Musculoskeletal disorders and associated healthcare costs among family members of injured workers

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The findings and conclusions in this study are those of the authors and do not necessarily represent the views of NIOSH
Background and Objective

- There is some evidence that occupational injuries and illnesses can affect the family members of injured workers (Keogh et al 2000, Adams et al 2002, Brown et al 2007)

- Asfaw et al (2012) showed an association between occupational injury and subsequent hospitalization of family members

- In this study we further explored the effects of occupational injury on family members by specifically examining the severity of occupational injury and subsequent musculoskeletal disorders (MSD) among family members
Data

• We used Truven data for 2005 and 2006 on workers’ compensation (injured workers) and medical visits/claims (family members of injured workers)
  – Cross sectional data

• The workers’ compensation (WC) dataset includes information on the nature of injury, indemnity and medical payments, days away from work, etc.
  – Over 30,000 employees from over 30 employers

• The medical claims dataset includes information on inpatient and outpatient claims, medical diagnosis codes (ICD-9), payments, etc.
  – About 25 million workers and family members

• Linking these datasets enabled us to compare the health status of family members before and after occupational injury
Data

• We considered closed, open, and reopened WC claims

• We excluded workers
  – with multiple occupational injuries
  – no family members
  – who suffered injuries during the first and last three months of 2005 and 2006

• Severely injured workers received indemnity payments and were away from work for at least 7 days
Data

- We considered all primary and secondary ICD-9 codes for MSD: 354, 550-553, 717-719, 721-724, 726-727, 728.7-728.8, 729, and 840-848
  - Codes 354, 550, 722, 726-727, and 840-848 accounted for 95% of claims in another dataset analyzed by NIOSH

- We also considered slips, trips, and falls (STF) with codes 800.0-829.1, 830.0-839.9, 850.0-854.9, and 920.0-924.9

- Finally, we analyzed all ICD-9 codes not included in the MSD+STF list to test whether our selection of MSD+STF codes were those most likely to be related to the physical stress of caring for an injured worker
Methods

• Descriptive analysis
  – Statistical significance of differences between family members of severely and non-severely injured workers in number of MSD claims
    • 3 months before injury
    • 3 months after injury
Methods

• For MSD claims before and after injury: Negative binomial model (conditional mean lower than conditional variance of number of families with outpatient MSD claims)
  – Dependent variables
    • Number of family members with at least one outpatient MSD claim
    • Total outpatient MSD claims among family members
  – Independent variables
    • Explanatory variable: Severity of injury
    • Controls: worker age, sex, whether they belonged in a union and were paid hourly, industry sector and geographic region of employment, health plan type
  – Incidence rate ratios (IRR): change in incidence rate of a dependent variable associated with a one unit change in an independent variable
Methods

• For cost of MSD claims before and after injury: Two part model
  (many family members had no MSD claims within 3 months after injury)
  – First Part: probability that at least one family member of an injured worker would have an outpatient MSD claim within 3 months after injury
  – Second part: average family MSD claim cost for families who had at least one MSD claim
  – Average MSD cost for all families = probability from first part * average cost from second part

• (Discussion) To estimate costs at the national level we used weights by Truven and converted all costs in 2013 dollars using the Medical care services component of CPI
# Preliminary results

## Descriptive

- Before and after: MSD

<table>
<thead>
<tr>
<th></th>
<th>Non-severely injured</th>
<th>Severely injured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of family members</td>
<td>-0.01 p=0.970</td>
<td>0.02 p=0.043</td>
</tr>
<tr>
<td>Number of claims</td>
<td>0.02 p=0.204</td>
<td>0.87 p=0.018</td>
</tr>
</tbody>
</table>

- Before and after: MSD+STF

<table>
<thead>
<tr>
<th></th>
<th>Non-severely injured</th>
<th>Severely injured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of family members</td>
<td>-0.01 p=0.989</td>
<td>0.02 p=0.056</td>
</tr>
<tr>
<td>Number of claims</td>
<td>0.02 P=0.178</td>
<td>0.11 p=0.009</td>
</tr>
</tbody>
</table>
Preliminary results

- **Negative binomial: number of family members**

<table>
<thead>
<tr>
<th></th>
<th>Severity</th>
<th>P</th>
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<tbody>
<tr>
<td>MSD</td>
<td>1.17</td>
<td>0.002</td>
</tr>
<tr>
<td>MSD+STF</td>
<td>1.15</td>
<td>0.002</td>
</tr>
<tr>
<td>Other</td>
<td>1.01</td>
<td>0.596</td>
</tr>
</tbody>
</table>

- **Negative binomial: number of claims**

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<thead>
<tr>
<th></th>
<th>Severity</th>
<th>P</th>
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<tbody>
<tr>
<td>MSD</td>
<td>1.15</td>
<td>0.042</td>
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<tr>
<td>MSD+STF</td>
<td>1.09</td>
<td>0.156</td>
</tr>
<tr>
<td>Other</td>
<td>0.10</td>
<td>0.881</td>
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</tbody>
</table>
Preliminary results

- Costs of outpatient claims

<table>
<thead>
<tr>
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<th>Difference between severely and non-severely injured</th>
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<tbody>
<tr>
<td>MSD</td>
<td>$85</td>
<td>P=0.000</td>
</tr>
<tr>
<td>MSD+STF</td>
<td>$81</td>
<td>P=0.000</td>
</tr>
</tbody>
</table>
Discussion and conclusions

• By linking occupational injury data with family member outpatient MSD claims data, this study examined changes in medical claims following injury.

• We found increases in diagnosed MSD and MSD+STF for family members of severely injured workers, compared to non-severely injured workers.

• At the national level, there were approximately 4.1 million occupational injuries per year during 2005-2006 (BLS):
  – 0.162 of those occupationally injured (our estimate) were severely injured.
  – 0.828 of nonelderly have access to any source of health insurance (Frostin 2007).
  – Approximately 550,000 workers were severely injured per year.
  – This results in approximately $46.75 million family outpatient MSD costs.
Discussion and conclusions

• Results were consistent with a dose-response relationship between severity of occupational injury and family health effects.

• Though occupational injury primarily affects injured workers, its impact can extend beyond the workplace and affect the health of family members.

• These indirect health effects of occupational injuries should be considered when policy actions, priorities, and resource allocation decisions are made for occupational safety and health.