The Economic Burden of Lung Cancer & Mesothelioma in Canada Due to Occupational Asbestos Exposure

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Summary of Findings

- Total cost of mesothelioma and lung cancer from asbestos related occupational exposure for new cases in 2011 was $1.7 billion.
- The per case average lifetime cost was $818K.
- Health-related quality of life costs were the highest proportion of the costs at 80%.
- The next highest proportion was direct costs, including health care, out of pocket, family care giving and WCB administration at 11%.
- Indirect costs, including friction and output & productivity costs, were 9% of total costs.
- Substantial economic burden from 2,099 newly diagnosed cases in 2011.
Overview

Type of economic burden study undertaken
- Incidence costing study
- Considers only newly diagnosed cases in a particular year
- Includes lifetime costs associated with each new case incurred by all stakeholders

Key question addressed by this analysis
- What would be the saving to society if we did not have any cases of cancer attributable to occupational asbestos exposures in a particular year?
- Economic burden = counterfactual scenario – current scenario
Overview (cont’d)

Key cost components considered

1. Direct costs (health care products & services)
2. Indirect costs (output & productivity in paid work)
3. Quality of life costs (social role engagement & intrinsic value of health)

Study Framing

○ Newly diagnosed cases in 2011
○ Estimate total lifetime costs of these cases incurred by all stakeholders (societal level economic burden)
○ Discounted all (future) costs to 2011 calendar year
# Impacts & Related Costs by Stakeholder

<table>
<thead>
<tr>
<th>1. Direct</th>
<th>2. Indirect</th>
<th>3. Quality of life</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual</strong></td>
<td><strong>Family &amp; Community</strong></td>
<td><strong>Employer</strong></td>
</tr>
<tr>
<td>• out-of-pocket expenses for health care products &amp; services</td>
<td>• care giving of family &amp; community members</td>
<td>• insurance programs costs for health care products &amp; services</td>
</tr>
<tr>
<td>• labour-market earnings</td>
<td>• family income and savings</td>
<td>• insurance admin</td>
</tr>
<tr>
<td>• payroll benefits associated with labour-market earnings</td>
<td>• quality of life of family and community members</td>
<td>• productivity &amp; output</td>
</tr>
<tr>
<td>• wage replacement benefits</td>
<td>• adult outcomes of children</td>
<td>• replacement worker recruitment &amp; training costs (friction costs)</td>
</tr>
<tr>
<td>• engagement in social roles</td>
<td></td>
<td>• insurance program costs for wage replacement benefit</td>
</tr>
<tr>
<td>• intrinsic value of health</td>
<td></td>
<td>• labour relations</td>
</tr>
</tbody>
</table>

**System, public sector & society**

• health care products & services
• insurance admin
• productivity & output
• friction costs
• capital accumulation, investment, and related productivity implications
• population health-related and quality of life
Direct Costs of Health Care

- Starting point was health care costs of lung cancer by type and stage identified by Canadian Cancer Risk Management Model (CRMM)
- CRMM also provided data on survival probabilities
- For mesothelioma survival used US Surveillance, Epidemiology, and End Results (SEER) Registry
- Added health care administration costs of 16.7% (Woolhandler 2003)
- Fraction of cases appearing in WCB system– 54% for mesothelioma and 10% for lung cancer (Del Bianco 2013)
- Higher health care costs for WCB accepted claims (WSIB 2007, CRMM)
Other Direct Costs

Family & Community Time in Care Giving
- Assumed 16 hours of care giving time per week (Van Houtven 2010)
- Care giving time valued at weighted average provincial minimum wage
- Weighted average increased by 2% per year after 2015

Out of Pocket Costs
- Assumed to be $548/month—includes travel, parking, drugs, home health care, vitamins, accommodation (Longo 2011)
- Assumed to increase by 2% per year
- Cost assumed to be incurred for 10 years and were adjusted for survival rates over this period

Administration
- Added WCB administrative costs of 27% of incurred expenses & transfer payments (AWCBC 2011)
Indirect Costs of Output & Productivity

Human Capital Approach (HCA)
- Used to estimate lost labour-market productivity & output
- Considered the wage of individual & the amount of work time lost due to poor health or premature death (CRMM, Earle 2010, SEER Registry)
- For counterfactual used average labour-market earnings in Canada adjusted for age & sex (LFS 2011, SLID 2010)
- Included payroll costs (14%) and productivity growth (1%) in estimates (Canadian National Accounts)

Friction Cost Approach (FCA)
- Used to reflect cost to employer to replace absent worker if sickness absence endured for a period of time
- Losses assumed to be 6 months of annual wage in year of diagnosis
Quality of Life Costs

- Captured through Quality Adjusted Life Years (QALYs)
- Preference-based measure of health-related quality of life
- Morbidity & time are combined using a weight that is between 0 (death) & 1 (one year in perfect health)
- QALY does not include productivity & output from market activity
- Future QALYs were discounted using a 3% rate
Quality of Life Costs (cont’d)

- QALY weights and conditional life expectancies associated with each cancer (CRMM, SEER, Arnold 2015)
- For counterfactual used population average QALY adjusted for age & sex (CCHS 2010)
- For counterfactual used population conditional life-expectancy (Canada Life Tables 2009-2011)
- Literature offers range of values for a QALY from $US20K to US$161K
- We use CAN$100K for value of a QALY
## Economic Burden of Mesothelioma

Based on 391 cases in 2011

<table>
<thead>
<tr>
<th>Category</th>
<th>All cases</th>
<th>Per case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care costs:</td>
<td>$18,111,628</td>
<td>$46,351</td>
</tr>
<tr>
<td>Informal care giving:</td>
<td>$5,211,858</td>
<td>$13,338</td>
</tr>
<tr>
<td>Out of pocket:</td>
<td>$4,859,052</td>
<td>$12,435</td>
</tr>
<tr>
<td>Workers’ comp administration:</td>
<td>$32,784,603</td>
<td>$83,902</td>
</tr>
<tr>
<td>Productivity and output:</td>
<td>$26,485,332</td>
<td>$67,781</td>
</tr>
<tr>
<td>Friction</td>
<td>$2,123,380</td>
<td>$5,434</td>
</tr>
<tr>
<td>Health-related quality of life:</td>
<td>$269,720,081</td>
<td>$690,263</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>$359,295,934</strong></td>
<td><strong>$919,503</strong></td>
</tr>
</tbody>
</table>

* 2011 Canadian dollars
## Economic Burden of Asbestos-related Lung Cancer

Based on 1,708 cases in 2011

<table>
<thead>
<tr>
<th>Category</th>
<th>All cases</th>
<th>Per case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care costs:</td>
<td>$48,631,695</td>
<td>$28,480</td>
</tr>
<tr>
<td>Informal care giving:</td>
<td>$29,464,431</td>
<td>$17,255</td>
</tr>
<tr>
<td>Out of pocket:</td>
<td>$28,253,406</td>
<td>$16,546</td>
</tr>
<tr>
<td>Workers’ Comp administration:</td>
<td>$23,538,935</td>
<td>$13,785</td>
</tr>
<tr>
<td>Productivity and output:</td>
<td>$109,797,788</td>
<td>$64,300</td>
</tr>
<tr>
<td>Friction:</td>
<td>$9,279,172</td>
<td>$5,434</td>
</tr>
<tr>
<td>Health-related quality of life:</td>
<td>$1,108,198,035</td>
<td>$648,988</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>$1,357,163,463</strong></td>
<td><strong>$794,789</strong></td>
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</table>

*2011 Canadian dollars*
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