Lung cancer risks among construction workers in Ontario: Results from the Occupational Disease Surveillance System, 1983-2016

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Background

Construction workers may be exposed to numerous lung carcinogens including diesel engine exhaust, crystalline silica, wood dust and asbestos.

Canada currently lacks any rapid approach to assessing cancer risk associated with occupational exposures, or to determine the risk of cancer among people working in a particular job or industry.

Although Canada collects timely and high quality information on newly diagnosed cancers through provincial and national registries, identifying cancers caused by workplace exposures is challenging because these records fail to capture any work history information.

Objectives

To examine the risk of lung cancer among construction workers in Ontario using newly established Occupational Disease Surveillance System (ODSS).

ODSS was recently established as a novel approach for identifying existing and emerging trends in work-related disease among workers in Ontario. ODSS captures data for more than 2.1 million Ontario workers through a linkage of existing administrative databases [1].

ODSS can be used to identify at-risk groups of workers by industry and occupation, and can support evidence-based prevention strategies to reduce risks of occupational disease among Ontario workers.

Methods

Data Sources

Workplace Safety and Insurance Board (WSIB) accepted lost-time claims records (1983-2014)
• Date of birth, sex, nature of work-related injury or disease, date of claim, occupation and industry related to claim

Registered Persons Database (RPDB) (1990-2015)
• Health Insurance Numbers (HIN), residence location, sex, date of birth, date of death

Ontario Cancer Registry (1964-2016)
• Incident lung cancer diagnosis, date of diagnosis, sex, date of birth, date of death

ODSS also includes additional administrative health databases for the surveillance of non-cancer health outcomes including asthma, contact dermatitis, and silicosis, among others:
• Canadian Institute for Health Informatics (CIHI) Discharge Abstract Database (DAD) (2006-2016)
• Ontario Health Insurance Plan (OHIP) eClaims Database (1999-2016)
• National Ambulatory Care Reporting System (NACRS) (2006-2016)

Assessing Exposure

Exposure was considered to be the occupation and industry associated with the WSIB claim. These data do not contain any information about exposure to particular substances. External information about exposure can be used to further help support the analysis and interpretation of suspected at-risk groups. For example, CAREX Canada provides estimates of the number of workers exposed to carcinogens by sector.

Methods (Cont’d)

Identifying Cases

Incident primary lung cancer cases were captured in the OGR using the International Classification of Disease 10th edition (ICD-10). Workers diagnosed with lung cancer prior to cohort entry were excluded from follow-up. Workers with a WSIB accepted lost-time claim for any cancer were also excluded.

Calculating Risk

Person-years at risk were counted from the date of WSIB claim until lung cancer diagnosis, emigration from Ontario, death or 2016 end of follow-up, whichever occurred first. Cox proportional hazards modelling was used to estimate risk of lung cancer for each industry and occupation group compared with all other workers. Analyses were completed in SAS v.94 (Cary, NC: SAS Institute Inc.).

Results

Among the more than 2.1 million workers that entered the ODSS cohort from 1983 to 2014, 34,661 were diagnosed with lung cancer during the follow-up period. Figure 2 illustrated the derivation of the ODSS worker cohort.

The ODSS worker cohort was 66% male, and the mean age at cohort entry was 37.4 years (SD: 12.3).

There were 211,549 workers employed in the construction industry at the time of their WSIB claim. Among these workers, 3,648 were diagnosed with lung cancer.

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Conclusions

Surveillance of occupational lung cancer can provide useful evidence to support the implementation of disease prevention programs by identifying and tracking groups at risk due to known or suspected occupational exposures and, by detecting previously unknown risk factors.

A limitation of these data is that they capture only the industry and occupation specific to the time of the compensation claim and employment at this time may not necessarily correspond to lifetime work history. WSIB coverage of the construction industry greatly expanded with new rules enacted in 2013 (3). Thus, the ODSS cohort may underestimate construction industry workers prior to these changes. Although data regarding workers’ lifestyle factors such as smoking behaviours are not available for this cohort, future analyses will attempt to indirectly adjust for these potential confounders.

References

1. Project details can be found at: http://www.occupationalcancer.ca/2016/odsds/

Table 1 presents the number of lung cancer cases, workers, and age-adjusted hazard ratios (HRs) and 99% confidence intervals (CIs) by industry and occupation group, stratified by sex.

Table 1. Risk of lung cancer by industry and occupation group

<table>
<thead>
<tr>
<th>Industry/Occupation</th>
<th>Male HR (99% CI)</th>
<th>Female HR (99% CI)</th>
<th>Overall HR (99% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labourers</td>
<td>1.08 (1.03, 1.13)</td>
<td>1.09 (1.04, 1.13)</td>
<td>1.08 (1.03, 1.13)</td>
</tr>
<tr>
<td>Carpenters</td>
<td>1.09 (1.04, 1.13)</td>
<td>1.11 (1.06, 1.17)</td>
<td>1.10 (1.06, 1.15)</td>
</tr>
<tr>
<td>Foremen</td>
<td>1.12 (1.07, 1.16)</td>
<td>1.13 (1.08, 1.19)</td>
<td>1.12 (1.08, 1.17)</td>
</tr>
<tr>
<td>Electrical power</td>
<td>1.16 (1.11, 1.21)</td>
<td>1.16 (1.11, 1.21)</td>
<td>1.16 (1.11, 1.21)</td>
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<tr>
<td>Linemen</td>
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<tr>
<td>Other</td>
<td>1.09 (1.04, 1.13)</td>
<td>1.11 (1.06, 1.17)</td>
<td>1.10 (1.06, 1.15)</td>
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