Workers' Compensation Research Institute. Accessed 01 December 2020, from https://www.wcrinet.org/images/uploads/files/wcri8394.pdf

Massachusetts Department of Public Health. (2019). *Fatal Injuries at Work: Massachusetts Fatality Update 2016-2017*. Accessed 14 December 2020, from https://www.mass.gov/doc/massachusetts-fatality-update-2016-2017/download

Melville, N. (2017). *Opioid Oversupply Common After Surgery*. Accessed 01 December 2020, from https://www.medscape.com/viewarticle/880413

National Academies of Sciences, Engineering, and Medicine. (2017). *Pain Management and the Opioid Epidemic: Balancing Societal and Individual Benefits and Risks of Prescription Opioid Use. Washington*, DC: The National Academies Press.

National Institute for Occupational Safety and Health. *Opioids in the Workplace*. Accessed 14 December 2020, from https://www.cdc.gov/niosh/topics/opioids/data.html

National Institute on Drug Abuse. (2020). *Overdose Death Rates*. Accessed 14th December 2020, from https://www.drugabuse.gov/drug-topics/trends-statistics/overdose-death-rates

Nuckols, T. K., Anderson, L., Popescu, I., Diamant, A. L., Doyle, B., Di Capua, P., & Chou, R. (2014). Opioid prescribing: a systematic review and critical appraisal of guidelines for chronic pain. *Annals of Internal Medicine*, 160(1), 38–47.

Occupational Safety and Health Administration. (2019). *OSHA Trade Release*. Accessed 14 December 2020, from https://www.osha.gov/news/newsreleases/trade/12172019-0

Schoomaker, H. & Woolf, S. (2019). Life Expectancy and Mortality Rates in the United States, 1959-2017. *JAMA*. 322(20).

Schneider, S. (2001). Musculoskeletal Injuries in Construction: A Review of the Literature. *Applied Occupational and Environmental Hygiene*, (16)11, 1056-1064.

Sullivan, M. (2018). Depression Effects on Long-term Prescription Opioid Use, Abuse, and Addiction. *The Clinical Journal of Pain*, 34(9), 878-884.

U.S. Bureau of Labor Statistics. (n.d.). *Fatal work injuries from unintentional overdose increased on average 24 percent per year, 2011–18*. Accessed 14th December 2020, https://www.bls.gov/opub/ted/2020/fatal-work-injuries-from-unintentional-overdose-increased-on-average-24-percent-per-year-2011-18.htm

U.S. Bureau of Labor Statistics. (2020). *National Census of Occupational Injuries in 2019* [News Release]. Accessed 16 December 2020, from https://www.bls.gov/news.release/pdf/cfoi.pdf