Final Progress Report

Use of Michigan Workers' Compensation Data for Surveillance of Work-Related Injuries and Illnesses

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Michigan State University

Kenneth D. Rosenman, MD, Principal Investigator, Michigan State University Mary Jo Reilly, MS, Project Manager, Michigan State University

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Contact Information Kenneth D. Rosenman, MD Michigan State University Department of Medicine 909 Wilson Road, room 117 West Fee Hall East Lansing, MI 48824-1315 517-353-1846 FAX: 517-432-3606 Rosenman@msu.edu

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A. List of Terms and Abbreviations

- AJIM American Journal of Industrial Medicine
- **BLS Bureau of Labor Statistics**
- CAOM Compensation Advisory Organization of Michigan
- **CET MIOSHA Consultation, Education and Training**
- CSTE Council of State and Territorial Epidemiologists
- EINs Employer Identification Numbers
- FTE full time equivalents
- KLA Kunz, Leigh & Associates
- LEV Levenshtien algorithm
- MAF Michigan Accident Fund
- MAPS Michigan Automated Prescription System
- MDHHS Michigan Department of Health and Human Services
- MIOSHA Michigan Occupational Safety and Health Administration
- MSC Michigan Safety Council
- MSU Michigan State University
- NIOSH National Institute for Occupational Safety and Health
- NAICS North American Industry Classification System
- NORA National Occupational Research Agenda
- **OEM Occupational and Environmental Medicine**
- QCEW Quarterly Census of Employment and Wages
- SDS supplementary data system
- WC Workers' Compensation
- WDCA Workers' Disability Compensation Agency
- WCRI Workers' Compensation Research Institute

B. Abstract

Michigan State University (MSU) acting as the bona fide agent of the Michigan Department of Health and Human Services (MDHHS) partnered with the Michigan Workers' Disability Compensation Agency (WDCA), and the Michigan Occupational Safety and Health Administration (MIOSHA) to respond to Funding Opportunity Announcement (FOA) RFA-OH-14-007 on Workers' Compensation Surveillance.

The work conducted addressed all ten National Occupational Research Agenda (NORA) industry sectors and three of the cross-sector programs; musculoskeletal disease, surveillance and traumatic injury.

We completed our aims to: 1) Develop rates of workers' compensation (WC) claims per full time equivalents (FTE) by industry, gender, age, injury and employer size; and 2) Develop an electronic interactive WC case dataset accessible to the public (<u>https://www.michigan.gov/mdhhs/0,5885,7-339-71548_54783_54784_78428---</u>,00.html#:~:text=The%20Michigan%20Environmental%20Health%20Tracking,on%).

This project was relevant to public health, and specifically occupational health, because it addressed all three core functions in public health: collection and analysis of data, building partnerships to promote the goal of reducing occupational illness, and assuring efforts to prevent additional work-related injuries and illness. We ensured that the surveillance data were of high quality, that stakeholders and the general public were aware and had access to the data, and that the data is available for prevention activities.

We disseminated the availability of the Workers' Compensation (WC) case datasets to employers, employees, health and safety professionals, public health professionals and researchers. MIOSHA assisted in determining follow-up interventions. We also have made available the methods for analyzing and formatting the data so that the workers' compensation data can be updated in the future (<u>https://oem.msu.edu/index.php/work-related-injuries/workers-compensation-data</u>).

SECTION 1

C.1. Significant Findings: We have developed an interactive web site accessible to the public for 2014-2017 workers' compensation paid claims both numbers and rates. The data is available by various combinations of variables for the years 2014, 2015, 2016 and 2017 separately and the combined 4-year data set. Because of increased

sample size, the combined 4-year rate series allows a user to examine the data at a greater level of detail. Variables we used were: age (24 years and younger, 25-54 years, and 55 years and older); gender; injury type (amputations, abrasions/cuts/lacerations/bites, crush/contusions, fracture/dislocations, sprain/strain/hernia/inflammation of nerves – all, sprains and strains – back, sprains and strains – back, sprains and strains – shoulder, sprains and strains – knee, sprains and strains - arm/hand, burns-chemical/heat/electrical, concussions, all diseases, and misc. ill-defined injuries; company size (small (1-10 employees), medium (11-249 employees), and large (250+employees); NORA sectors and three digit NAICS.

C.2.Translation of Findings: The data is available at the MDHHS MiTracking website; <u>https://www.michigan.gov/mdhhs/0,5885,7-339-71548_54783_54784_78428---</u>, <u>00.html#:~:text=The%20Michigan%20Environmental%20Health%20Tracking,on%</u> This site is maintained by MDHHS and will continue to be available even though funding for this NIOSH project has ended. Google analytics indicated that in 2020 there were an average of over 20 unique users with different page views accessing the workers' compensation data each month (Appendix 1).

C.3. Outcomes/Impact

C.3.a. Potential Outcomes: Work-related injuries and compensation claims have a wide variation between companies in the same industry category as well as across different industries (Rosenman et al, 2007; Shannon and Vidmar, 2004). Potentially the ready availability of WC data will enable health and safety specialists, employers, labor groups and government to address differences in rates of claims so as to initiate and evaluate prevention programs.

C.3.b. Intermediate Outcomes: There was increased use of the web site from 2019 to 2020 as measured by google analytics (Appendix 1). If financial support from stake-holders is obtained to continue to update the site with new data from 2019 onward, this would be an additional intermediate outcome that shows there is value in the data and it being readily available.

C.3.c. End Outcomes: The ultimate end outcome would be a reduction in workers' compensation claims. This would be hard to attribute to the ready availability of data on the website since there are multiple factors and interventions that can affect change in workers' compensation claims. The combination of decrease in claim rates and individual testimonials of users would be anecdotal evidence that the availability of the data helped reduce workers' compensations claims.

Section 2

D.1. Scientific Report

In the 1970's, the Bureau of Labor Statistics (BLS) used workers' compensation (WC) data from up to 38 states in what they called the supplementary data system (SDS) to complement the annual employer survey (NRC, 1987). Because of difficulty in obtaining the data, differences between states in eligibility criteria and cost, BLS ended the SDS. Although BLS calculated rates, the usage of WC data for surveillance has generally been limited to the enumeration of injuries, illnesses and cost data without the calculation of rates. The administrative database compiled by state workers' compensation agencies is readily available in many states and has been used to enumerate the annual number of work-related conditions and their costs (Davis, Rosenman et al, 2013). The Michigan WDCA is typical in the way it publishes its data in their annual report, by showing the number of claims (injuries and illnesses) and associated costs

(https://www.michigan.gov/documents/leo/wdca_2019_Annual_Report_685356_7.pdf). Rates were not calculated because data on the number of employees by company (and therefore industry) reside in a different agency and the two data sets have not been combined.

The use of data systems such as WC are important to provide data that both supplement the BLS counts as well as provide data at the state and potentially at the county or metropolitan statistical area level within a state. This is not to suggest that inclusion of WC data solves the undercount issue since work in Michigan and other states has shown that WC data is also incomplete (Biddle et al, 1998; Bonauto et al, 2003; Leigh and Robbins , 2004; Rosenman et al, 2000; Rosenman et al, 2013; Spieler and Burton, 2012; Stanbury et al, 1995).

D.1.a. Background of the Michigan Workers' Disability Compensation Agency

The Michigan WDCA was established in 1912. Public and private Michigan employers are required to have WC insurance. Workers who are covered by federal law and are not covered by the Workers' Disability Compensation Act of Michigan are Federal (i.e. postal workers and Veteran's Administration hospital workers), railroad, shipping and harbor employees. Employers with less than three employees, some agricultural employers, and the self-employed are also not covered by the Workers' Disability Compensation Act of Michigan. There are approximately 243,000 employers subject to the Workers' Disability Compensation Act of Michigan.

Michigan does not have a single state insurance fund. Michigan has 508 insurance companies authorized to provide WC insurance (although 20 companies have 82% of the market share), 30 self-insured trade groups and 414 self-insured employers.

Insurance companies and the self-insured all have the same reporting requirements to the WDCA.

WDCA maintains all data on reported and settled claims electronically, including identifiers for claimants and their employers and information about the injury, dollar amounts paid, and time away from work. The Michigan WDCA is in the process of upgrading their software system for tracking data that was put into operation in 1991. The new system is anticipated to be in place in 2021. The new system will allow employers and insurance companies to submit their data electronically.

D.1.b. Specific Aims/Methods/Results/Discussion/Conclusion

Develop rates of Workers' Compensation (WC) claims per full time equivalents (FTE) by industry, geography, injury type, gender, age and employer size.

The WC data for 2014, 2015, 2016, 2017 and 2018 claims filed for paid lost work time were obtained. We have completed the analysis of the 2014, 2015, 2016 and 2017 data (20,732 paid claims from 8,933 unique companies in 2014, 18,457 paid claims from 8,314 unique companies in 2015, 16,223 paid claims from 7,787 unique companies in 2016, 15,210 paid claims from 7,710 unique companies in 2017, and 17,020 paid claims from 8,158 unique companies in 2018). Employer Identification Numbers (EINs) which are in the state WC data were obtained by the WDCA under strict confidentiality requirements from the State of Michigan's Department of Treasury and the WDCA only provided us with the last four digits of the EIN for the companies with claims. The WDCA does not have North American Industry Classification System (NAICS) code for industry type. To obtain the NAICS code and number of workers within each NAICS we matched the WDCA claims database with the Quarterly Census of Employment and Wages (QCEW) database for 2014-2017. We are still waiting for the 2018 QCEW data to do the match for the 2018 data.

The approach for matching was developed by our contractor, Kunz, Leigh & Associates (KLA), since the last four digits of EIN were not sufficient to create a definite match. We used both the Levenshtien and Soundex algorithms to perform the match. The criteria we used for matching the WDCA and QCEW databases were:

- Levenshtien 5 1: Using the Levenshtein algorithm, this record was matched by employer name, FEIN, street address, city, state, and zip code.
- Levenshtien5 2: Using the Levenshtein algorithm, this record was matched by FEIN, street address, city, state, and zip code.
- Levenshtien5 3: Using the Levenshtein algorithm, this record was matched by employer name, and FEIN.

- Soundex 1: Using the Soundex algorithm, this record was matched by employer name, FEIN, street address, city, state, and zip code.
- Soundex 2: Using the Soundex algorithm, this record was matched by employer name, and FEIN.
- Soundex 3: Using the Soundex algorithm, this record was matched by FEIN, street address, city, state, and zip code.
- Soundex 4: Using the Soundex algorithm, this record was matched by employer name, and requiring an exact match on street address, city, state, and zip code.
- Soundex 5: Using the Soundex algorithm, this record was matched by street address, city, state, zip code, and requiring an exact match on employer name.
- Soundex 6: Using the Soundex algorithm, this record was matched by employer name, street address, city, state, and zip code.

The LEV and SOUNDEX programs were able to identify matches from 90% to 100% of the claims. To ensure accuracy of the matches, a manual review was conducted for all matches in 2014 and all new matches in subsequent years. The manual review identified incorrect matches and either corrected matches were identified or, if no direct match to a company in the QCEW was possible, an online search for the company NAICS and number of employees using manta.com or dnb.com was performed. Approximately 5% of the matches were based on manta.com or dnb.com.

We were highly successful in matching companies from the WC data to the QCEW data. For 2014-2017, of the 70,622 claims, only 42 companies, representing 66 claims, remained unmatched.

The criteria to select a NAICS code to represent the overall employer within the QCEW reflect a modification of the methods used by Wurzelbacher et. al. in their published paper (Development of Methods for Using Workers' Compensation Data for Surveillance and Prevention of Occupational Injuries Among State-Insured Private Employers in Ohio AJIM 2016: 59; 1087-1107. The compression rules we used to choose the NAICS code when combining QCEW locations into one single location were:

- Rule 1. Determine the 6-digit NAICS code associated with at least 75% of the employees for a given employer across locations. If this fails, then...
- Rule 2. Determine the 4-digit NAICS code associated with at least 75% of the employees for a given employer across locations. If this fails, then...
- Rule 3. Determine the 3-digit NAICS code associated with at least 75% of the employees for a given employer across locations. If this fails, then...
- Rule 4. Determine the 2-digit NAICS code associated with at least 75% of the employees for a given employer across locations. If this fails, then...

- Rule 5. Determine the NAICS code associated with the most employees for a given employer. If this fails, then...
- Rule 6. OEM Staff select a NAICS code for this employer.

We obtained FTE data for Michigan from an unpublished document (WHITE PAPER: Myers Jones MW, Bushnell T, Wurzelbacher S, Jones M. Estimating Full-Time-Equivalent Employee Denominators for Calculating Workers' Compensation Claim Rates: Notes on estimating FTEs per employee using American Community Survey data from the U.S. Census Bureau and Labor Productivity and Costs data from the Bureau of Labor Statistics), for 2014, 2015, 2016 and 2017. We calculated rates by various combinations of variables for the years 2014, 2015, 2016 and 2017, separately and combined. Because of increased sample size, this combined 4-year rate series allowed us to examine the data at a greater level of detail. Variables we used were: age (24 years and younger, 25-54 years, and 55 years and older); gender; injury type (amputations, abrasions/cuts/lacerations/bites, crush/contusions, fracture/dislocations, sprain/strain/hernia/inflammation of nerves - all, sprains and strains - back, sprains and strains - shoulder, sprains and strains - knee, sprains and strains - arm/hand, burnschemical/heat/electrical, concussions, all diseases, and misc. ill-defined injuries; company size (small (1-10 employees), medium (11-249 employees), and large (250+ employees); NORA sectors and three digit NAICS.

We resolved two additional data issues: counts and rates for employers with multiple locations were included in the overall state data but not the individual county-level data, and counts and rates for employers whose employees work out of a single location but were potentially injured in another part of the state (i.e. the trucking industry), their counts and rates were assigned to the county where the company headquarters were located.

KLA developed a How-to-Guide to perform the matching of the two data bases and format the results so data 2018 onward can be posted on the interactive website.

Development of the interactive electronic WC case datasets accessible to the public.

KLA, our contractor for the matching, had previously developed the MDHHS's MiTracking, Michigan Environmental Public Health Tracking website (<u>https://www.michigan.gov/mdhhs/0,5885,7-339-71548_54783_54784_78428---</u>,00.html#:~:text=The%20Michigan%20Environmental%20Health%20Tracking,on%).

KLA formatted the match data, which were added to the tracking site.

There are three documents that accompany the data on the MiTracking web site: 1) Full Metadata- this is a detailed, technical description of the data; (2) About These Data - is oriented more to the general population; and (3) WC Content- this is the information that will be seen initially when a person wants to look at the work-related injury and illness data queries. Copies of these documents are in Appendix 2.

See below a screenshot of the fields available for query in the Michigan tracking system:

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Small Employer (1-10 Employees)								
Medium Employer (11-249 Employees)								

The National Tracking Network is a CDC funded system of integrated health, exposure, and environmental hazard information and data from national, state, and city sources. The Tracking Network provides users with the ability to query data content areas for various indicators and measures, and to create maps, tables, and graphs with the query results. This website portal houses environmental data for the state of Michigan. It has interactive capabilities to search various markers of health and the environment and will continue to expand with additional capabilities as additional data is added. By putting the WC data on this website, we have both ensured its ongoing availability even though our award has ended and have increased its visibility (See Appendix 1 for google analytics for the whole website)

In addition, there is a link to the tracking site from our existing MSU Occupational and Environmental Website (<u>https://oem.msu.edu/index.php/work-related-injuries/workers-compensation-data</u>).

Interactions with Stakeholders

Ms. Reilly attended the state WC partners meeting on 12/8/2016 in Atlanta. Some of the key take-home messages from this valuable meeting included the need to determine how to address critical issues such as multi-employer worksites, the public sector, sustainability of the activity, and denominator choices. In addition, discussions on the potential uses of the WC findings were especially helpful, in terms of thinking about how to translate the activity and outputs into prevention activity.

Dr. Rosenman, Jeremy Harder (KL&A) and Tim Hollosy (KL&A) attended the state WC partners meeting on 12/4/2017 in Minneapolis, Minnesota. We presented a visual look at the Michigan WC project during the meeting.

We also participated in the quarterly conference calls with NIOSH and the four other state grantees and interested states.

We participated in meetings with our contractors performing the match and setting up the web portal on a monthly, and sometimes more frequent basis.

We also met several times with the Michigan WDCA administrators.

We held a stakeholder meeting on 4/13/2018. Seventeen individuals attended the meeting, including the Director of the Michigan Occupational Safety and Health Administration (MIOSHA), the Director of the Michigan Workers' Disability Compensation Agency, representatives from the Michigan Department of Health and Human Services (MDHHS), the Michigan Safety Council (MSC), union representatives, our contractors from KL&A, and the Michigan Accident Fund (MAF). The two-and-a-half-hour meeting included an introduction on the background about the project, an interactive demonstration of the capabilities of the rate and count website, and an opportunity for feedback, suggestions and requests for additional capabilities. Suggestions from the participants to improve the analysis and presentation of the data were subsequently incorporated.

Future/ongoing activity in Progress:

• Match Workers' Compensation Claim Data with Michigan Automated Prescription System (MAPS) to examine opioid use before and after injury by age, county, gender, industry and injury type (see protocol in Appendix 3).

- Add 2018 data and explore sustainability for 2019 data and beyond. Dr. Rosenman met virtually with the new director of WDCA, Jack Nolish, on 8/21/2020. He was interested in continuing to update the web with new data and future discussions were planned to carry this out.
- Continue to meet with stakeholders such as the Compensation Advisory Organization of Michigan (CAOM), which represents the workers' compensation insurance providers in Michigan.
- Dr. Rosenman has been appointed a member of the Michigan Advisory committee of the Workers' Compensation Research Institute (WCRI). The WCRI, organized in 1983, is an independent, not-for-profit research organization that studies WC benefit delivery systems nationwide. The Institute has broad support. Members include employers, insurers, managed care organizations and state governmental entities in the US and other countries, as well as some state labor organizations. The Michigan Advisory Board meets twice a year. Dr. Rosenman's membership on the advisory committee will facilitate ongoing interaction with key workers' compensation stakeholders.

Human Subjects/IRB Approval

IRB approval was obtained and renewed annually for all the activity in this award.

D.1.c. References Workers' Compensation

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E. Inclusion of Children

Children who had a WC claim for an occupational illness or injury were included in the data.

F. Materials available for other investigators

Michigan's interactive WC data for 2014-2017 is available at: (<u>https://www.michigan.gov/mdhhs/0,5885,7-339-71548_54783_54784_78428---</u>,00.html#:~:text=The%20Michigan%20Environmental%20Health%20Tracking,on%). The information on line includes background information about the data (Appendix 2)

A How-to-Guide for matching WC and QCEW data and formatting to place on the web is available on our web site: <u>https://oem.msu.edu/images/resources/MSU_WC_User_Guide_7_22.pdf</u>

G. Inclusion Enrollment Report

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Appendix 1

- 1. Google Analytics 2019
- 2. Google Analytics 2020

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	Work-							Highest queried was		
2020-01	Related	41	31	2441	7	684	19.2	drug poisoning at 90		
	Workers' Comp	27	23							
	Work-				1			Highest queried was		
	Related							childhood lead at 70		
2020-02	Injuries &	23	17	1809	14	666	19.8	and lowest was		
	Workers' Comp	9	6							
	Work-							Highest queried was		
2020-03	Related	28	23	3006	15	820	18	ticks at 54 and lowest		
	Comp	24	22							
	Work-	24	22					Highest queried was		
	Related							ticks at 72 and lowest		
2020-04	Injuries &	53	37	3702	17	936	18.6	was childhood cancer at		
	Workers'									
	Comp	31	25							
	Work-							Highest was ticks at 240		
2020-05	Related							and lowest was heat		
2020-05	Injuries &	51	31	4217	35	969	28.2	illness at 2		
	Workers'	32	24							
	Work-							Highest was ticks at 179		
2020-06	Related	34	28	2922	6	677	20.9	and lowest was		
	Comp	19	18							
	Work-							Highest was ticks at 107		
2020-07	Related	33	29	3198	12	840	18.3	and lowest was		
	Workers'Co	26	24							
	Related							lead at 82 and lowest		
2020-08	Injuries &	32	27	2114	41	687	22.2	was a three-way tie of		
	Workers'Co	55	50							
Notes										
*Data poi	rtal queries co	ounts qu	eries that v	were actually run	n. They can	only be drilled	down to the	content area level, work-	related inju	uries and il
**Averag	e # of queries	s per con	tent area is	limited because	e there are u	usually outliers	that skew th	e results		
Workers'	Comp added	12/4/20	18							
Data port	al metrics go	back thr	ough April	2019						
Content p	bage metrics g	o back th	rough Sept	ember 2018; but	more detai	ed Google Anal	ytics started	luly 2019		

Appendix 2

1. Full Metadata - a detailed, technical description of the data:

MICHIGAN WORKERS' COMPENSATION (PAID WAGE LOSS CLAIMS)

Publication Date: 4/18/2019

Abstract

Workers' compensation (WC) is the system used to provide wage replacement, medical, and rehabilitation benefits to workers who suffer a work-related injury or illness. A work-related injury is any injury that happens on the job. It can be the result of a specific event or happen over time. Since WC is no-fault insurance, the cause of the injury is not considered. The types of injuries found in the Michigan WC data include amputations, abrasions and cuts, crushes and contusions, fractures and dislocations, sprains and strains, burns, and concussions.

A work-related illness is any illness where work caused or significantly contributed to the cause or aggravated the illness. Work-related illnesses are the result of exposure to something at the workplace, whether it is dust, fumes, gas, heat, cold, an infectious agent or even stress. Types of work-related illnesses found in the Michigan WC data include tuberculosis, silicosis, respiratory disease from exposure to a toxic fume, and hearing loss. For an illness to be workrelated the workplace must be more likely than not a cause or significant contributor of the illness. In this dataset, all work-related illnesses were combined in a single category because there are so few of them that result in a paid wage loss WC claim.

This dataset contains paid wage loss WC claims for seven or more days in a row (seven days include normal time off such as weekends) of lost work time for Michigan workers. Another category of claims is for specific loss and does not need to have seven or more days off work to be awarded WC; these include an amputation involving bone loss, loss of vision, total loss of hearing, or death.

The data are aggregated by

- · injury categories and one illness category,
- industry type,
- gender,
- age group,
- employer size, and
- year of injury.

The numerators for the rates generated in this dataset come from the Michigan Workers' Compensation Agency (WCA) database of paid wage loss and specific loss claims. The denominators for the rates generated come from the Unemployment Insurance Agency (UIA) Quarterly Census of Employment and Wages (QCEW). For rates by gender and/or age, the U.S. Census Local Employment Dynamics (LED) Extraction Tool – Quarterly Workforce Indicators (QWI) was used. The QWI allows for the generation of age-specific and gender-specific denominators (which the QCEW data does not have), for the Michigan workforce.

Purpose

In Michigan, there are approximately 20,000 individuals each year who receive WC for a workrelated injury or illness to cover their medical treatment costs and wage losses for being off work for seven or more days in a row or for having a specific loss (e.g., amputation with bone loss) (www.michigan.gov/wca). These numbers are down from approximately 27,000 in 2007. The number of new paid claims to cover medical treatment only is much larger. In Michigan in 2016, 937 million dollars were paid for both new claims and previous claims that are still being compensated. This amount does not take into account the indirect costs to an individual who cannot work or on a company's productivity.

Most of the WC paid wage loss claims in Michigan are for injuries, especially sprains and strains, broken bones, and crushes. Specific loss claims include amputations involving loss of bone. The types of workplaces where these injuries occur include factories, schools, hospitals, stores and more.

This dataset was created to learn how often work-related injuries and illnesses occur for various groups of people (for example, construction workers or young workers) in Michigan. These data provide measures for work-related injuries and illnesses on the Michigan Tracking (MiTracking) public data portal. The public portal provides public health professionals, researchers, Tracking grantees, and the public with aggregated information on paid wage and specific loss claims for work-related injuries and illnesses in the State of Michigan.

Supplemental Information

In 2016, the Michigan State University (MSU) Division of Occupational and Environmental Medicine (OEM) received funding from the National Institute for Occupational Safety and Health (NIOSH) to conduct a study of the paid wage and specific loss workers' compensation claims in Michigan.

Paid wage loss claims are for lost work time of seven or more days in a row, or for a specific loss such as amputation involving loss of bone, loss of vision, total loss of hearing, or death. Paid wage and specific loss claims are the numerator for this project. Medical only claims are not included in this project. Wage and specific loss claims filed that were not paid are also not included in this project. Data on Michigan residents who were injured in another state were included.

Keywords

Work-related injuries, work-related illnesses, industry, MSU, workers' compensation, Workers' Comp, WCA, Workers' Compensation Agency

Bounding Coordinates

West Bounding Coordinate: -90.418133999999995

East Bounding Coordinate: -82.41839400000006

North Bounding Coordinate: 48.18953400000002

South Bounding Coordinate: 41.69608800000003

Other Information on Data

Level of Geographic Detail: State, County

Currentness Reference (when data were last updated): 4/18/2018

Frequency at which the data are updated: Every two years

Data Status: Complete

Completeness Report

Data are complete as of July 31, 2018.

Included in this dataset are paid wage loss and specific loss claims for work-related amputations, abrasions and cuts, crushes and contusions, fractures and dislocations, sprains and strains, burns, concussions and other diseases.

Data do not include:

- Michigan workers who had a medical-only workers' compensation claim.
- Michigan workers whose workers' compensation wage loss or specific loss claim was denied/not paid.
- Michigan workers who did not file a workers' compensation claim.
- Michigan workers who had less than seven consecutive days off work.

Limitations of these data:

- Not all work-related injuries and illnesses in Michigan will be identified. The data do not include:
 - Workers who are not covered by the state worker's compensation program (selfemployed such as independent contractors, if two or fewer employees in a company, federal employees such as postal workers, and railroad or merchant marine or ship loading/unloading workers).

- Workers who did not file a WC wage loss claim, despite being eligible, for a lost time claim.
- Workers who had medical-only claims.
- Workers with wage loss or specific loss claims that were denied.
- Workers with injuries or illnesses who are assigned a different job at work while they are recovering from their injury or illness.
- The number of paid wage loss and specific loss claims for injuries or illnesses may be high in a given category just because there are many workers in that category.
- A rate that is listed for an industry provides the average rate for companies in that industry, some companies in that industry grouping will have lower rates and some will have higher rates.
- If an individual worked at two different companies during the same time period, they
 will be counted twice in the denominator. The full time equivalent (FTE) weights help to
 equalize the effect of this issue.
- Counts and rates for employers with multiple locations are included in the overall state data but not the individual county-level data.
- For companies whose employees work out of a single location but were potentially injured in another part of the state (i.e. the trucking industry), their counts and rates were assigned to the county where the company headquarters are located.
- The data do not include workers not covered under the Michigan Workers' Disability Compensation Act: federal employees, railroad employees, seamen, longshoremen, employers with fewer than three employees and the self-employed.
- The data cannot tell us the events and root cause of what led to the injury or illness.

Data Processing Description

The datasets used to generate counts and rates of work-related injuries and illnesses were from the WCA's database of paid wage loss and specific loss claims (numerator) and the Michigan UIA QCEW (denominator). The files were temporarily merged in order to assign the companies in the WCA dataset with an industry code, the North American Industry Classification System (NAICS), which is contained in the QCEW but not the WCA datasets. Once the match to obtain NAICS codes for the companies associated with paid claims of seven or more days was completed, the datasets were separated and the files de-identified.

The number of paid wage loss and specific loss claims for work-related injuries and illnesses for the State of Michigan were calculated by:

- Age group (14-24, 25-54 and 55 and older) of employee,
- County of the employer,
- Gender (male, female) of employee,
- Industry type (all, and the 10 NIOSH National Occupational Research Agenda [NORA] sectors: agriculture, forestry & fishing; construction; public safety; healthcare & social assistance; manufacturing; oil & gas extraction; mining; services; transportation,

warehousing & utilities; and wholesale & retail trade) in which the individual had worked,

The following NORA Sector Groups and associated NAICS codes are listed below:

NIOSH NORA Sector Group	NAICS Code			
Agriculture, Forestry & Fishing (except Wildland	11			
Firefighting)				
Construction	23			
Healthcare & Social Assistance	62, 54194, 81291			
Manufacturing	31-33			
Mining (except Oil & Gas Services)	21			
Oil & Gas Extraction	211, 213111, 213112			
Public Safety (including Wildland Firefighting)	92212, 92214, 92216, 62191			
Services (except Public Safety)	51, 52, 53, 54, 55, 56, 61, 71, 72, 81, 92			
Transportation, Warehousing & Utilities	48-49, 22			
Wholesale & Retail Trade	42, 44-45			

- Employer size (small 1-10 employees, medium 11-249 employees, large 250+ employees),
- Injury or illness type (amputation; burn (chemical, electrical, heat); concussion; crush or contusion; cut (laceration, abrasion, scratch, human or animal bites); fracture or dislocation; sprain or strain (hernia, inflammation of joints, nervous system, central nervous system, carpal tunnel, nerves); and disease (suffocation, parasitic, dysentery, anthrax, brucellosis, conjunctivitis, tetanus, tuberculosis, infectious disease, dermatitis, skin infections and conditions, allergic dermatitis, freezing, hearing loss, heatstroke, poisoning, toxic material exposure, blood disease, toxic respiratory exposure, toxic hepatitis, gastrointestinal disease, toxic poisoning, pneumoconiosis, aluminosis, anthracosis, asbestosis, byssinosis, siderosis, silicosis, lung disease, radiation effects, sunburn, microwave, x-ray, isotopes, welder's flash, hemorrhoids, hepatitis, equilibrium, cerebrovascular, eye diseases, stress, tumors, cancer, respiratory disease, pneumonia, flu, rhinitis, insanity, paralysis, prosthetic damage, heart attack, other disease), and
- Year (2014, 2015, 2016 and all years combined) of injury or illness.

The rate of paid wage loss and specific loss claims for work-related injuries and illnesses for the state of Michigan and by county was calculated using the following steps:

 For the entire state of Michigan, the rates were calculated by dividing the number of paid wage loss and specific loss claims for work-related injuries and illnesses by the number of workers in Michigan in a specific year. This number was then multiplied by 100.

- For each county, the rates were calculated by dividing the number of paid wage loss and specific loss claims for work-related injuries and illnesses by the number of workers in the county of the employer in a specific year. This number was then multiplied by 100.
- For age-specific and gender-specific rates, a QWI modifier was applied to the denominator to allow for calculation of rates by age categories and gender, since this information is not available in the QCEW data.

Calculation of rates: The rate of paid wage and specific loss WC claims was calculated by dividing the number of paid wage and specific loss claims by the number of employees derived from the UIA QCEW which was multiplied by the American Community Survey (ACS) Full-Time Equivalent (FTE) estimate. A threshold of 15 must be attained per numerator for calculations

Calculation of FTEs: FTEs were calculated by applying a percentage that represents the number of hours worked by an individual in that particular industry. For this project, the ACS estimates of the FTEs per Michigan industry were used because the ACS is state-specific and allows for a more precise estimate of the industries in Michigan.

To calculate an FTE-based rate (number of claims per 100,000 FTE): we applied the following formula: (N/EH) * 200,000,000 where N = the number of paid wage and specific loss claims for injuries/Illnesses; EH = total hours worked by employees in the industry sector in the calendar year (number of hours * 50 weeks per year); 200,000,000 = base for 100,000 equivalent full-time workers (working 40 hours per week, 50 weeks per year).

Calculation of age-specific and gender-specific denominators: The U.S. Census QWI LED Extraction Tool was used to obtain the proportion of the workforce who were male, female, and by age categories (<24 years, 25-55 years and 56+ years). Yearly average employment data by the gender and age categories were calculated by averaging the quarterly employment data for each year in these categories. These percentages were then applied to the denominators used to calculate rates by these indicators.

Access Constraints

There are no access constraints for data available through the Michigan Environmental Public Health Tracking public portal.

Use Constraints

It is recommended that all users read and fully comprehend metadata prior to data use.

These data cannot be used for commercial purposes and shall not be used to engage in any method, act, or practice to conduct the solicitation or advertisement of goods, services, or real estate to Michigan consumers without first obtaining written permission from the MSU OEM.

Data users are prohibited from attempting to learn the identity of any person included in the data and from linking these data with any other data for the purpose of matching records to identify individuals or entities (such as places of work).

Security Handling Description

If data are distributed, the use constraints specified in this metadata apply to all recipients of the data.

Distribution Liability

The Michigan Public Health Tracking Network is maintained, managed, and operated by the Division of Environmental Health (DEH) within MDHHS. In preparation of these data, every effort has been made to offer the most current, correct, complete, and clearly expressed information possible. Nevertheless, some errors in the data may exist. In particular, but without limiting anything here, MDHHS disclaims any responsibility for source data, compilation and typographical errors and accuracy of the information that may be contained in these data.

These data do not represent the official legal version of source documents or data used to compile these data. MDHHS and MSU OEM further reserve the right to make changes to these data at any time without notice.

It is strongly recommended that careful attention be paid to the contents of the metadata file associated with these data to evaluate dataset limitations, restrictions, or intended uses. MDHHS and MSU OEM shall not be held liable for improper or incorrect use of the data described and/or contained herein.

MDHHS and MSU OEM make no warranties or representations whatsoever regarding the quality, content, condition, functionality, performance, completeness, accuracy, compilation, fitness, or adequacy of the data. By using the data, you assume all risk associated with the acquisition, use, management, and disposition of data in your information system, including any risks to your computers, software, or data being damaged by any virus, software, or any other file that might be transmitted or activated during the data exchange of this data.

MDHHS and MSU OEM shall not be liable, without limitations, for any direct, indirect, special, incidental, compensatory, or consequential damages, or third-party claims, resulting from the use or misuse of the acquired data, even if MDHHS and MSU OEM have been advised of the possibility of such potential damages or loss. Format compatibility is the user's responsibility.

Reference herein to any specific commercial products, processes, services, or standards by trade name, trademark, manufacture, URL, or otherwise, does not necessarily constitute or imply its endorsement, recommendation or favoring by MDHHS or MSU OEM. The view

and opinions of the metadata compiler expressed herein do not necessarily state or reflect those of MDHHS, or the data owners and shall not be used for advertising or product endorsement purposes.

Use of the data with other data shall not terminate, void, or otherwise contradict this statement of liability.

The sale or resale of the data, or any portions thereof, is prohibited unless with the express written permission of MDHHS and MSU OEM. All rights reserved. These data may not be used for commercial purposes without first obtaining written permission from the MSU OEM.

If errors or otherwise inappropriate information is brought to our attention, a reasonable effort will be made to fix or remove it. Such concerns should be addressed to the Michigan Tracking Program (See Contact Information below).

Custom Order Process

For access to unrestricted or public use Michigan-specific data, please see: <u>www.oem.msu.edu</u> or call 517-353-1846.

For access to restricted or secure data, please contact the Michigan Workers' Compensation Agency or the Michigan Unemployment Insurance Agency.

Contact Information

Michigan Department of Health and Human Services Division of Environmental Health P.O. Box 30195 Lansing, MI 48913 PHONE: (517) 335-8350 MDHHS-MiTracking@michigan.gov

2. About These Data - description oriented to the general Population:

What is Workers' Compensation?

Workers' compensation (WC) is the system used to provide wage replacement, medical, and rehabilitation benefits to workers who suffer a work-related injury or illness.

A work-related injury is any injury that happens on the job. It can be the result of a specific event or happen over time. An example of an injury from a specific event is when an individual falls off a ladder and breaks a bone. An example of an injury that occurs over time is a sprain that developed because of the repetitive nature of the job.

A work-related illness is any illness where work caused, significantly contributed to the cause, or aggravated the illness. Work-related illnesses are the result of exposure to something at the workplace. Work-related illnesses often develop after a longer period of time but can also happen from a one-time exposure.

For more information, please visit our Work-Related Injuries & Illnesses content page.

Why was this dataset created?

This dataset was created to learn how often work-related amputations, abrasions and cuts, crushes and contusions, fractures and dislocations, sprains and strains, burns, concussions, and other diseases that occur over time, that are covered by wage replacement, occur in various industries, locations, and groups of workers in Michigan.

The number of work-related injuries or illnesses give a general idea of these conditions in the workplace in Michigan. Rates tell us the risk of injury in each category and allow for comparisons.

How was this Dataset Created?

This dataset was created by the Michigan State University Division of Occupational and Environmental Medicine (MSU OEM) research team using two sources:

- 1. The Michigan Workers' Compensation Agency (WCA) database of paid wage loss claims. These data tell us about each work-related injury or illness.
 - The WCA database includes all paid wage loss claims for lost work time of 7 or more days.
 - Another category of claims is for specific loss and does not need to have 7 or more days off work to be awarded workers' compensation; these include an amputation involving bone loss, loss of vision, total loss of hearing, or death.
 - o Data on Michigan residents who were injured in another state were included.

- Types of injuries found in the Michigan Workers' Compensation (WC) data include amputations, abrasions and cuts, crushes and contusions, fractures and dislocations, sprains and strains, burns and concussions.
- Types of illnesses found in the Michigan WC data include tuberculosis, silicosis, respiratory disease from exposure to a toxic fume, and hearing loss. In this dataset, all work-related illnesses are combined because there are so few of them that result in a paid wage loss workers' compensation claim.
- 1. The Unemployment Insurance Agency (UIA) Quarterly Census of Employment and Wages (QCEW). These data tell us how many workers were employed for each industry.
 - The data were grouped by year, type of injury or illness, and type of industry. To protect patient confidentiality, small numbers are not shown.

The MSU OEM research team and its data partners have applied appropriate cell suppression rules imposed by the data providers and/or using guidance from the Centers for Disease Control and Prevention (CDC). Even at the county level it can be expected that the measures generated will often be based upon numbers too small to report or present without violating state and federal privacy guidelines and regulations. Staff have adhered to the cell suppression rules by suppressing all counts and rates greater than 0 and less than 6.

Complimentary suppression was not necessary for this dataset since there are many unknowns and therefore the smaller groups do not equal the total. For some data, it was necessary to increase cell sizes by combining data across time (e.g., years) and geographic areas (statewide instead of county-level data).

How Were the Measures Calculated?

Number of WC paid wage loss and specific loss claims for work-related injuries and illnesses for the State of Michigan were counted and grouped by:

- Type of injury
- Age group
- County
- Gender
- Industry type
- Year of injury
- Employer Size

Crude rate of WC paid wage loss and specific loss claims for work-related injuries and illnesses per 100 workers

We calculate rates to tell us the risk of injury in that category and allow comparisons to find categories which have the highest risks. The rate of paid wage loss and specific loss claims for work-related injuries and illnesses for the state of Michigan and by county was calculated using the following steps:

- 1. For the entire state of Michigan, the rates were calculated by dividing the number of paid wage loss and specific loss claims for work-related injuries and illnesses by the number of workers in Michigan in a specific year. This number was then multiplied by 100.
- 2. For each county, the rates were calculated by dividing the number of paid wage loss and specific loss claims for work-related injuries and illnesses by the number of workers in that county in a specific year. This number was then multiplied by 100.

What are the Limitations of these Data?

- The data do not include workers who did not file a WC claim, despite being eligible, for a wage or specific loss claim, workers who had medical-only claims and for wage or specific loss claims that were denied.
- The data do not include workers with injuries or illnesses who are assigned a different job at work while they are recovering from their injury or illness.
- The number of paid wage loss or specific loss claims for injuries or illnesses may be high in a given category just because there are many workers in that category.
- A rate that is listed for an industry provides the average rate for companies in that industry, some companies in that industry grouping will have lower rates and some will have higher rates.
- If an individual worked at two different companies during the same time period, they will be counted twice in the denominator. The FTE weights help to equalize the effect of this issue.
- Counts and rates for employers with multiple locations are included in the overall state data but not the individual county-level data.
- For companies whose employees work out of a single location but were potentially injured in another part of the state (i.e. the trucking industry), their counts and rates were assigned to the county where the company headquarters are located.
- The data do not include workers not covered under the Michigan Workers' Disability Compensation Act: federal employees, railroad employees, seamen, longshoremen, employers with fewer than 3 employees and the self-employed.
- The data cannot tell us the events and root cause of what led to the injury or illness.

For more information about these data, read the *full metadata*.

For questions or inquiries about the data, contact the Michigan State University (MSU) College of Human Medicine's Occupational and Environmental Medicine (OEM) Division at ODREPORT@ht.msu.edu.

Source: Michigan Workers' Compensation Agency paid wage loss claims data and the Unemployment Insurance Agency Quarterly Census of Employment and Wages.

Usage rights: All rights reserved. These data may not be used for commercial purposes without first obtaining written permission from the MSU OEM. Contact the MSU OEM at ODREPORT@ht.msu.edu for more information.

3. WC Content – initial information that will be seen when a person wants to look at the work-related injury and illness data queries: Workers' Compensation (Paid Wage Loss Claims)



The law requires a safe and healthy workplace. But, workplace injuries and illnesses still occur daily. Almost all workplace injuries and illnesses can be prevented. In Michigan, there are about 20,000 individuals each year who have a new workers' compensation (WC) claim for a work-related injury or illness to cover lost work time and associated medical costs. There were over 47,000 people in 2018 receiving lost wage benefits

from an injury or illness that million were paid in Michigan

Work-related injury and illness data

paid wage loss workers' compensation benefits or specific loss benefits portal.



happened in or before 2018. \$896 during 2018.

for Michigan workers who received are available on the MiTracking data



Work-related injury Work-related illness Workers' Disability Compensation Agency Workers' Disability Compensation Act Reporting Risk Factors Prevention Data - MiTracking Learn More

Citations

Expanded Version

Workers' Compensation (Paid Wage Loss Claims)



The law requires a safe and healthy workplace. But, workplace injuries and illnesses still occur daily. Almost all

workplace injuries and illnesses can be prevented. In are about 20,000 individuals each year who have a new compensation (WC) claim for a work-related injury or lost work time and associated medical costs. There 47,000 people in 2018 receiving lost wage benefits or illness that happened in or before 2018. \$896 million paid in Michigan during 2018.



Michigan, there workers' illness to cover were over from an injury dollars were Work-related injury and illness data for Michigan workers who received paid wage loss workers' compensation benefits or specific loss benefits are available on the MiTracking data portal.

Work-related injury

A work-related injury is an injury that happens on the job. It can be a one-time event or happen over time. Injuries can happen in all types of workplaces.

Work-related illness

A work-related illness is any illness where work caused the illness or made an existing illness worse. Work-related illnesses are from exposure to something at the workplace. Work-related illnesses often develop after a longer period of exposure. One-time exposures can also cause work-related illness.

Exposure Examples

- Dust
- Fumes
- Gas
- Heat
- Cold
- Infectious agents (bacteria, viruses, fungi, and parasites)
- Stress

Workers' Disability Compensation Agency

The Workers' Disability Compensation Agency regulates Michigan's Workers' Disability Compensation Act. Workers' compensation is a no-fault insurance program, meaning the worker is not at-fault for an injury. A worker must be off for more than 7 days in a row (can include weekends) to qualify for paid wage loss benefits. Another category of claims is for specific loss and does not need to have more than 7 days off work to be awarded workers' compensation; these include an amputation involving bone loss, loss of vision, total loss of hearing, or death. Medical or rehabilitation benefits do not have a requirement for days off.

Workers' compensation can include:

- Wage replacement
- Specific loss benefits (amputation involving bone loss, loss of vision, total loss of hearing, or death)
- Medical benefits
- Rehabilitation benefits

For more information, visit the Department of Labor and Economic Opportunity's <u>Workers' Disability Compensation Agency</u>.

Workers' Disability Compensation Act

The Workers' Disability Compensation Act covers most Michigan employers. Employers must buy an insurance policy from a private insurance company or be self-insured. This requirement makes sure there is payment for claims and costs.

Groups not covered:

- Federal employees
- Railroad employees
- Seamen on navigable waters
- Workers who load and unload water vessels
- Private employers with less than three workers at any one time
- Private employers with at least one worker employed for less than 35 hours per week, and who works less than 13 weeks total in a year
- Self-employed

For more information, visit the Department of Labor and Economic Opportunity's <u>Workers' Disability Compensation Agency</u>.

Reporting

The Michigan Workers' Disability Compensation Agency receives claims. This Agency makes sure that workers receive payment for lost work time and medical care costs.

Michigan Claims

Most Michigan WC claims are the following:

Most common injuries:

- Sprains and strains
- Broken bones
- Crushes

Where injuries happen most often:

- Factories
- Schools
- Hospitals
- Stores

For more information, visit the Department of Labor and Economic Opportunity's Workers' Disability Compensation Agency.

Risk Factors

All workers are at risk of having an injury or illness from exposure on the job.

Most at risk:

- New employees
- Senior, or long-term workers
- Workers in certain types of industry

Prevention

To prevent work-related injuries and illness, companies can:

- Develop health and safety plans
- Have good engineering controls
- Have safe work practices
- Use state and national resources to keep workers safe

For more information, visit the Department of Labor and Economic Opportunity at <u>Michigan Occupational Safety and Health Administration</u> (<u>MIOSHA</u>).

Inspection

The Michigan Occupational Safety and Health Administration (MIOSHA) is the group that inspects a company to enforce workplace safety regulations.

Data - MiTracking

MiTracking Workers' Compensation Indicator

- Paid Wage Loss Claims
 - Statewide data may be grouped by
 - Employer Size (small, medium, large by number of employees)
 - Industry Type (3-digit NAICS [North American Industry Classification System] code)
 - Injury Type
 - Year of injury (all years combined)
 - County data may be grouped by
 - Age Group
 - County of Employer
 - Employer Size
 - Gender
 - Industry Type (NIOSH NORA [National Occupational Research Agenda] sector)
 - Injury Type
 - Year of injury

MiTracking Injury and Illness Data Can Tell Us

- The number and rate of work-related amputations, abrasions and cuts, crushes and contusions, fractures and dislocations, sprains and strains, burns, concussions, and other diseases that are covered by wage replacement
- How often wage loss claims are paid in various industries, locations, and groups of workers in Michigan

MiTracking Injury and Illness Data Cannot Tell Us

- The total burden of work-related injuries and illnesses in a population
- The cause or conditions that led to the work-related injury or illness
- The long-lasting effects on retirees
- Workers not covered by the Workers' Disability Compensation Act
- Workers who, although qualified, do not file a wage loss claim or a claim for a specific loss
- Workers denied wage loss or specific loss claims
- Workers who only received medical or rehabilitation benefits
- Workers off work for less than eight days
- Workers with injuries or illnesses who are assigned a different job at work while they are recovering from their injury or illness

Find Out More

In 2016, the Michigan State University (MSU) Division of Occupational and Environmental Medicine (OEM) received funding from the National Institute for Occupational Safety and Health (NIOSH) to conduct a study of the paid wage and specific loss workers' compensation claims in Michigan.

For more data information, visit:

- <u>About These Data</u> on the Data Portal
- Metadata (Technical information about the content, quality, and context of the data)

Learn More

Department of Labor and Economic Opportunity

MI Occupational Safety and Health Administration (MIOSHA)

MI Workers' Disability Compensation Agency

Michigan Department of Health and Human Services (MDHHS)

Thirteen Indicators of the Health of Michigan's Workforce

Work-Related Amputations in Michigan, 2006

Work-Related Amputations in Michigan, 2007

Work-Related Amputations in Michigan, 2008

Work-Related Amputations in Michigan, 2009

Work-Related Amputations in Michigan, 2011

Work-Related Amputations in Michigan, 2012

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Work-Related Amputations in Michigan, 2017

Work-Related Health Disparities in Michigan, 2011

Michigan State University Occupational and Environmental Medicine (MSU OEM)

<u>Homepage</u>

Resource page

United States Bureau of Labor Statistics

Homepage

United States Department of Labor

Occupational Safety and Health Administration (OSHA)

Contact Information

Contact the MSU OEM at ODREPORT@msu.edu for more information.

Citations

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Appendix 3

Opioid Prescribing Practices for Individuals with Workers' Compensation Claims Study Design and Protocol

Opioid Prescribing Practices for Individuals with Workers' Compensation Claims Study Design and Protocol

BACKGROUND

Pain management for acute injuries commonly includes prescription opioids, however, use of opioids for acute pain has been shown to increase the risk of long-term use and as many as one in four patients who receive long-term opioid therapy experience addiction.^{1, 2} During 2018, there were an estimated 133,219 individuals who experienced a nonfatal occupational injury in Michigan, 21,315 of which required more than seven days away from work.³ This represents a large number of individuals experiencing acute and potentially continuing with chronic pain. Research has shown that workers with substance use disorder miss an average of 4.3 more days of work each year than workers without substance use disorder.⁴ Although opioid prescribing rates have consistently decreased from 2015 to 2018, it is unknown if prescribing practices have changed for occupational injuries among workers in Michigan.⁵

SPECIFIC AIMS

- 1. Determine the prevalence of prescription opioid use prior to and following a work-related injury.
- 2. Determine if the prevalence of prescription opioid use following a work-related injury varies by age, gender, injury type, or industry.
- 3. Determine if the rate of prescription opioid use following a work-related injury is changing over time.
- 4. Determine if the average daily and total morphine milligram equivalents of prescription opioids dispensed following a work-related injury is changing over time.
- 5. Determine if the total morphine milligram equivalents of opioid pain medication prescribed following a work-related injury differs for workers who have received long-term opioid therapy (continuous opioid therapy for the two year prior to injury) compared to workers who have not received long-term opioid therapy.

METHODS AND PROCEDURES

Study Design:

This retrospective cohort study will use data from the Michigan Workers' Compensation Claims (WCC) Database and the Michigan Automated Prescription System (MAPS). Eligible WCC records from 2016 through 2018 will be deterministically and probabilistically matched to MAPS records of prescription opioid dispensing based on identifying information such as date of birth, social security number, and first and last name. Successfully matched MAPS records will be retained if the date of prescription was identified before or after the date of injury.

Data Sources:

The WCC, which is managed by the Michigan Department of Labor and Economic Opportunity (MDLEO), has an electronic database that includes claims for occupational injuries that resulted in more than seven days in a row of missed work. Most public and private employees are eligible to submit workers' compensation claims to insurance agencies/employers regulated by the Michigan Workers' Disability Compensation Agency. Notable exceptions are federal government workers, interstate railroad workers, seamen on navigable waters, workers who load and unload sea vessels (i.e. longshoremen), workers who are employed by a private employer with fewer than three employees or a private employer that does not employ at least one worker for 35 or more hours per week for at least 13 weeks, and self-employed workers.

The MAPS includes data on all dispensed and prescribed controlled substances (DEA schedule 2-5 drugs). Board of Pharmacy Administrative Rule 338.3162b requires all pharmacies, practitioners, and veterinarians who dispense schedules 2-5 controlled substances to electronically report prescription data to MAPS daily. Exemptions to these requirements include controlled substances administered to patients, samples of controlled substances provided to a patient, and controlled substances that are dispensed by a physician at a medical institution for a maximum of 48 hours.

Target population:

The target population includes all individuals, who have experienced a work-related injury resulting in more than seven days of lost worktime from 2016 through 2018 and received workers' compensation from an insurance company/employer regulated by the Michigan Workers' Disability Compensation Agency.

Study Population:

See target population

Exclusion criteria:

WCC records that have been denied or that had insufficient lost worktime to qualify for benefits. There will be no excluded MAPS records.

Human Subject Protection:

This research project does not present more than a minimal risk to individual s because the project will only be performing data analysis on data that had already been collected for administrative purposes. The main risk to subjects is breach of confidentiality through improper disclosure of personally identifying information. However, the researchers will minimize the risk of improper disclosures by removing all identifiers from the analytic dataset.

Data Linkage

The 2016, 2017, and 2018 WCC Database will be provided to LARA. LARA will perform all data linkage steps and remove all patient-level identifiers from the linked dataset prior to transferring data back to MSU OEM. Data will first be matched deterministically on social security number and then by first name, last name, and date of birth. WCC records that could not be deterministically matched to MAPS records will undergo a probabilistic matching process using first name, last name, day, month, and year of birth, gender, zip code, social security number, and last four digits of social security number. Variables used for matching will be standardized prior to analysis, such as removing non-alphanumeric characters from names, removing leading or trailing whitespace, excluding values used to identify missing or incomplete data (e.g. 999999999 for a social security number).

Analytic Variables

The following WCC variables will be retained in the analytic dataset:

- Type
- DOI (Date of injury)
- ee zip (employee zip code)
- county of injury
- claim stat (Workers' Compensation claim status)
- emp city (employer city)
- emp st (employer state)
- emp zip (employer zip)
- emp payroll (employer payroll)
- num ees (number of employees)
- emp class (employer class)
- gender
- dth indicator (death indicator)
- date last worked
- date returned work
- injury code

- injury description
- body part code
- body part description
- premium indicator
- Age at time of injury

LARA will calculate age in years (rounded down to nearest whole year) at the time of injury and then remove date of birth from the analytic dataset. The following MAPS variables will be linked to the WCC database:

- Date prescription was filled
- Refill number
- Product ID qualifier
- Product ID
- Quantity Dispensed
- Drug Dosage Units Code
- Days' Supply
- Classification code for payment type
- Date sold
- Compound product ID qualifier
- Compound product ID
- Compound ingredient quantity
- Compound drug dosage units code

Data Management

All patient-level personal identifiers including first name, last name, middle initial, date of birth, date of death, social security number, and employer name and street address will be removed from the matched dataset prior to transferring to MSU OEM. All datasets will be encrypted prior to transfer and transferred through a secure method such as a secure FTP. The analytic dataset (aka matched dataset) will be stored on a restricted access network location on MSU servers only. Only approved MSU research staff will have access to the analytic dataset.

If the MAPS records are shared in long format (i.e. a record for each prescription dispensed), then LARA will provide a newly generated identification variable to link each prescription record to the WCC employee record. The identification variable should not be based on or assembled from other individual identifiers.

Quality Assurance

The final analytic dataset will be examined to ensure quality of data. The following quality assurance steps will be performed prior to analysis:

- Duplicate records will be identified and removed.
- Missing data will be evaluated to determine if data are missing at random or could potentially lead to bias.
- All analytic variables will be examined for outliers and implausible and/or inconsistent values.

Statistical Analysis

Descriptive Analysis

Basic descriptive analysis will include frequencies of injured workers who did not receive any opioid pain medication prior to or after the date of their injury, injured workers who received opioids both prior to and after their injury, and injured workers who were opioid naïve (did not receive at least one opioid medication in the two years prior to their injury) and subsequently received one or more opioid pain medications in the twelve months following their injury. Differences across these groups in the distribution of gender, age, employer class, type of injury, length of time away from work, and residence in a rural or urban area will be examined by chi-square tests of association for categorical data, chi-square tests of trend for discrete data, and by t-tests for continuous data. Residence in a rural or urban area will be based on the county that contains the entire employee's zip code or most of the employee's zip code. The 2013 National Center for Health Statistics Urban-Rural Classification Scheme for Counties will be used to classify each county as an urban or rural area.

Dependent Variables

- Receipt of a prescription for an opioid pain medication within six months of a work-related injury
- Total morphine milligram equivalent (MME) units of opioid pain medication within six months of a work-related injury
- Total days' supply of opioid pain medication within six months of a work-related injury
- Proportion of work-related injuries during each month of the surveillance period that received an opioid medication following the date of injury, among workers who were opioid-naïve prior to the date of injury
- Average daily MME units of first prescribed opioid pain medication following a work-related injury for each month of surveillance period

Independent Variables

- Age
- Gender
- Type of injury
- Employer class
- Number of lost workdays
- Residence in a rural/urban area

<u>Analysis</u>

Risk factors associated with a higher likelihood of receiving an opioid prescription following a work-related injury among opioid-naïve workers will be examined using a logistic regression model. Covariates found to be significantly associated with the outcome will be included in the

regression model. To reduce autocorrelation within the data, only the first injury will be included in regression analysis among workers with more than one injury during the surveillance period. Similar regression models will be used to test for factors associated with higher doses (morphine milligram equivalents) and increased number of days' supply following a work-related injury among workers who received at least one opioid pain medication. The appropriate regression model (e.g. Poisson, negative binomial, etc.) will be selected based on the statistical characteristics of the outcome variable including distribution, dispersion, and variance.

Trend analysis will be used to determine if the proportion of work-related injuries receiving an opioid pain medication within different periods after an injury is changing over time. Trend analysis will also be used to determine if the mean daily MME is changing over time among workers prescribed one or more opioid pain medications within six months of a work-related injury. Trend analysis will utilize the month as the unit of analysis. The appropriate statistical test will be based on a visual inspection of the data. For example, if there is evidence of a linear trend, an appropriate regression analysis (e.g. ARIMA) will be used to evaluate trends. Otherwise, if the data cannot be assumed to follow a linear pattern, an appropriate nonparametric test will be used (e.g. Mann-Kendall test).

DISSEMINATION

A report on the results of the analysis will be prepared. Results will be shared with interested stakeholders including the Michigan Workers' Disability Compensation Agency; Members of the Michigan Occupational and Environmental Medicine Association, and Employer and Employee organizations.

A peer-reviewed publication will be prepared for the medical literature.

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