



Emergency department visits for the treatment of work-related injury and illness in Ontario

Mustard CA, Chambers A, Bielecky A, Smith PM.

Institute for Work & Health
October 18, 2011



Introduction: A two-part presentation

Part 1

Comparison of data sources for the surveillance of work injury

C Mustard, on behalf of A Chambers, P Smith, A Bielecky

Part 2

Surveillance of work injury by time of day in Ontario

A Chambers, on behalf of C Mustard, P Smith, A Bielecky



Part 1: Comparison of data sources for the surveillance of work injury

Work exposures continue to cause a large preventable burden of injury and illness in working-age adults. For example, approximately one quarter of injuries resulting in activity limitation among US adults are work-related.

In this presentation, we highlight findings from a study of the incidence of work injury over a five year period 2004-2008, comparing the incidence of work-related injury and illness presenting to Ontario emergency departments to the incidence of worker's compensation claims reported to the Ontario Workplace Safety and Insurance Board resulting in the payment of wage replacement benefits.



Introduction (2)

In many settings, there are concerns about the reliability of workers' compensation administrative records as a source of surveillance information on the incidence of work-related injury and illness.

These controversies center on concerns about the integrity of workplace reporting of work-related injury and illness among particular groups of workers, or for certain types of injuries as well as concerns about some classes of workers (self-employed and independent contractors) who are excluded from insurance coverage.



Introduction (3)

In the province of Ontario, citizens are universally insured for medically-necessary health care, including services provided in hospital emergency departments.

Similarly, a single publicly-administered insurance agency administers wage replacement benefits and purchases health care services in circumstances of work-related disability.

Both sources of information in this study are population based. Approximately 30% of the Ontario labour force are in employment relationships that are excluded from coverage by the workers' compensation insurance agency, the Workplace Safety & Insurance Board (WSIB).



Work Injuries requiring health care and/or time off work

Work Injuries requiring health care
reported to the WSIB, 2004-2008

A
Lost-time claims,
N=435,336

B
No Lost-time
claims,
N=887,562

C
Work Injuries requiring health
care **not** reported to the WSIB
(N=unknown)

D
Work Injuries not
requiring health care,
not required to be
reported to the WSIB
N= unknown

E
Injuries presenting to Ontario emergency departments
coded as work-related (N=699,196)



Study Hypotheses

- 1) the annual rate of change in the frequency of compensation claims and emergency department visits will be equivalent in the two data sources,
- 2) while the incidence of emergency department visits for work-related conditions is expected to be higher than the incidence of workers' compensation lost-time claims, across age groups and gender, the ratio of rates of compensation claims and emergency department visits will be equivalent,
- 3) the distribution of records relative to the external cause of injury will be equivalent between compensation claims and emergency department visits and,
- 4) the incidence of emergency department visits and lost-time compensation claims for serious injuries (defined as those resulting in fracture or concussion) will be equivalent between the two administrative data sources.



Methods (1)

Descriptive analysis of the frequency of emergency department records and workers' compensation claims over time, by age and gender groups and by the external cause of injury.

Estimates of annual hours worked for the Ontario labour force by age and gender, derived from labour force surveys, are used to compute rates of work injuries per 200,000 hours worked.

Denominator estimates were adjusted for differences in the coverage of the Ontario labour force between the WSIB and the Ontario Health Insurance Plan in the calculation of age and sex specific injury rates.



Methods (2)

The National Ambulatory Care Reporting System (NACRS) was established by the Canadian Institute for Health Information in 1997.

For the purposes of this study, we obtained extracts for 699,196 NACRS records reported in the province of Ontario over the period April 2004 to December 2008 with a 'responsibility for payment' code indicating the Workplace Safety & Insurance Board.

Variables included in extracted records were: gender, birth date, visit type, triage date, triage time and fields documenting the main problem and the external cause of injury.

Of the 699,196 emergency department records, 588,186 (84%) had an accompanying code for an external cause of injury, indicating a traumatic cause.



Methods (3)

Administrative records maintained by the Ontario Workplace Safety & Insurance Board contain information describing registered employers and the course and outcome of individual compensation claims.

Electronic records of compensation claims resulting in the payment of wage replacement contain information on the date and time of injury, the employer's economic sector and the gender, birth date and occupation of the injured worker.

In addition, a national coding standard is used to classify information describing the injury event characteristics and the injury characteristics: 1) the nature of injury, 2) the part of body involved, 3) the source of injury or disease and 4) the event or exposure.



Hypothesis 1: The annual rate of change in the frequency of compensation claims
And emergency department visits will be equivalent in the two data sources

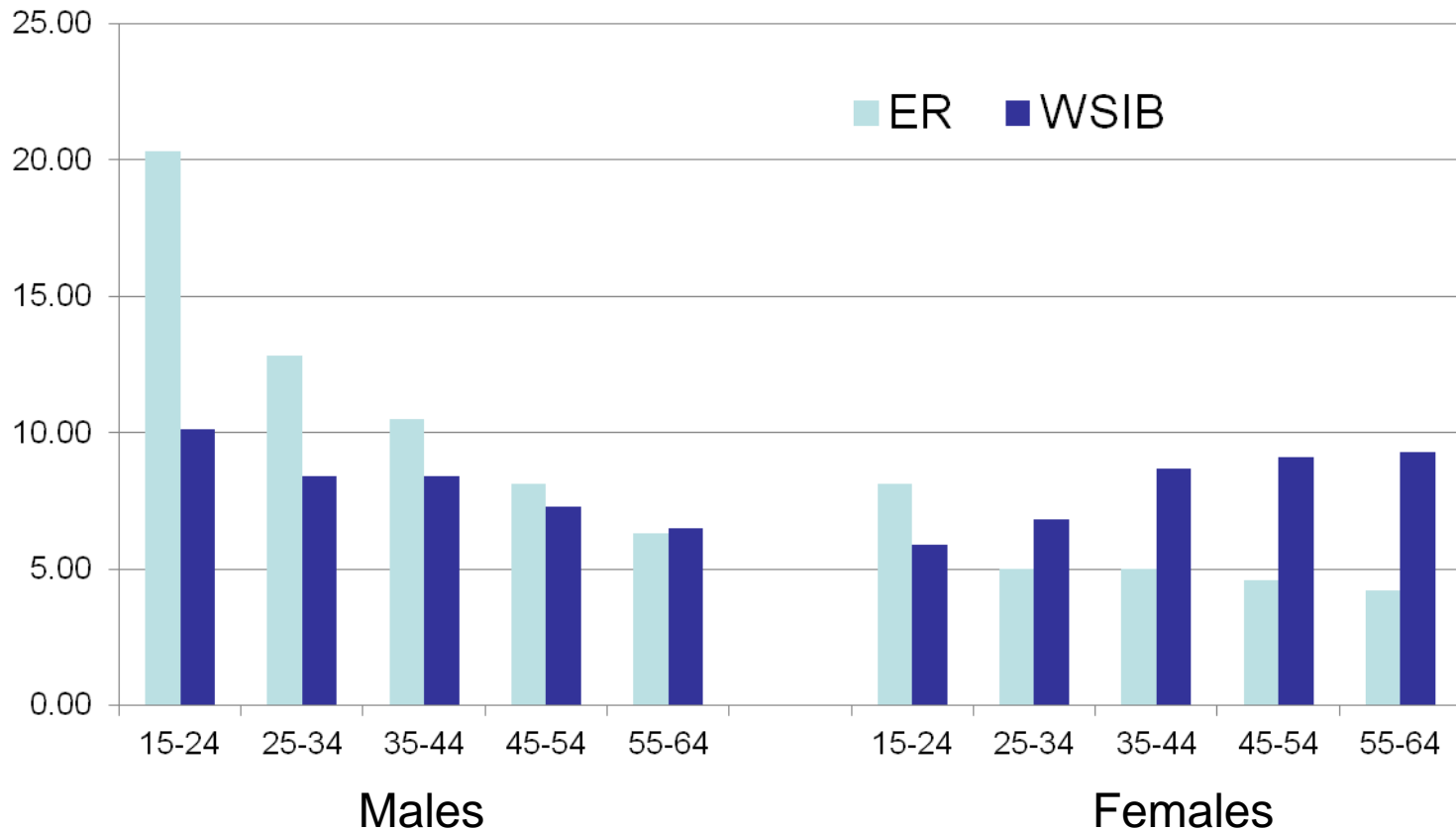
	Emergency department visits for work-related conditions	Lost-time claims, Workplace Safety & Insurance Board	Ratio of emergency department visits to lost-time claims
2004	149,965	94,407	1.59
2005	153,010	93,306	1.64
2006	141,766	86,354	1.64
2007	134,915	83,656	1.61
2008	128,277	77,613	1.65
Total	707,933	435,336	1.62
Percent change: 2004-2008	-14.5	-17.8	

Emergency department records were available for the period April – December 2004 (N=116,309).
In this table, we have projected the full year count of emergency department records for 2004.



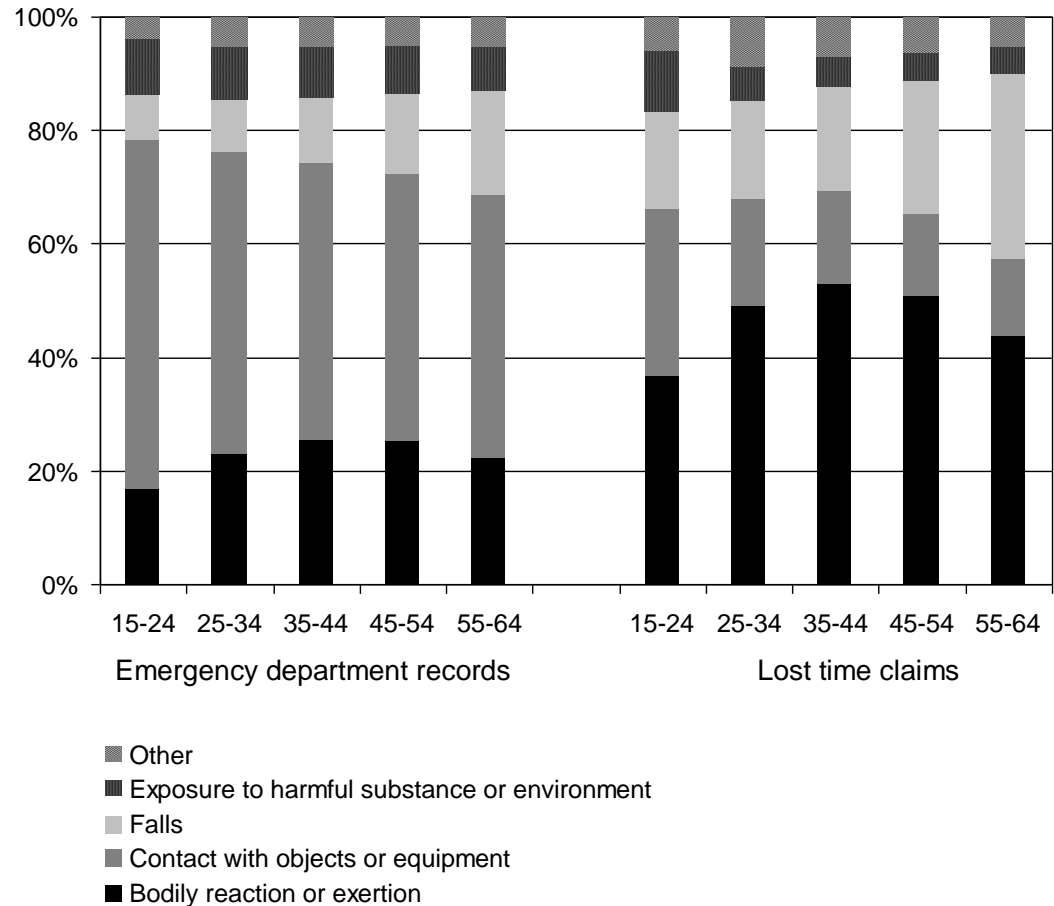
Hypothesis 2: The rate ratio of compensation claims and emergency department visits will be equivalent across age groups and gender

Incidence rate per 200,000 hours of work





Hypothesis 3:
The distribution of records
relative to the external
cause of injury will be
equivalent between the
two data sources
(Females)





Hypothesis 4: the incidence of emergency department visits and lost-time compensation claims for serious injuries (fracture or concussion) will be equivalent in the two data sources.

Males	Fracture or Concussion	All visits	Fracture or concussion as a percent of all visits	Fracture or concussion incidence per 2,000,000 hours of work
ER	N	N	%	
15-24	4,845	103,065	4.7	9.54
25-34	6,959	123,703	5.6	7.21
35-44	8,018	119,513	6.7	7.02
45-54	7,276	89,748	8.1	6.57
55-64	3,661	36,070	10.1	6.39
Total	30,759	472,099	6.5	7.16
WSIB				
15-24	4,447	40,240	11.1	11.17
25-34	6,558	60,275	10.9	9.10
35-44	8,779	74,918	11.7	9.87
45-54	6,160	64,641	9.5	6.92
55-64	3,351	29,496	11.4	7.41
Total	29,295	269,570	10.9	8.74



Conclusion

This study has described the concordance of two independent, administrative data sources providing information on the incidence of work-related injury for the complete population of working age-adults in Ontario

In this setting, emergency department records appear to be a valid source of surveillance information on the incidence of work-related injury



Part 2: Surveillance of work injury by time of day in Ontario

There is strong evidence that night, evening, rotating and irregular shifts are associated with an elevated risk of occupational injury.

Despite these established risks, there is no routine surveillance of work injury by shift schedule or time of day in Canada.

This proposed study is designed to demonstrate the utility of an approach to the surveillance of work-related injury in relation to time of day of injury occurrence.

The study methods serve to describe differences between occupations and industries in the risk of work injuries over the 24 hour clock.



Methods (1)

Numerator - Number of injuries reported 2004-2008 in Ontario

- 1) Emergency department visits recorded in the *National Ambulatory Care Reporting System (NACRS) 2004-2008*. Triage time is used as a proxy for the time that the injury occurred.
- 2) Lost-time claims from the WSIB (2004-2008)

Denominator - The Labour Force Survey (LFS) can tell us the number of hours worked 2004-2008 in Ontario under different stratification options. These estimates can be adjusted for differences in the coverage of the Ontario labour force between the WSIB and the Ontario Health Insurance Plan.

How should those hours be distributed across the 24 hour clock?



Methods (2)

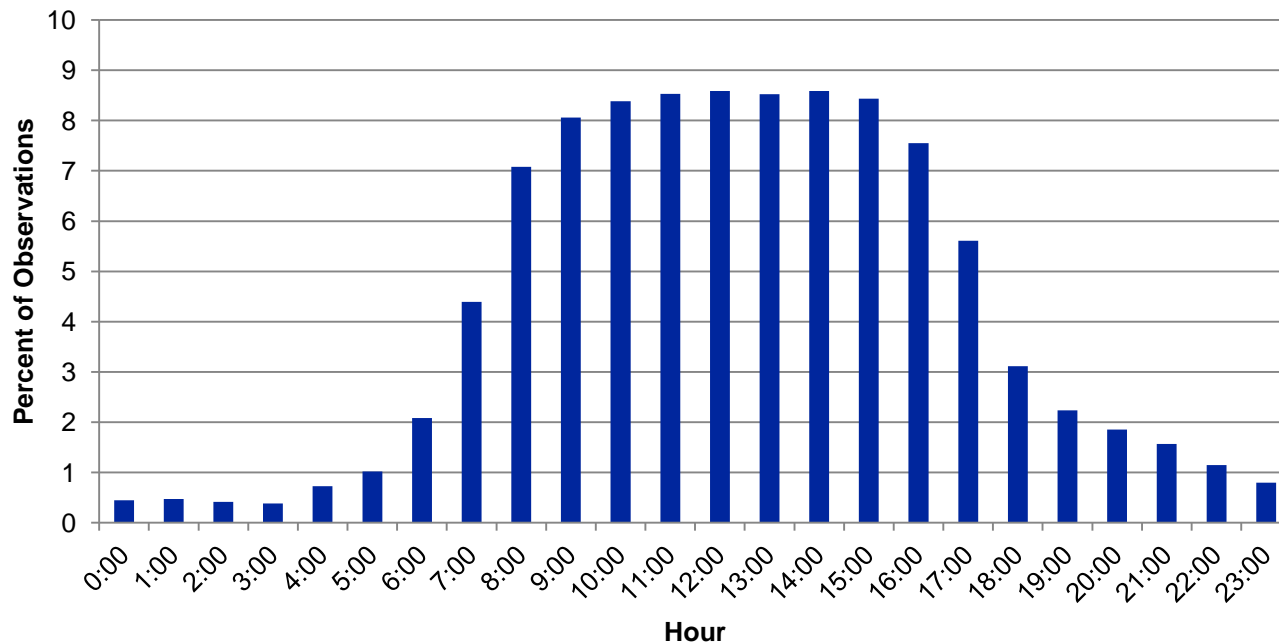
Statistics Canada's General Social Survey (GSS) gathers information on social trends and periodically collects information on time use using a diary format.

Each respondent in the sample is randomly assigned a day of the week and are asked to report their activities over a 24h period. Codes are applied to different activities. We focused only on activities that were worked related.

We would expect more work related activities to be reported between 9:00am and 5:00pm than during the evening and overnight.

Methods (3)

Distribution of work related activities over the 24h clock



Source: GSS Cycle 19 (2005), restricted to work-related activities and 15-64 year olds



Methods (4)

The GSS Cycle 19 (2005) was used to form a proportional matrix for different stratification options based on gender, age, and occupation. LFS estimates of total hours worked 2004-2008 are then applied.

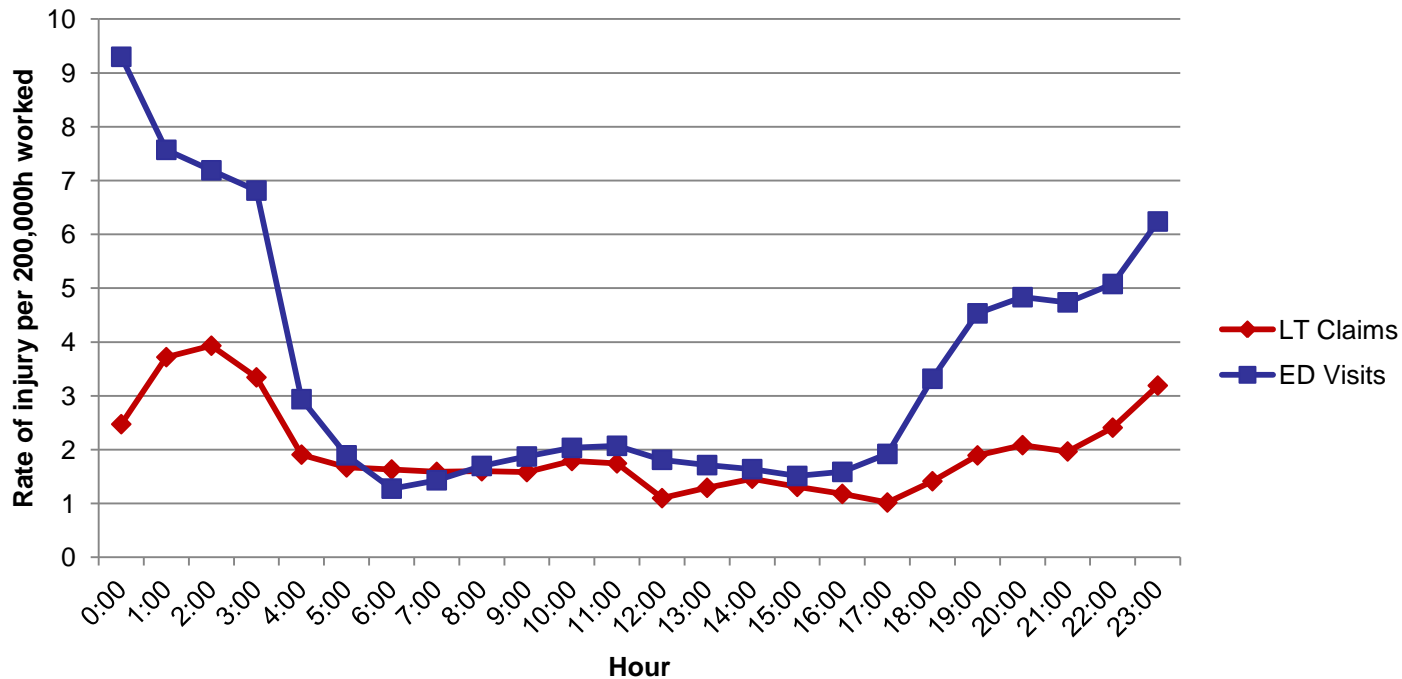
To stratify the estimates by occupation only the lost-time claims can be used. The NACRS database does not include information on occupation.

We used the IRSST's occupational classification which allocates occupations defined by standard classification systems (e.g., SOC, NOC) into three categories including manual, mixed and non-manual.



Part 2a: Rate of Injury – WSIB vs NACRS

Rate of injury per 200,000 hours worked 2004-2008 in Ontario by data source and hour

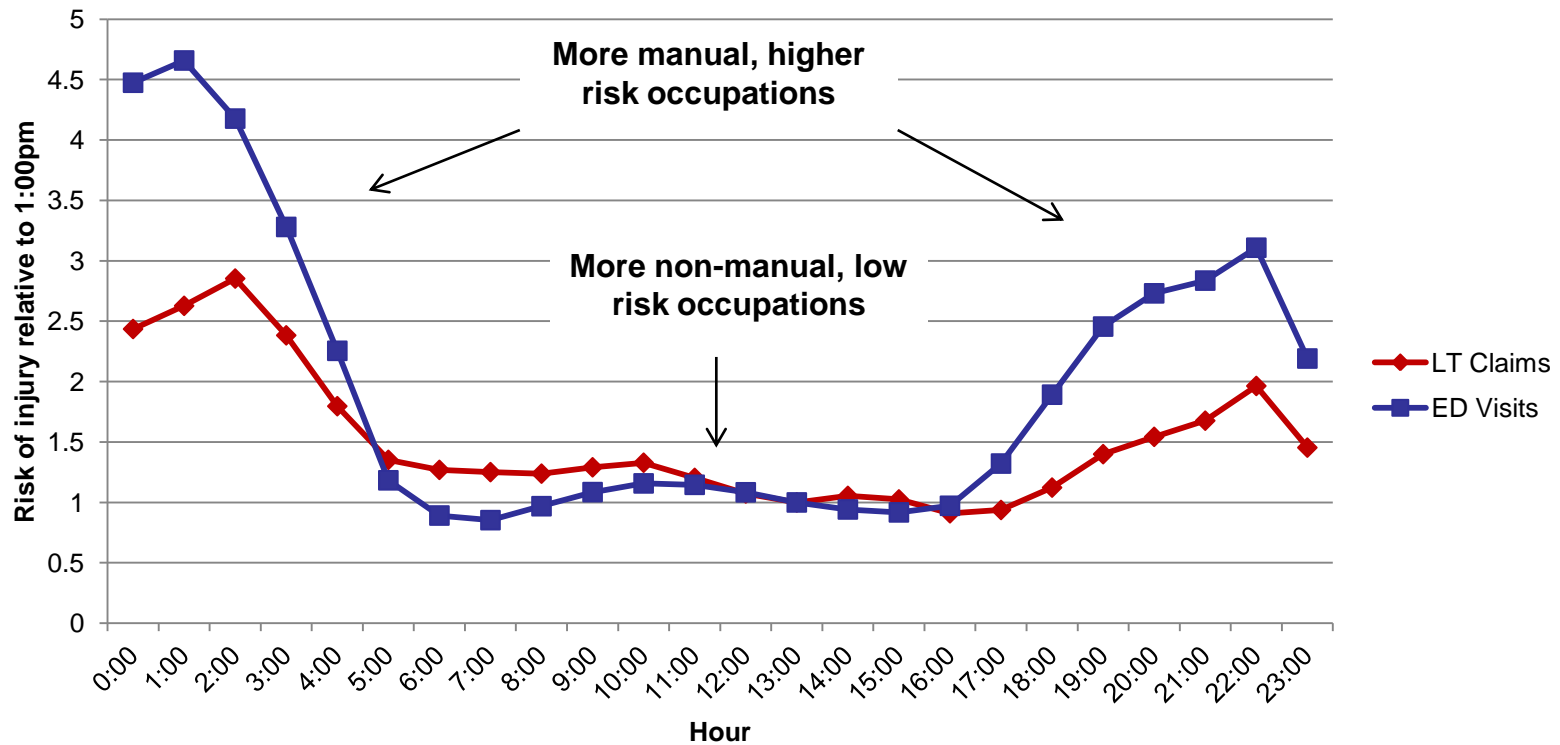


Source: Ontario lost-time claims (2004-2008). NACRS emergency department visits where responsibility for payment is the WSIB.
Denominator based on estimated hours worked in Ontario (2004-2008) from the LFS and distributed by hour using the GSS Cycle 19 (2005).



Part 2a: Relative Risk of Injury – WSIB vs NACRS

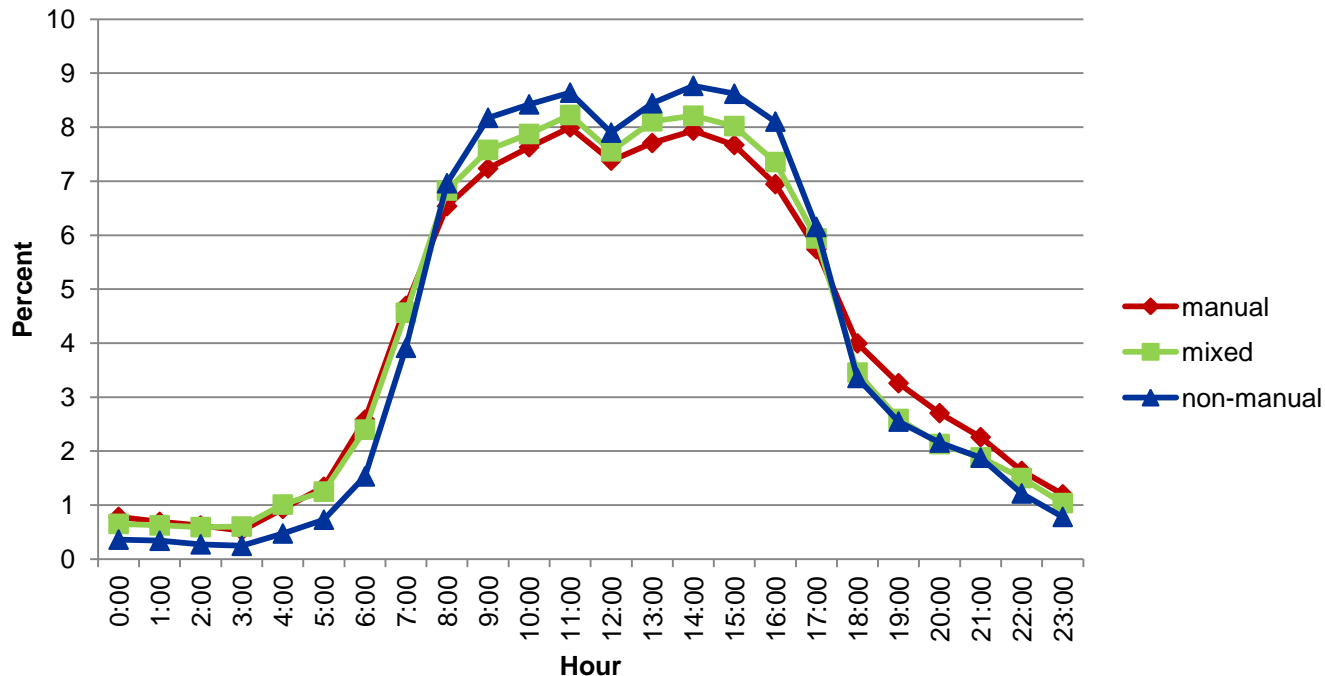
Relative risk of injury by hour & data source relative to 1:00pm



Source: Ontario lost-time claims (2004-2008). NACRS emergency department visits where responsibility for payment is the WSIB. Denominator based on estimated hours worked in Ontario (2004-2008) from the LFS and distributed by hour using the GSS Cycle 19 (2005).

Part 2b: Distribution of Work Hours by Occupation

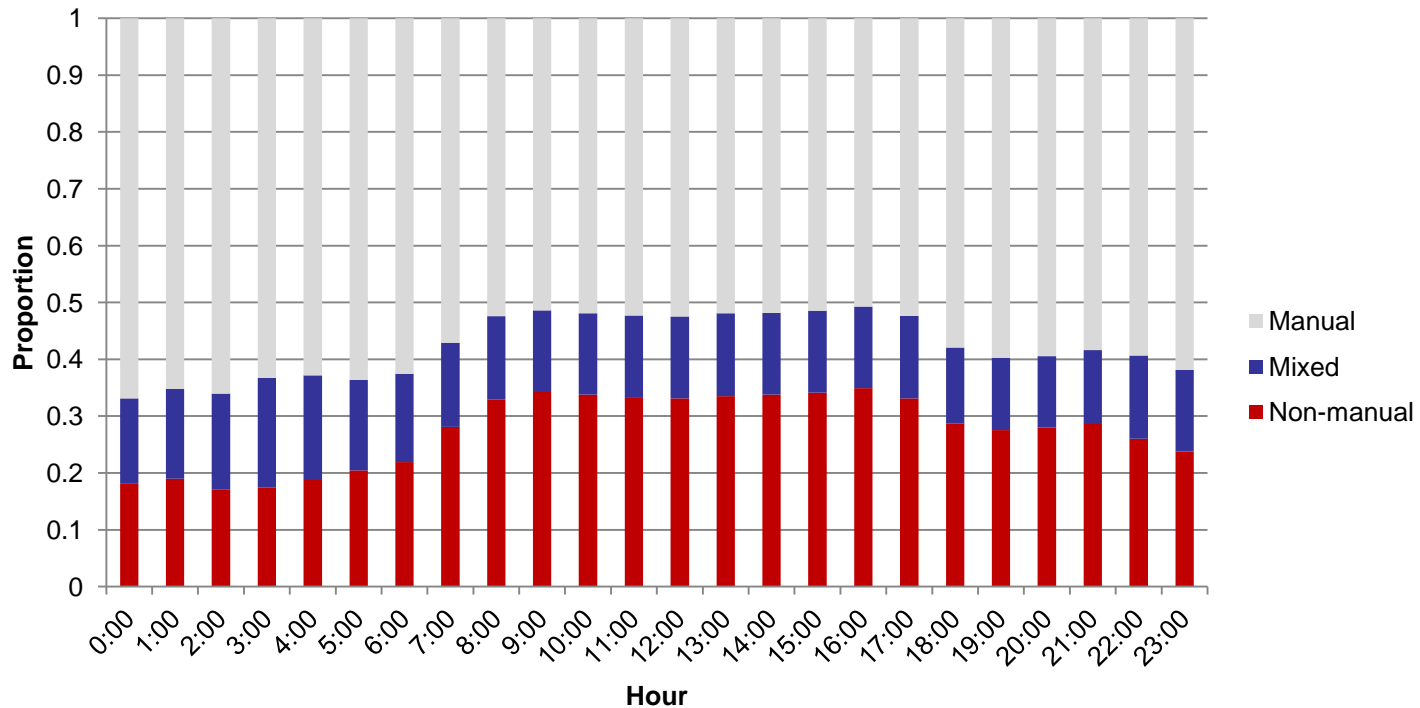
Percentage of work hours in Ontario (2004-2008) by hour and occupation



Source: LFS estimates of the number of hours worked 2004-2008 in Ontario distributed across a proportional matrix using data from the GSS Cycle 19 (2005). Occupational classification based on the NOC 2006.

Part 2b: Distribution of Work Hours by Occupation

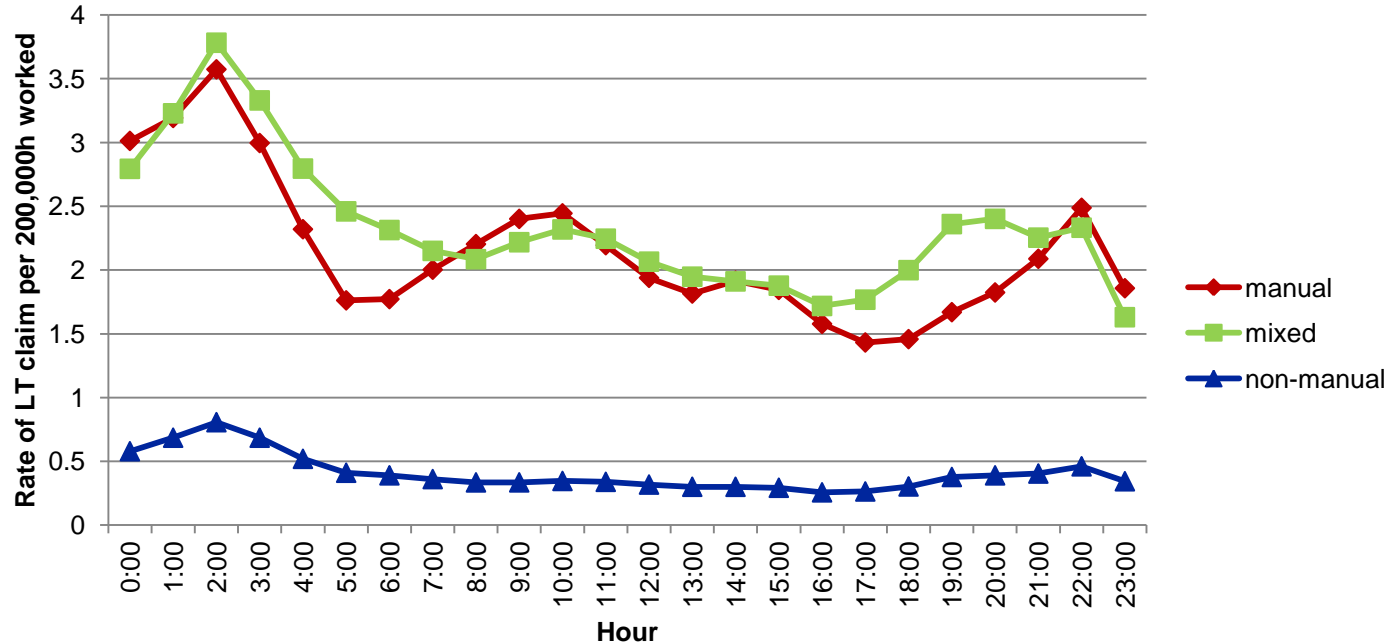
Proportion of work hours associated with manual, mixed or non-manual occupations for each hour of the 24h clock



Source: LFS estimates of the number of hours worked 2004-2008 in Ontario distributed across a proportional matrix using data from the GSS Cycle 19 (2005). Occupational classification based on the NOC 2006.

Part 2b: Rate of Lost-time Claims by Hour & Occupation

Rate of lost-time claims in Ontario (2004-2008) per 200,000h worked by occupation

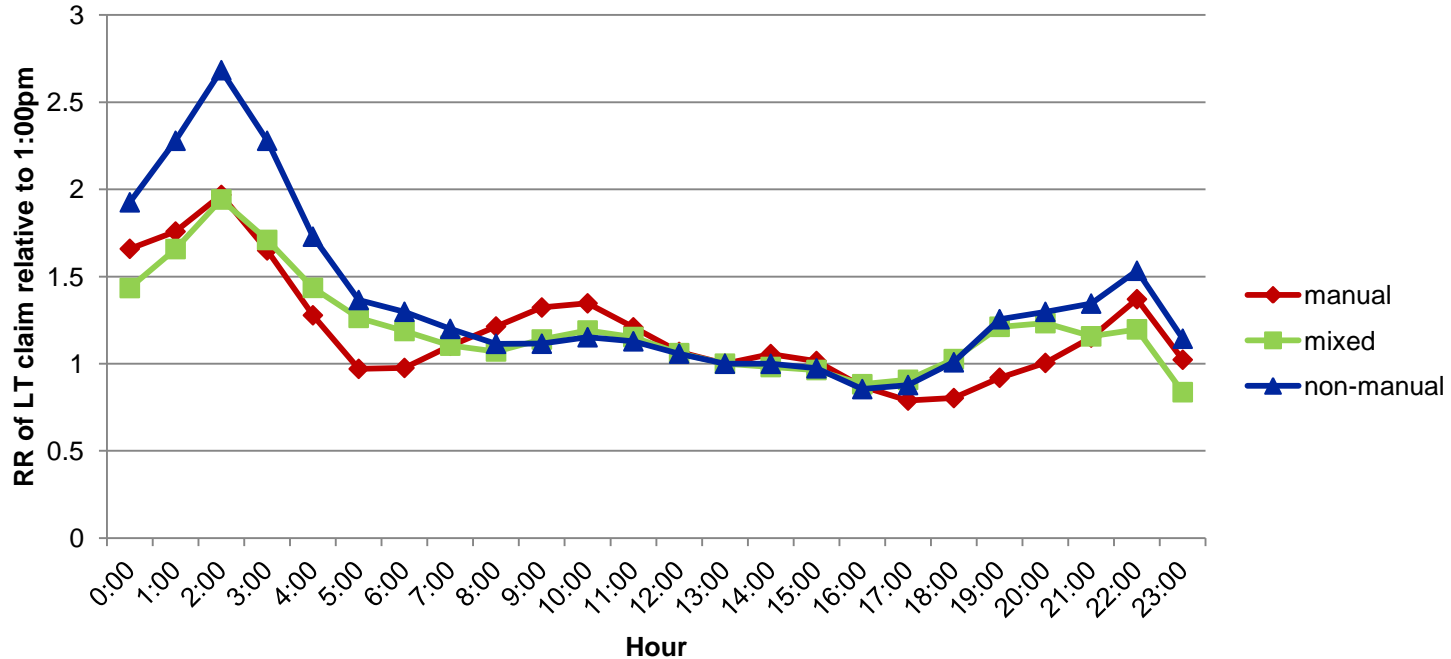


Note: estimates based on a 3h weighted average. Source: LT claims from WSIB (2004-2008). Denominator based on LFS estimates of the number of hours worked 2004-2008 in Ontario distributed across a proportional matrix using data from the GSS Cycle 19 (2005). Occupational classification based on the NOC 2006.



Part 2b: Relative Risk of Lost-time Claims by Hour & Occupation

Relative risk of LT claim relative to 1pm by occupation and hour



Source: LFS estimates of the number of hours worked 2004-2008 in Ontario distributed across a proportional matrix using data from the GSS Cycle 19 (2005). Occupational classification based on the NOC 2006.



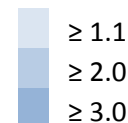
Part 2b: Relative Risk of Lost-time Claim

Table 1: Relative risk of lost-time claim relative to 12:00-15:59 for females

Hour	Occupation								
	Manual			Mixed			Non-manual		
	Age			Age			Age		
	15-29	30-44	45-64	15-29	30-44	45-64	15-29	30-44	45-64
24:00-3:59	1.64	5.37	1.37	1.40	1.94	1.44	1.48	2.37	3.81
4:00-7:59	1.43	1.58	1.19	0.95	1.14	0.99	1.11	1.61	1.54
8:00-11:59	1.31	1.28	1.24	0.97	1.21	1.01	0.95	1.12	1.14
12:00-15:59	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16:00-19:59	1.09	1.09	1.04	1.14	1.02	0.88	0.91	0.95	0.93
20:00-23:59	1.98	1.92	1.74	1.36	1.43	1.08	1.41	1.63	1.46

Table 2: Relative risk of lost-time claim relative to 12:00-15:59 for males

Hour	Occupation								
	Manual			Mixed			Non-manual		
	Age			Age			Age		
	15-29	30-44	45-64	15-29	30-44	45-64	15-29	30-44	45-64
24:00-3:59	0.89	1.95	2.45	0.70	2.07	1.31	1.84	1.63	3.48
4:00-7:59	0.50	0.72	0.91	0.62	1.23	1.19	1.09	1.00	1.28
8:00-11:59	1.24	1.35	1.28	1.03	1.33	1.28	1.21	1.26	1.32
12:00-15:59	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16:00-19:59	0.90	0.89	0.86	0.91	0.86	0.91	0.86	0.87	0.85
20:00-23:59	0.97	1.47	1.66	0.90	1.28	1.26	1.27	1.53	1.38





Conclusion

This study has used two different data sources to characterize the risk of work injury over the hour of the 24h clock by age, gender and occupation.

Both data sources show that the relative risk of work injury is elevated outside regular work hours. This is not attributed to differences in the distribution of work hours among different occupational groups – the relative risk of injury does appear to vary by age, gender and occupation.

In terms of establishing a data source for the surveillance of work injury by hour for the purposes of evaluation, monitoring and risk characterization, this study has demonstrated the utility of using two data sources with differences in coverage simultaneously to confirm observed trends and patterns.



Thank You!

Please contact me directly for further information

Web site: www.iwh.on.ca

E-mail: **cmustard@iwh.on.ca**

Dr. Cameron Mustard



**Institute
for Work &
Health**

Research Excellence
Advancing Employee
Health

www.iwh.on.ca