



# Occupational patterns in opioid-related harms among Ontario workers: Findings from the Occupational Disease Surveillance System

Dr. Nancy Carnide (IWH) and Dr. Paul Demers (OCRC)

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# Acknowledgements

## Project team:

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Ministry of Labour,  
Training and Skills  
Development



Ministry of Health



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# Project Advisory Committee

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- International Brotherhood of Boilermakers
- International Brotherhood of Electrical Workers (IBEW) LU 353
- Ontario Building Trades
- Eastern Construction
- Public Services Health & Safety Association
- Infrastructure Health & Safety Association
- Public Health Ontario
- Canadian Centre on Substance Use and Addiction
- Ontario Workplace Safety and Insurance Board
- Ontario Ministry of Labour, Immigration, Training and Skills Development

# Key messages from today's presentation

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Rates of opioid-related harms among a group of formerly injured workers significantly higher than those in the general Ontario population

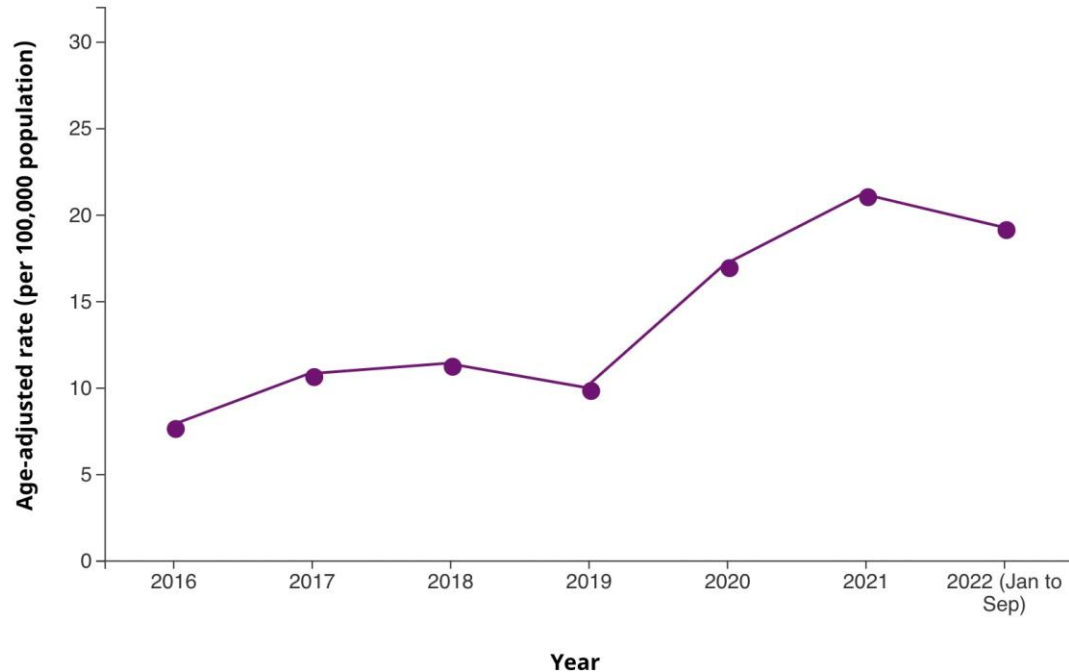
- Provides support for the role of work-related injuries as a contributor to opioid-related harms among the employed population

Opioid-related harms cluster among certain occupational groups

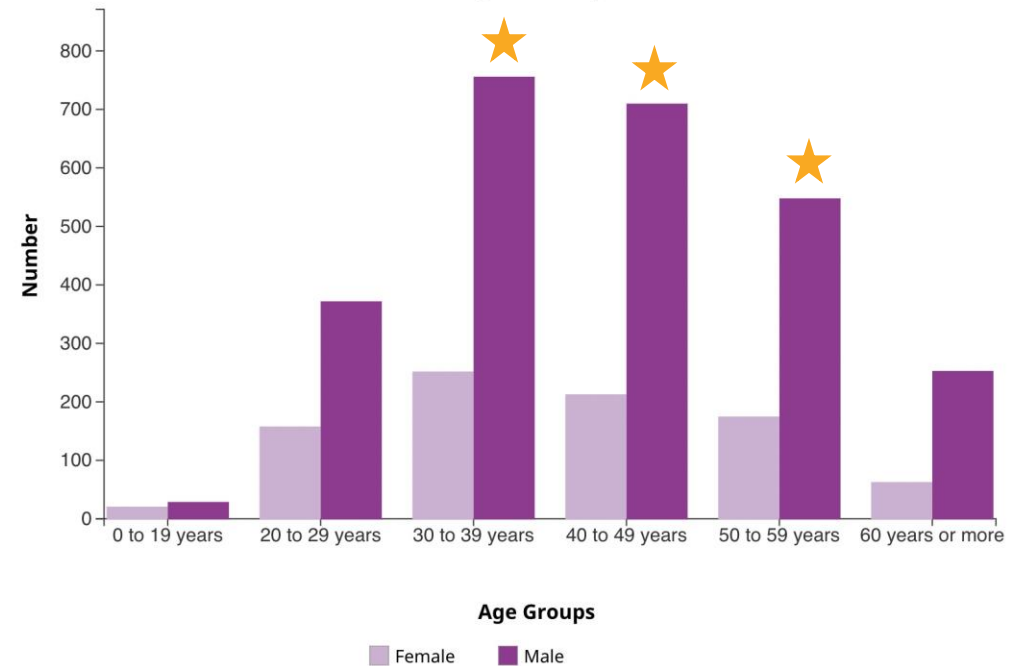
- Particularly among blue-collar, physically-demanding occupations

# Recent trends in the opioid toxicity crisis in Canada

Age-adjusted rate (per 100,000 population) of total apparent opioid toxicity deaths in Canada, 2016 to 2022 (Jan to Sep)



Number of accidental apparent opioid toxicity deaths by sex and age group in Canada, 2022 (Jan to Sep)



**Total of 34,455 apparent opioid toxicity deaths between January 2016 and September 2022**

# Occupational patterns in opioid poisonings in the US

Drug overdose mortality is associated with employment status and occupation in the National Longitudinal Mortality Study

Jonathan Aram, Norman J. Johnson, Mei-Ling Ting Lee & Natalie Slopen

Morbidity and Mortality Weekly Report

## Occupational Patterns in Unintentional and Undetermined Drug-Involved and Opioid-Involved Overdose Deaths — United States, 2007–2012

Laurel Harduar Morano, PhD<sup>1,2</sup>; Andrea L. Steege, PhD<sup>2</sup>; Sara E. Luckhaupt, MD<sup>2</sup>

DOI: 10.1002/ajim.23027

RESEARCH ARTICLE

AMERICAN JOURNAL OF INDUSTRIAL MEDICINE WILEY

## Opioid-related overdose deaths by industry and occupation—Massachusetts, 2011-2015

Devan Hawkins MS<sup>1</sup> | Cora Roelofs ScD<sup>2</sup> | James Laing<sup>3</sup> | Letitia Davis ScD<sup>3</sup>

### High-risk occupational groups:

- Construction and trades
- Natural resources (mining, extraction, forestry, fisheries)
- Transportation
- Maintenance
- Healthcare
- Services

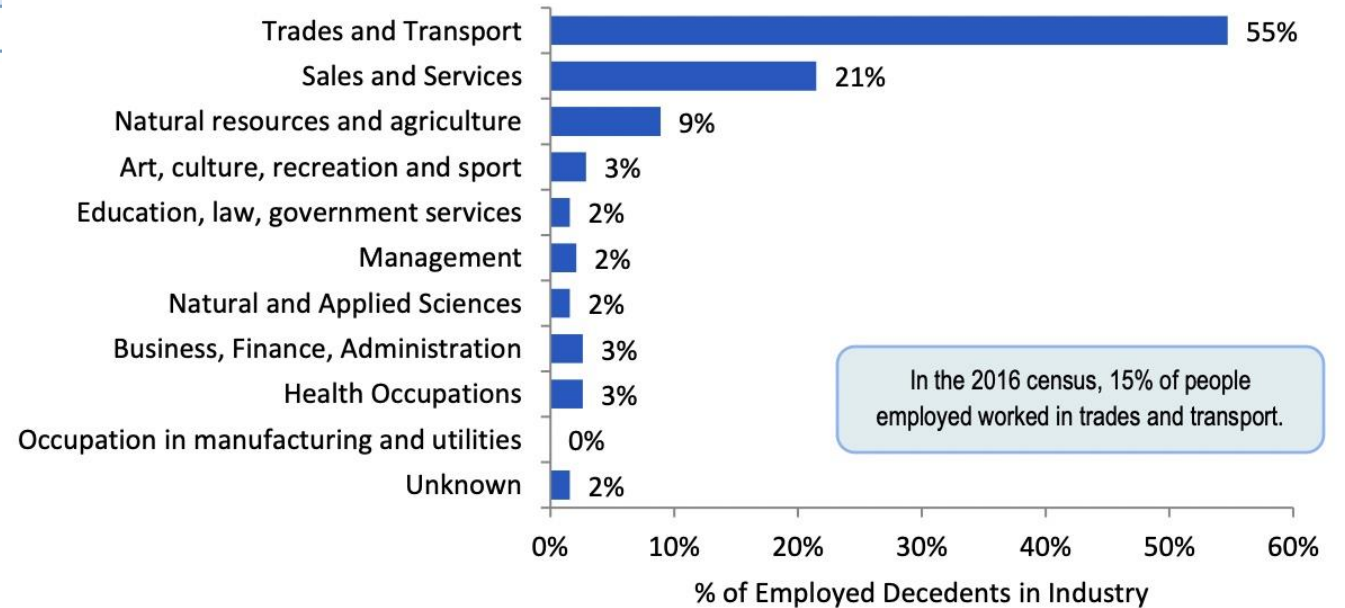


# Opioid-related deaths in BC (2016-2017)

**Table 3. Illicit drug overdose deaths by employment status and sex**

Employment Status	Female		Male		Total	
	No.	%	No.	%	No.	%
Employed	39	24	343	49	382	53
Unemployed	117	71	330	47	447	60
Unknown	9	5	34	5	43	6
<b>Total<sup>1</sup></b>	<b>165</b>	<b>100</b>	<b>707</b>	<b>100</b>	<b>872</b>	<b>100</b>

**Fig. 7. Illicit drug overdose deaths by industry of work**



Source: *Illicit Drug Overdose Deaths in BC: Findings of Coroners' Investigations*. September 2018.  
<https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/statistical/illicitdrugoverdosedeadsinbc-findingsofcoronersinvestigations-final.pdf>

# Opioid-related deaths in Ontario (2019-2020)

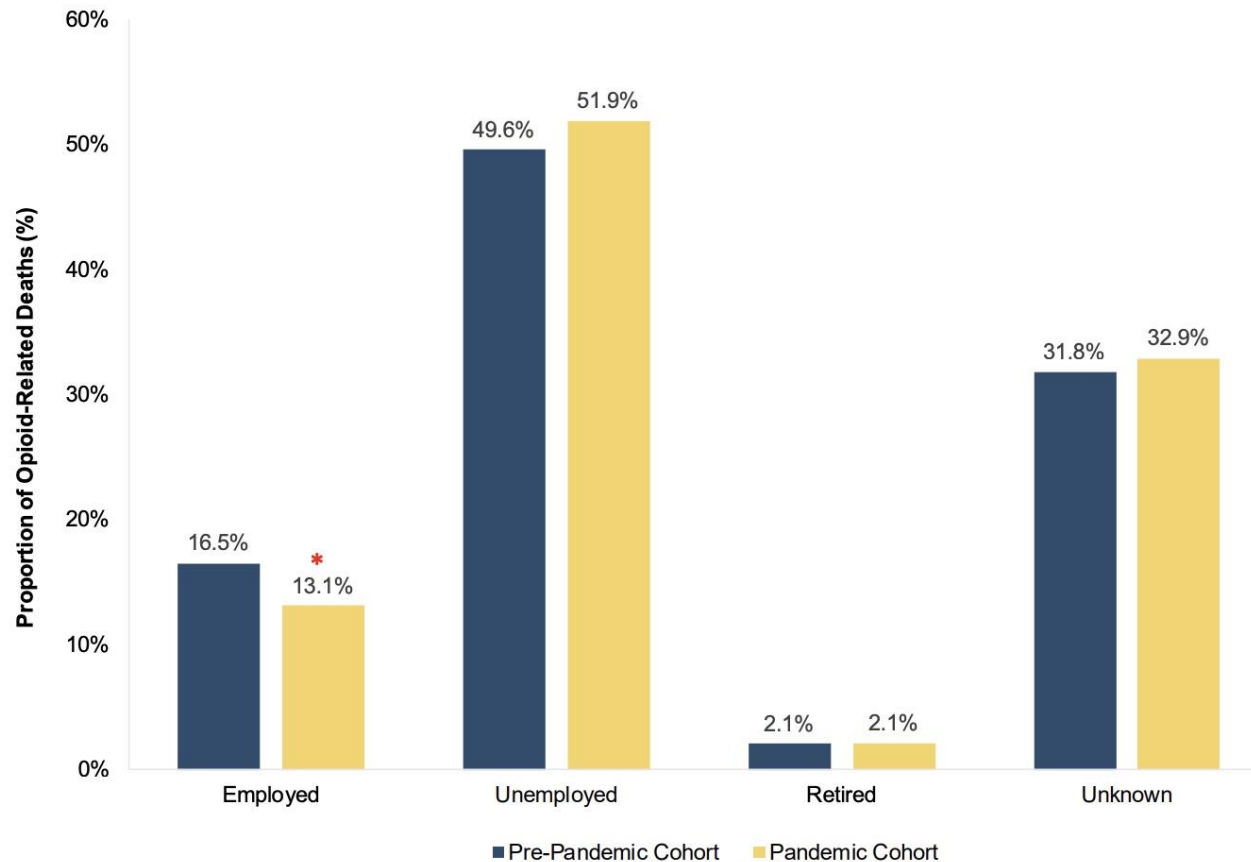
## Industry of work among those employed

Industry (using the North American Industry Classification System)	Pre-Pandemic Cohort N=192	Pandemic Cohort N=264	P-Value
Construction	57 (29.7%)	78 (29.5%)	0.97
Retail trade	7 (3.6%)	15 (5.7%)	0.32
Transportation and warehousing	8 (4.2%)	15 (5.7%)	0.47
Health care and social assistance	9 (4.7%)	14 (5.3%)	0.77
Accommodation and food services	12 (6.3%)	12 (4.5%)	0.42
Manufacturing	10 (5.2%)	12 (4.5%)	0.74
Other services*	46 (24.0%)	61 (23.1%)	0.83
Other Trades**	11 (5.7%)	15 (5.7%)	0.98
Unknown	32 (16.7%)	42 (15.9%)	0.83



# Opioid-related deaths in Ontario (2019-2020)

## Employment status of people experiencing an opioid-related death



# Objectives

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**Overall project objective:** To establish a surveillance program to monitor opioid-related harms in the Ontario workforce by adapting an existing resource, the Occupational Disease Surveillance System (ODSS)

## Objectives of this presentation:

1. To compare rates of opioid-related harms among workers in the ODSS to those in the general Ontario population, overall and by occupation
2. To examine the association between occupation and risk of opioid-related harms among workers within the ODSS

# Occupational Disease Surveillance System (ODSS)

- Unique system that can identify and monitor trends in work-related disease in Ontario
  - Many cancers and a wide range of other health outcomes
- Established by linking existing provincial health databases to job information
- Analytical cohort of over 2.3 million workers (approximately 1.7 million for this project)



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# Workers in the ODSS

Occupation

Industry

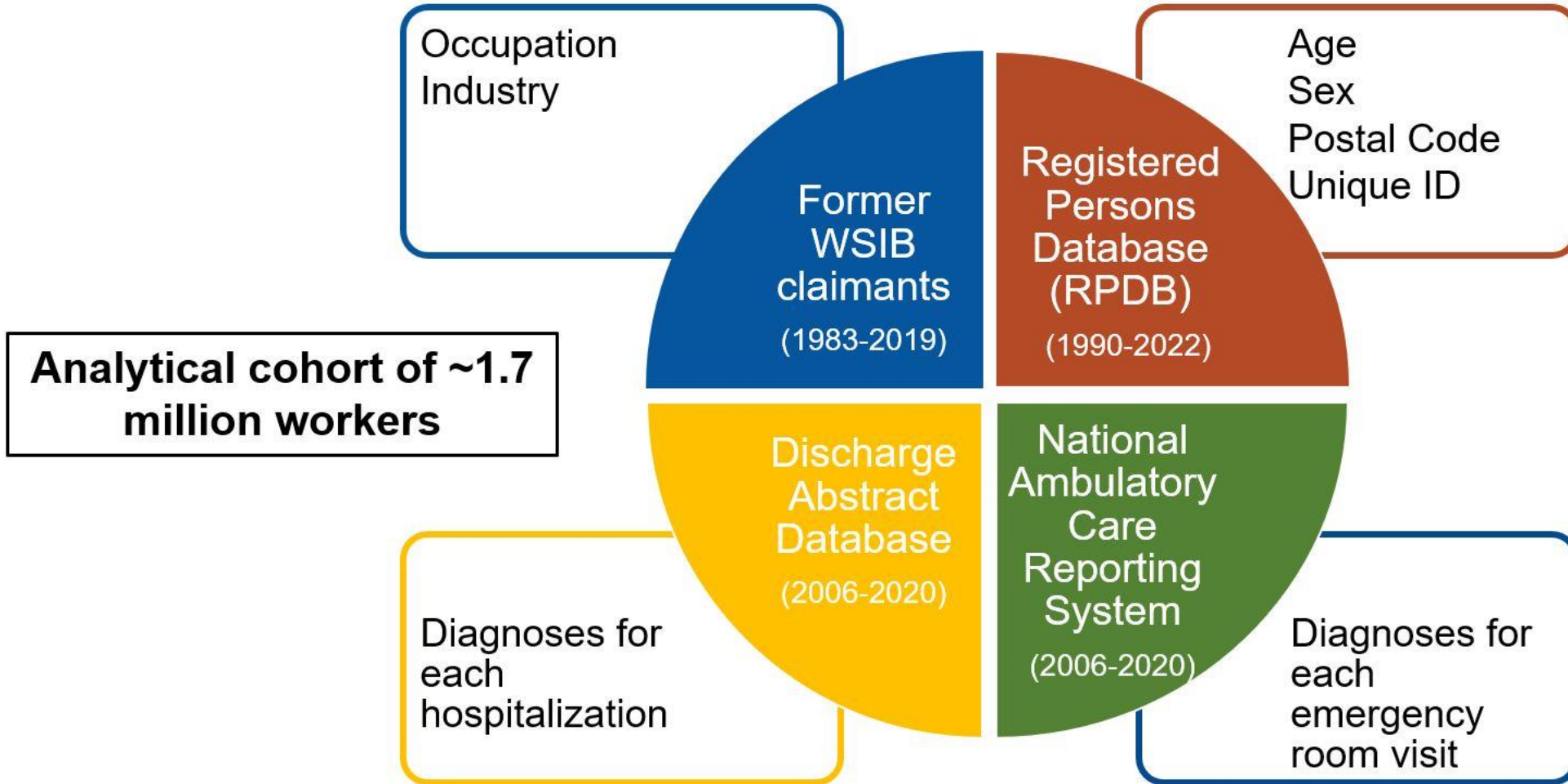
Analytical cohort of ~1.7  
million workers

Former WSIB  
claimants  
(1983-2019)

Occupation coded using the  
Canadian Classification  
Dictionary of Occupation

3 levels: division, major, minor

# ODSS data relevant to this project



# Opioid-related harms

- Identified using International Classification of Diseases, 10<sup>th</sup> Revision, Canada (ICD-10-CA) codes in hospitalization and ED data
- May involve pharmaceutical and/or non-pharmaceutical opioids

## Poisonings

- Toxicity due to excess in body
- Occurs when taken incorrectly
- Accidental, intentional, or unknown intent

## From 2006 – 2020:

13,594 events for **10,066** cases

## Mental and behavioural disorders

- Various disorders e.g., withdrawal, dependence
- Differ in severity, clinical form

## From 2006 – 2020:

19,133 events for **11,762** cases



# Data sources: Analysis 1



Occupational Disease Surveillance System  
2006 to 2020

Identified:

- # of cases of each opioid-related harm
- Person-years of observation (i.e., time each worker was observed and followed)

By calendar year, age, sex, region



General Ontario Population  
2006 to 2020

Identified:

- Incidence rates of each opioid-related harm

By calendar year, age, sex, region

# Statistical analysis: Analysis 1

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- Calculated **standardized incidence ratios (SIRs)** overall and for each **occupation** group at the division level
- Done by data source (hospitalizations, ED visits)
- SIRs adjusted for sex, age, calendar year, and region

# Overall comparison of ODSS to general population

Workers in the ODSS demonstrated elevated risk of all opioid-related harms when compared to the general population

## Poisonings

Emergency department visits (SIR 2.41)  
Hospitalizations (SIR 1.54)

## Mental & Behavioural Disorders

Emergency department visits (SIR 1.86)  
Hospitalizations (SIR 1.42)

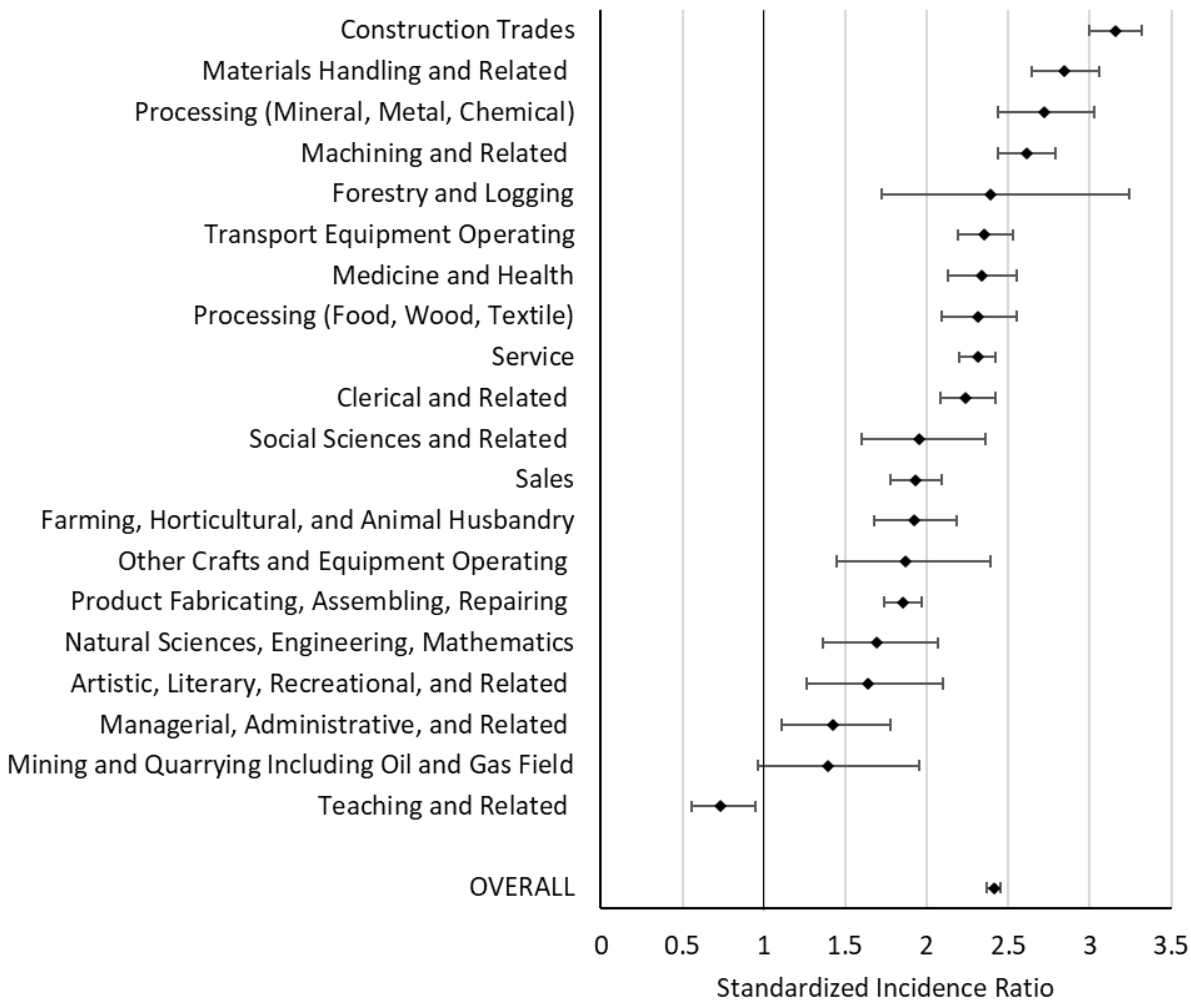
SIR: standardized incidence ratio

**Interpretation:** SIR > 1.0 means the risk of opioid-related harms is elevated among workers in the ODSS compared to the general population

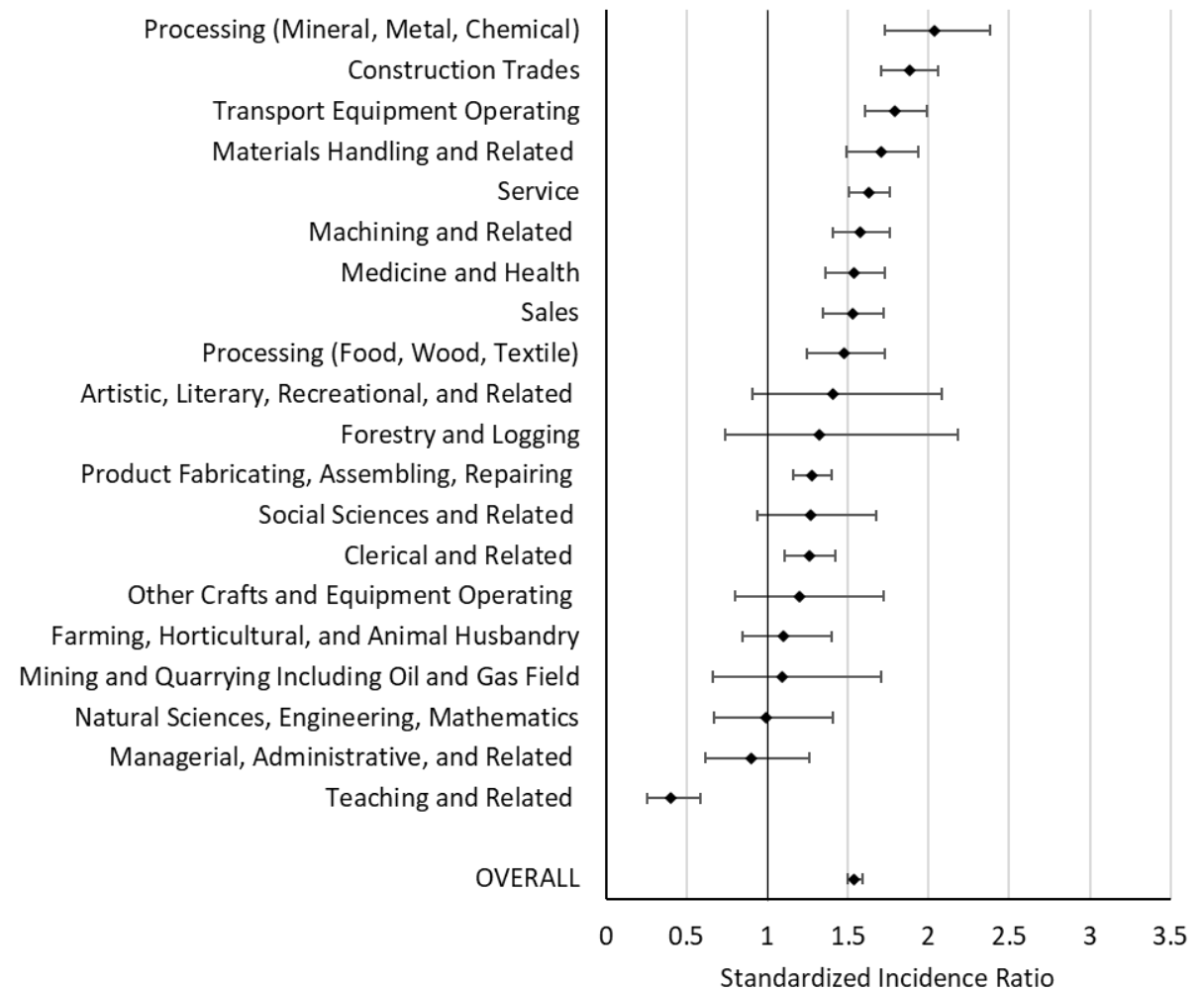
*\*All SIRs are statistically significant*

*\*\*SIRs adjusted for sex, age, calendar year, and health region*

ED Visits for Opioid-Related Poisonings by Occupation

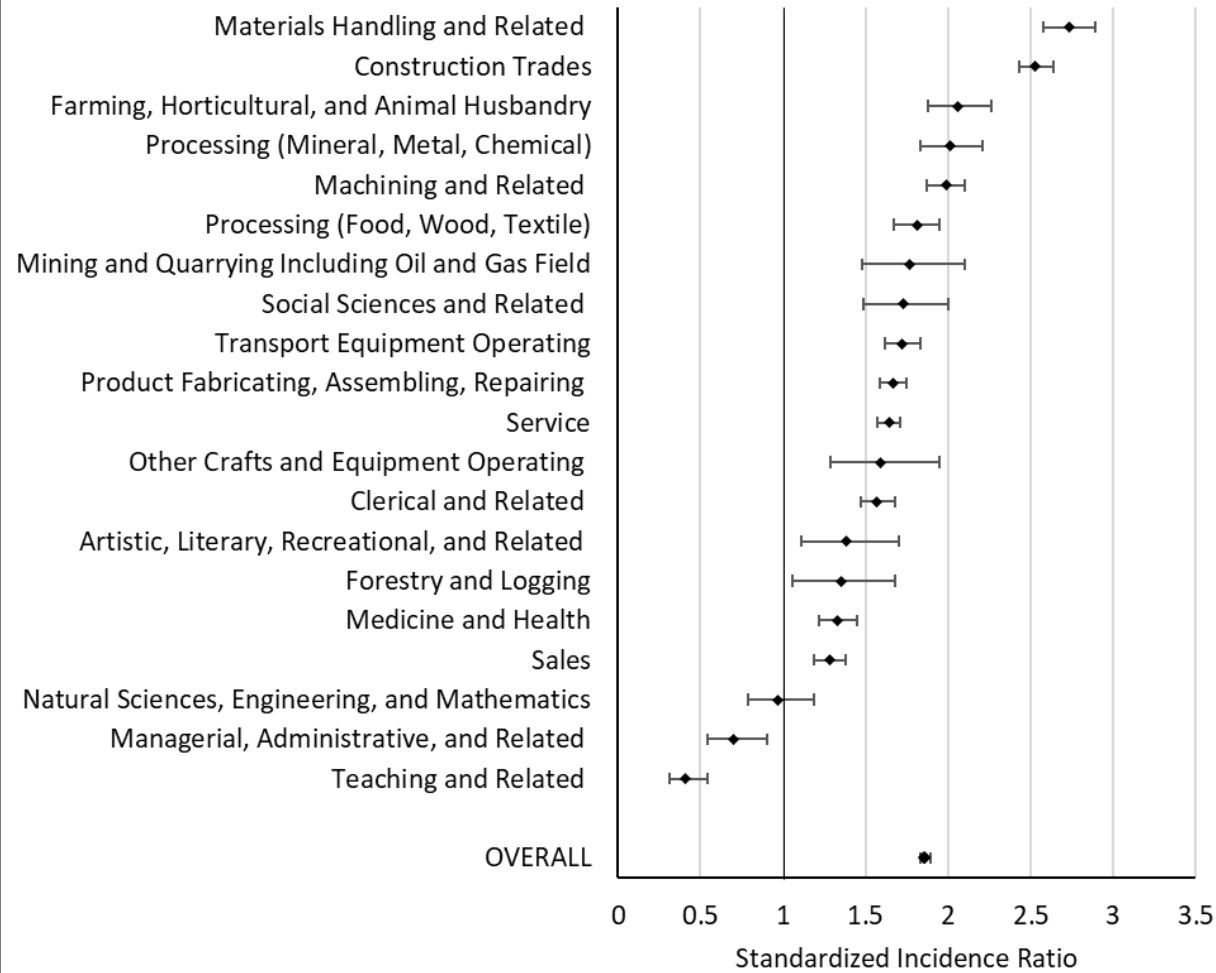


Hospitalizations for Opioid-Related Poisonings by Occupation

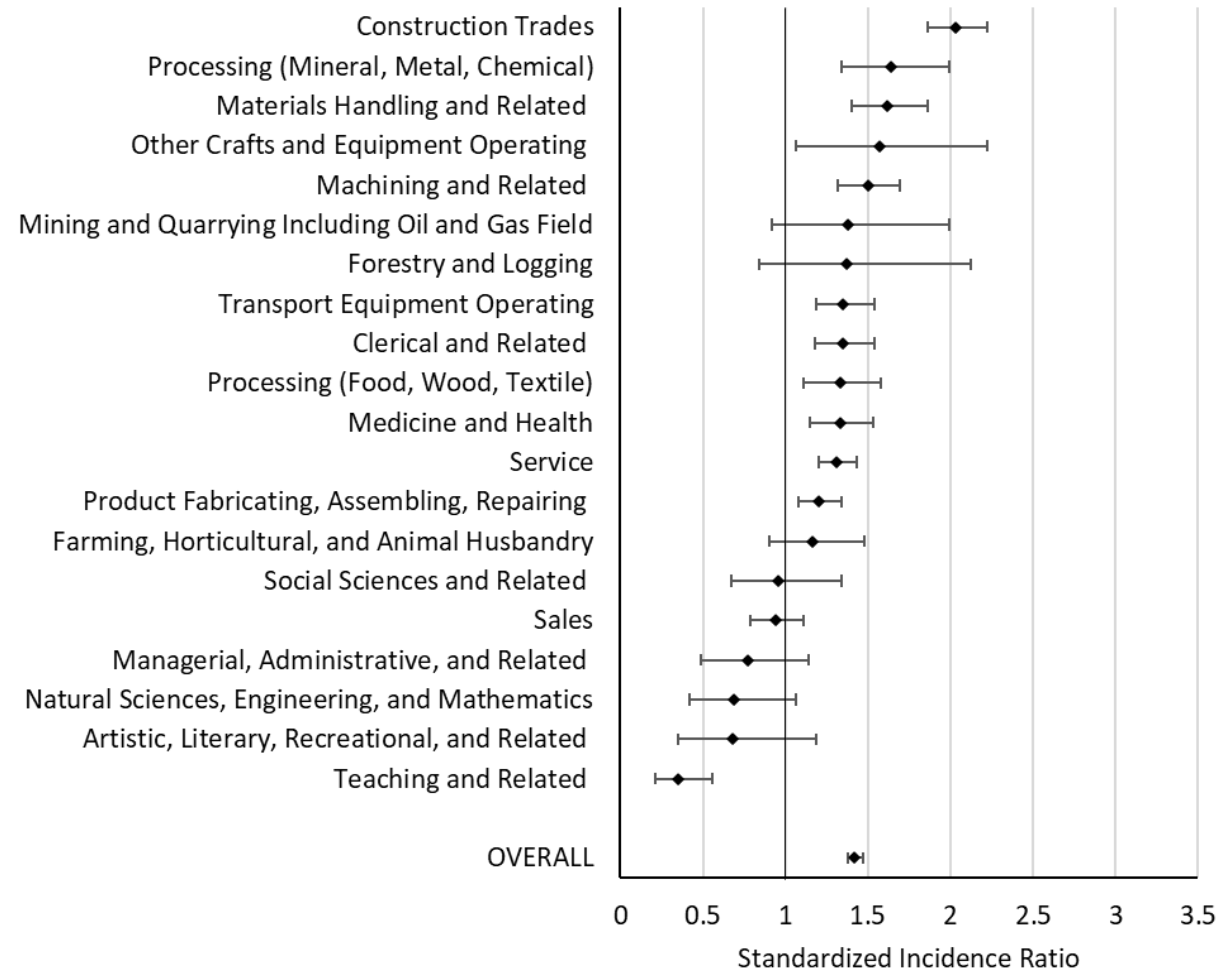


**Figure 1.** Standardized incidence ratios (SIRs) and corresponding 95% confidence intervals (CIs) by occupation for opioid-related poisonings: Ontario, Canada, 2006-2020

ED Visits for Opioid-Related Mental and Behavioural Disorders by Occupation



Hospitalizations for Opioid-Related Mental and Behavioural Disorders by Occupation

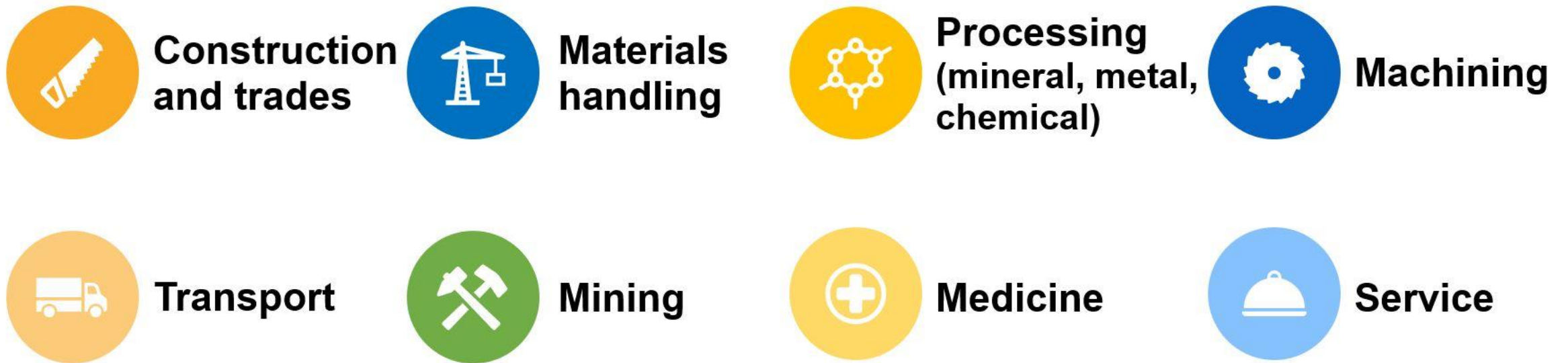


**Figure 2.** Standardized incidence ratios (SIRs) and corresponding 95% confidence intervals (CIs) by occupation for opioid-related mental and behavioural disorders: Ontario, Canada, 2006-2020

# Comparison of ODSS to general population by occupation

Workers in almost all occupations demonstrated elevated risks of opioid-related harms compared to the general population

Some of the more consistently high SIRs were among workers in:





# Data source: Analysis 2

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## Occupational Disease Surveillance System 2006 to 2020

Identified:

- # of cases of each opioid-related harm
- Person-years of observation (i.e., time each worker was observed and followed)

# Statistical analysis: Analysis 2

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- Cox proportional hazards models were used to estimate **hazard ratios (HRs)** and 95% confidence intervals for each of the opioid-related harms by occupation compared with all other workers in the ODSS
  - Examined at 3 occupational levels: division, major, and minor groups
- Models adjusted for sex, age at start of follow-up, and birth year

# Division-level occupational groups with elevated risks of poisonings and mental/behavioural disorders



## Construction and trades

P: 1.57 (1.48-1.67)\*  
MB: 1.59 (1.51-1.68)



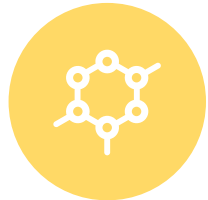
## Forestry and logging

P: 1.45 (1.09-1.94)  
MB: 1.70 (1.34-2.16)



## Materials handling

P: 1.32 (1.22-1.43)  
MB: 1.22 (1.13-1.31)



## Processing (mineral, metal, chemical)

P: 1.27 (1.14-1.42)  
MB: 1.26 (1.14-1.39)



## Processing (food, wood, textile)

P: 1.12 (1.01-1.24)  
MB: 1.19 (1.09-1.31)



## Machining

P: 1.13 (1.04-1.21)  
MB: 1.17 (1.09-1.25)

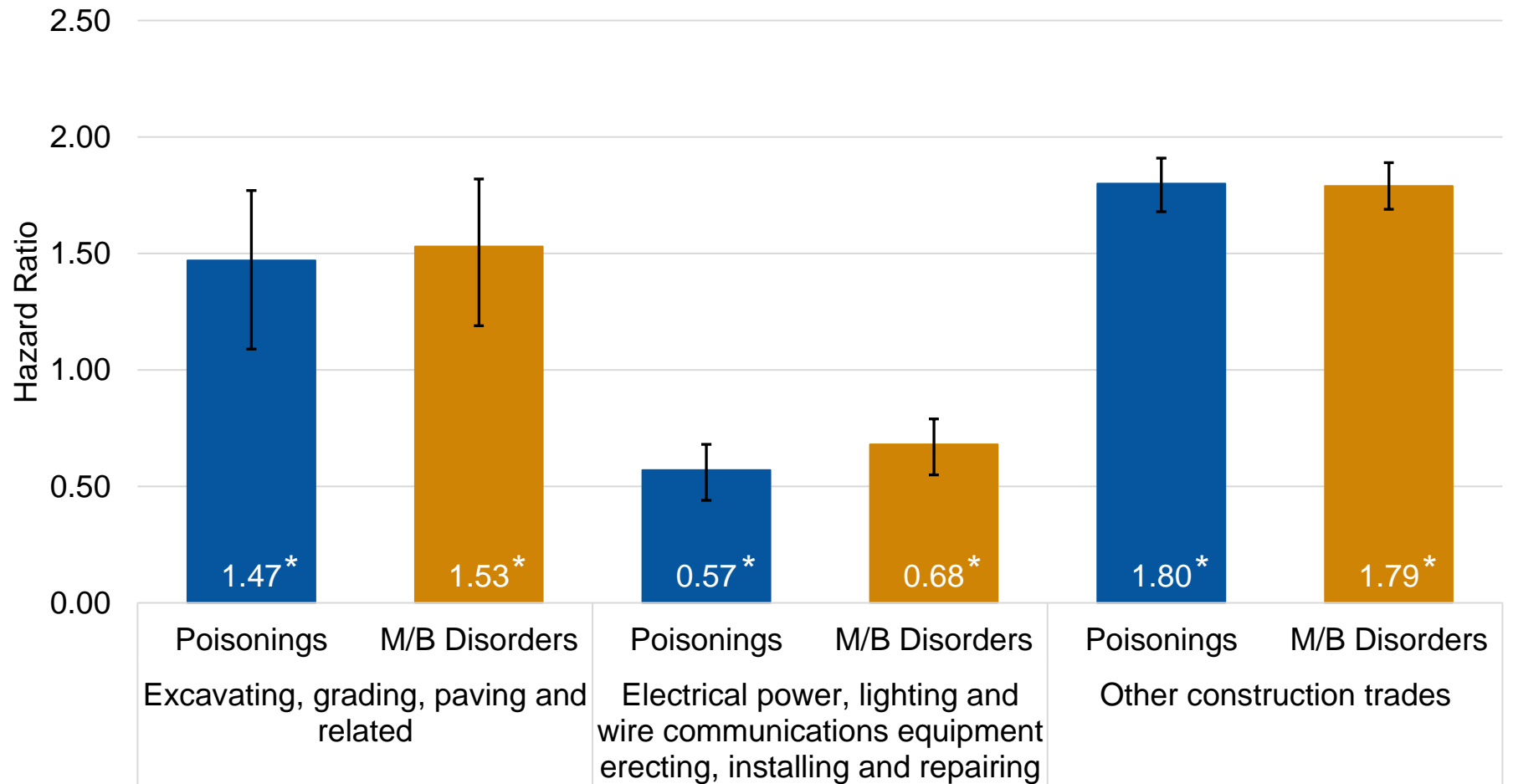
P: Poisonings  
MB: Mental & behavioural disorders

\*Hazard ratio (95% CI)

# Findings from **major-level** occupational groups: **construction and trades**



## Construction and trades

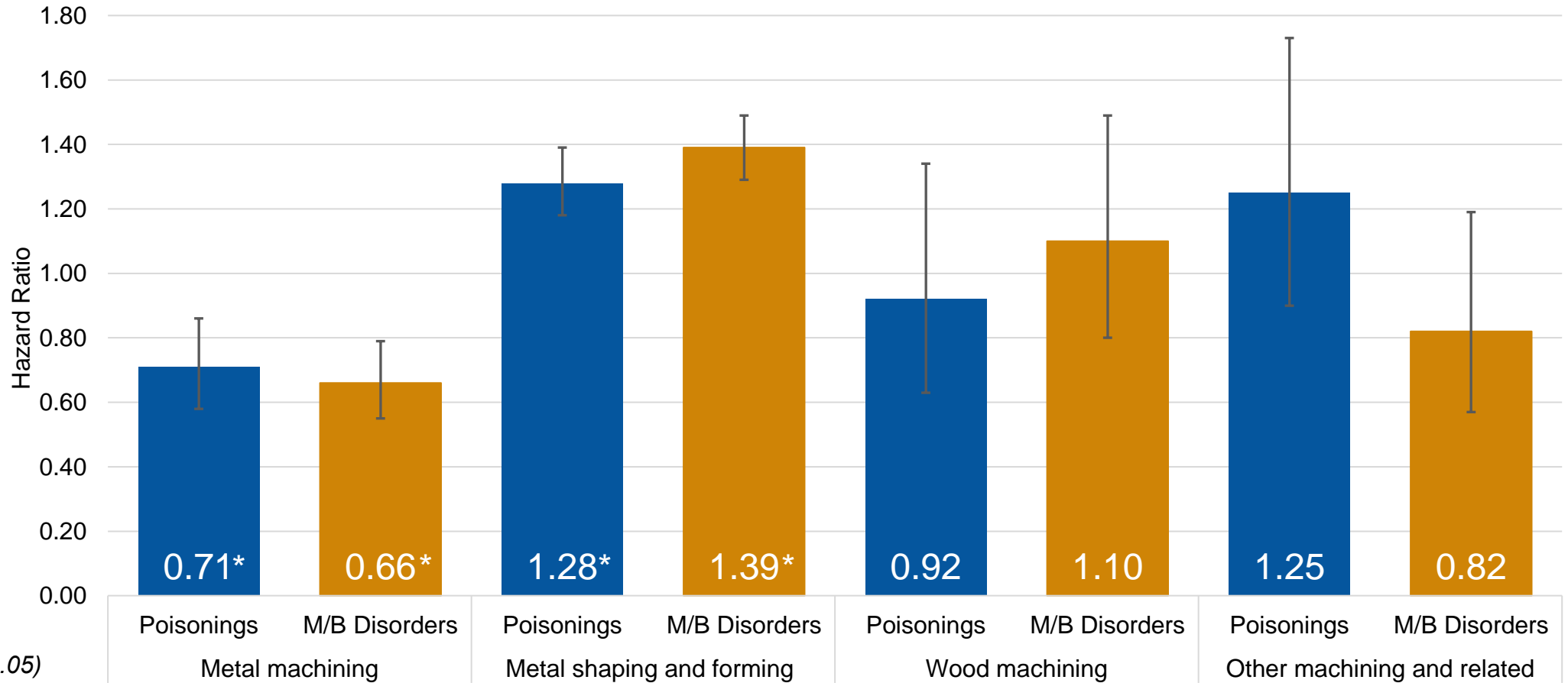


\*Statistically significant ( $\alpha=0.05$ )

# Findings from **major-level** occupational groups: machining



## Machining



\*Statistically significant ( $\alpha=0.05$ )

# Division-level occupational groups with elevated risks of poisonings or mental/behavioural disorders



## Mining and quarrying

P: 1.04 (0.76-1.42)

**MB: 1.68 (1.34-2.11)**



## Transport equipment operating

**P: 1.18 (1.09-1.27)**

MB: 1.06 (0.98-1.14)

P: Poisonings

MB: Mental & behavioural disorders

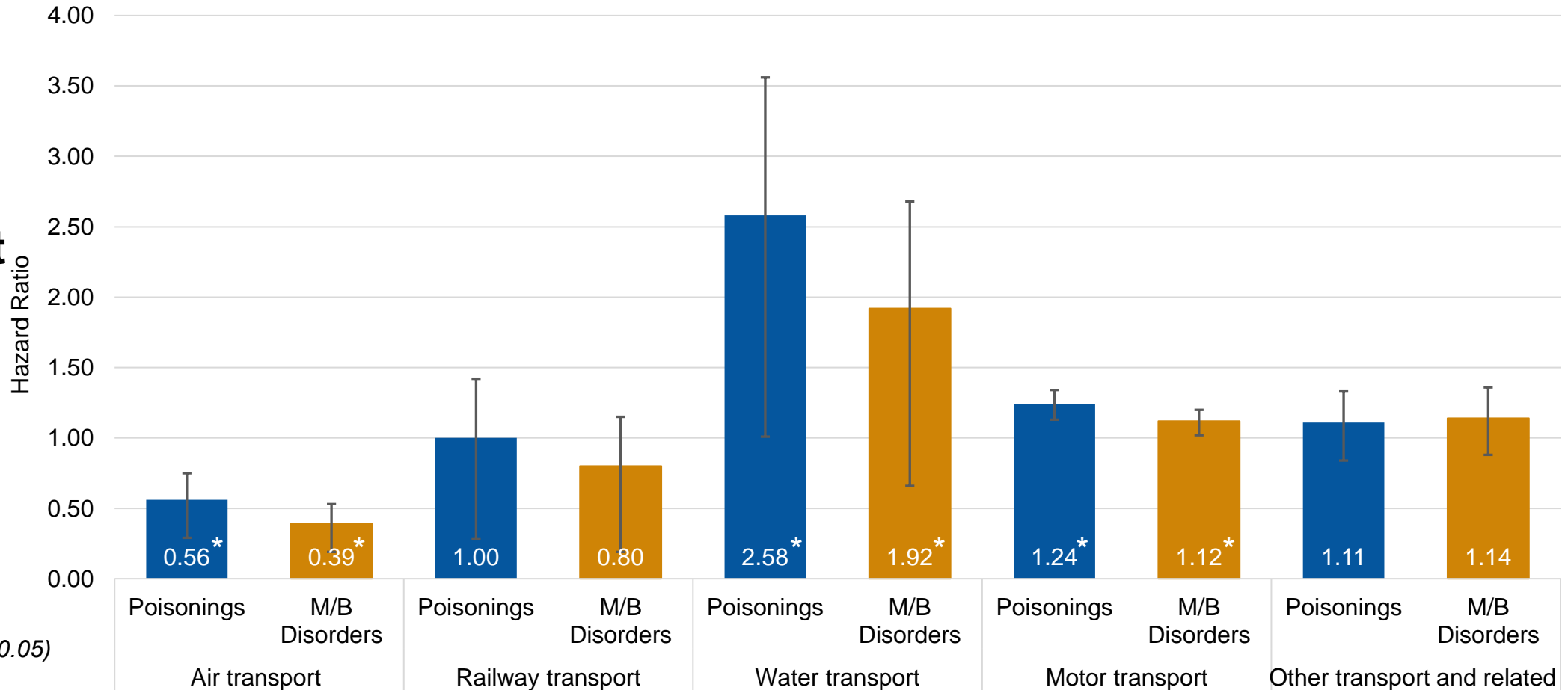
\*Hazard ratio (95% CI)



# Findings from **major-level** occupational groups: transport equipment operating



## Transport equipment operating



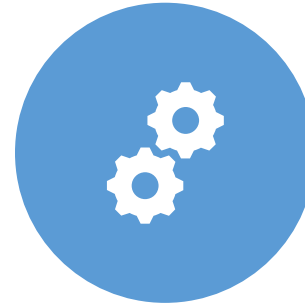
\*Statistically significant ( $\alpha=0.05$ )

# Mixed findings



## Medicine and health

- No association at the division-level
- At the major-level, elevated risk for:
  - Nursing aides and orderlies



## Service

- No association at the division-level
- At the major-level, elevated risk for:
  - Lodging and other accommodation
  - Personal service
  - Apparel and furnishing service
- At the minor-level, elevated risk for:
  - Guards and watchmen

# Back to our key messages

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Rates of opioid-related harms among workers in the ODSS (a group of formerly injured workers) significantly higher than those in the general Ontario population

- Role of work-related injuries as a contributor to opioid-related harms among the employed population

Opioid-related harms cluster among certain occupational groups

- Particularly among blue-collar, physically-demanding occupations
- Important signal for strategically targeting prevention and harm reduction activities

# The role of workplace injuries and pain



Workplace  
injuries and pain

Many high-risk groups in physically demanding jobs with high rates of injury



- Pain
- Functional interference
- Poor mental health
- Return to work challenges
  - Pressure to return
  - Lack of appropriate workplace accommodations
  - Insufficient sick leave
  - Intermittent interruptions in employment

# Research linking workplace injuries and opioid-related harms

Comparing workers who have been injured at work to the general population:

- Elevated risk of opioid-related death

**Increased overall and cause-specific mortality associated with disability among workers' compensation claimants with low back injuries**

Christopher J. Martin MD, MSc<sup>1</sup> | ChuanFang Jin MD, MPH<sup>1</sup> | Stephen J. Bertke PhD<sup>2</sup> | James H. Yiin PhD<sup>2</sup> | Lynne E. Pinkerton MD, MPH<sup>2,3</sup>

**TABLE 2** Mortality among workers with a claim for low back sprain or strain (1998-2015, West Virginia Referent Rates)<sup>a</sup>

	Overall cohort (N = 14 218)			Cohort members with lost work time (N = 8365)			Cohort members with permanent disability <sup>b</sup> (N = 4013)		
	OBS	SMR	95% CI	OBS	SMR	95% CI	OBS	SMR	95% CI
All deaths	1393	0.92	0.87-0.97	958	1.04	0.98-1.11	518	1.07	0.98-1.16
All cancers	353	0.88	0.79-0.98	243	0.99	0.87-1.12	121	0.90	0.75-1.08
Heart diseases	239	0.80	0.70-0.91	168	0.92	0.79-1.07	94	0.95	0.77-1.16
Intentional self-harm	65	1.14	0.88-1.45	48	1.43	1.06-1.90	23	1.41	0.89-2.11
Accidental poisoning	119	1.62	1.34-1.94	85	2.02	1.61-2.50	53	2.78	2.08-3.64

# Research linking workplace injuries and opioid-related harms

Comparing workers who have been injured at work to non-injured workers:

- Elevated risk of opioid-related death

Impact of workplace injury on opioid dependence, abuse, illicit use and overdose: a 36-month retrospective study of insurance claims

Abay Asfaw <sup>1</sup>, Leslie I Boden <sup>2</sup>

**Table 2** Hazard of opioid-related morbidity: Cox PH regression results stratified by age groups and region

	Model 1*		Model 2†	
	HR	95% CI	HR	95% CI
Non-injured (ref.)				
Injured	1.79	1.24 to 2.60		
Medical-only injured			1.54	1.02 to 2.32
Lost-time injured			2.91	1.75 to 4.84

# Other potential reasons



## MALE-DOMINATED OCCUPATIONS

Gender norms of working through pain, showing strength



## SUBSTANCE USE WORKPLACE NORMS

Substance use acceptance in the workplace



## WORK ENVIRONMENT FACTORS

E.g., work demands, support, isolated work



## DISCLOSURE CONCERNS

Stigma, fear of reprisal or other consequences

# Data visualization tool

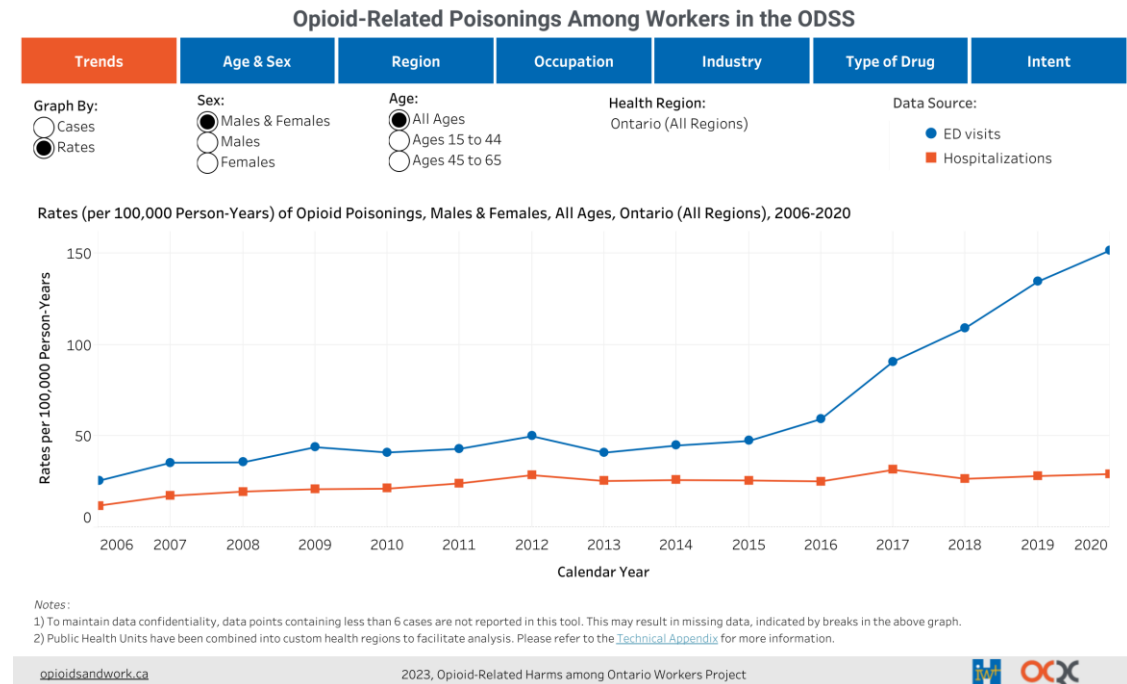


# Interactive data visualization tool

**Goal:** to allow users to explore data on opioid-related harms within the ODSS

**What will this tool do?**

- Create graphs of cases and rates of opioid-related hospitalizations and ED visits among workers in the ODSS from 2006 to 2020
- 3 dashboards: poisonings, mental & behavioural disorders, adverse drug effects



# Where will it be available?

Project website:  
[www.opioidsandwork.ca](http://www.opioidsandwork.ca)



The Opioid-Related Harms among Ontario Workers project aims to establish a surveillance program to monitor opioid-related adverse health events among Ontario workers

[Learn more →](#)



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**Team**

Meet the project team.

[Learn more →](#)



**Methods**

Learn how this project is expanding and adapting the Occupational Disease Surveillance System (ODSS).

# Thank you

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