EMS Occupational Risks

Two main studies


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Emergency Medical Services Personnel

- 900,000 providers
  - 180,000 full time
  - 154,000 paramedics
- Includes paramedics, emergency medical technicians and other responders
- 31 million responses and 22 million patients treated per year in the U.S.

Research Objectives

- Determine rate of fatal occupational injuries
- Determine the rate of non-fatal occupational injuries and illnesses among EMS workers
- Determine the relative risk of occupational injuries and illnesses for EMS compared to other occupations and the national average

Literature

- No prior literature on how EMS rates may compare to BLS.
- Two papers - Gershon et al and Schwartz et al – indications of very high injury rates.
Data sources

- Department of Labor (DOL) Census of Fatal Occupational Injuries (CFOI) 1992 to 1997
- National EMS Memorial Service (NEMSMS) 1992 to 1997

### EMS Fatalities

<table>
<thead>
<tr>
<th>EMS Fatalities Cause/Database</th>
<th>DOL/CFOI</th>
<th>NEMSMS</th>
<th>NHTSA/FARS</th>
<th>Fatality Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground transportation</td>
<td>67</td>
<td>33</td>
<td>8</td>
<td>67</td>
</tr>
<tr>
<td>Air ambulance crash</td>
<td>*</td>
<td>19</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>*</td>
<td>13</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Assault/Homicide</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>14**</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>91</td>
<td>70</td>
<td>8</td>
<td>114</td>
</tr>
</tbody>
</table>

* Does not meet DOL publication requirements.
** There were 14 deaths other than ground transportation and assault (DOL policy precludes the identification of cells with fewer than five cases.)

### Transportation related occupational fatality rates 1992 to 1997

<table>
<thead>
<tr>
<th>Transportation Incidents</th>
<th>Fire</th>
<th>Police</th>
<th>EMS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.5</td>
<td>6.3</td>
<td>9.6</td>
</tr>
</tbody>
</table>

National average is 2
Non-Fatal Occupational Injuries and Illnesses Among Emergency Medical Services Personnel

Research Data

- Two urban EMS agencies
- 1998 to 2002
- 502 cases
- 409 workers
- 2.8 million hours worked

Non-fatal Occupational Injury Rates per 100 FT workers per year

Rates by demographic

Rates by Activity

Call cycle
Comparisons to National Average

- Comparison to the national average by nature, body part, source and event
- 285 EMS cases with lost work days only
- Rates per 10,000 ft workers
- Department of Labor national rates for 2000
- (select categories included on slides)

<table>
<thead>
<tr>
<th>Nature</th>
<th>Cases</th>
<th>EMS rate</th>
<th>National rate</th>
<th>Relative Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fractures</td>
<td>13</td>
<td>91.9</td>
<td>12.7</td>
<td>7.2</td>
</tr>
<tr>
<td>SS&amp;T</td>
<td>176</td>
<td>1,243.9</td>
<td>79.2</td>
<td>15.7</td>
</tr>
<tr>
<td>Multiple trauma</td>
<td>39</td>
<td>275.6</td>
<td>6.5</td>
<td>42.4</td>
</tr>
<tr>
<td>Total trauma</td>
<td>276</td>
<td>1,950.6</td>
<td>166.3</td>
<td>11.7</td>
</tr>
<tr>
<td>Total diseases</td>
<td>9</td>
<td>63.6</td>
<td>11.4</td>
<td>5.6</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td>2,014.2</td>
<td>181.1</td>
<td>11.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Body part</th>
<th>Cases</th>
<th>EMS rate</th>
<th>National rate</th>
<th>RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back</td>
<td>88</td>
<td>621.9</td>
<td>44.7</td>
<td>13.9</td>
</tr>
<tr>
<td>Knees</td>
<td>30</td>
<td>212.0</td>
<td>14.2</td>
<td>14.9</td>
</tr>
<tr>
<td>Ankles</td>
<td>19</td>
<td>134.3</td>
<td>9.1</td>
<td>14.8</td>
</tr>
<tr>
<td>Multi</td>
<td>37</td>
<td>261.5</td>
<td>15.8</td>
<td>16.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>EMS cases</th>
<th>EMS rate</th>
<th>National rate</th>
<th>RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care patients</td>
<td>108</td>
<td>763.3</td>
<td>8.1</td>
<td>94.2</td>
</tr>
<tr>
<td>Floors/walkways</td>
<td>18</td>
<td>127.2</td>
<td>30.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Stairs</td>
<td>10</td>
<td>70.7</td>
<td>2.7</td>
<td>26.2</td>
</tr>
<tr>
<td>Stretchers</td>
<td>16</td>
<td>113.1</td>
<td>0.3</td>
<td>376.9</td>
</tr>
</tbody>
</table>

Relative risk of injury with lost work days

- The risk for EMS workers is seven times higher than the national average
Most costly
Average cost per event

- Nature of Injury
  - SS&T: $2,100
- Body part
  - Shoulder: $3,200
- Source
  - Bodily motion: $3,200
- Event
  - Overexertion: $4,700

Overall costs

- Average cost per case = $1,600
- Cases per 100 full time employees per year = 35
- Average injury cost per year per 100 full time employees = $56,000
- Cost per year for 180,000 EMS workers = $100,800,000

Lost work time

- Average of seven lost work days per incident
- 35 incidents per 100 full time workers per year = 245
- EMS lost work days in U.S. per year = 441,000

Transportation risks

- Fatality rate five times higher than the national average
- Injury rate 30 times higher than the national average

Transportation risks

- Fatality rate five times higher than the national average
- Injury rate 30 times higher than the national average

Haddon’s Matrix for EV Collisions

<table>
<thead>
<tr>
<th></th>
<th>Human/Host</th>
<th>Vehicle/agent</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-event</td>
<td>Fatigue</td>
<td>Poor maintenance</td>
<td>Poor visibility</td>
</tr>
<tr>
<td>(pre-injury)</td>
<td>Poor driver training</td>
<td>Poor design</td>
<td>Hazardous conditions</td>
</tr>
<tr>
<td></td>
<td>Impaired hearing</td>
<td>Inappropriate tires or tire</td>
<td>Urban vs. rural</td>
</tr>
<tr>
<td></td>
<td>Alcohol/subs abuse</td>
<td>pressure</td>
<td>- Inadequate agency</td>
</tr>
<tr>
<td></td>
<td>Non-use of seatbelts</td>
<td>Lack of functional</td>
<td>policies and/or</td>
</tr>
<tr>
<td></td>
<td>Distractions , Stress</td>
<td>seatbelts</td>
<td>enforcement</td>
</tr>
<tr>
<td></td>
<td>Poor driving skills</td>
<td>Lack of driver’s</td>
<td>- Inadequate funding</td>
</tr>
<tr>
<td></td>
<td>Diesel fume exposure</td>
<td>compartment airbags</td>
<td>for research and</td>
</tr>
<tr>
<td></td>
<td>Smoker, Speed</td>
<td></td>
<td>prevention.</td>
</tr>
<tr>
<td>Event</td>
<td>Employee’s health</td>
<td>Protruding objects</td>
<td>Lack of vehicle</td>
</tr>
<tr>
<td></td>
<td>Resistance to energy</td>
<td>Sharp corners</td>
<td>restrain walk/roll on</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unsecured equipment</td>
<td>road side</td>
</tr>
<tr>
<td>Post event</td>
<td>Employee’s health</td>
<td>Presence of hazardous</td>
<td>Availability of</td>
</tr>
<tr>
<td></td>
<td>Priority given to</td>
<td>materials</td>
<td>ambulances</td>
</tr>
<tr>
<td></td>
<td>other’s care over self care</td>
<td></td>
<td>Trauma Center</td>
</tr>
</tbody>
</table>

Fatigue

- 21 hours of wakefulness produces impairment of the same magnitude as a 0.08% blood alcohol concentration [1];
- the legal limit for commercial drivers in the U.S is 0.04% BAC [2].

The faces of fatigue

Joseph "Neal" Sherman died when the exhausted driver of the ambulance fell asleep and went off the road; Neal was 25.

Ashleigh Neale Sherman sits at the gravesite of the father she never met.


Heather Brewster

In July 1997, Heather Brewster’s car was rear-ended by Sookim Hong, a medical resident who’d just finished a 36-hour hospital shift. Brewster suffered massive brain injuries and was in a coma for weeks. The accident left Brewster permanently disabled: she now walks slowly, doesn’t remember much of what she used to and has been declared incompetent by the courts.

Brewster’s family is suing Hong and the hospital that employed her at the time.


The other victims

An ambulance went through an intersection in Brooklyn, N.Y., and smashed into this car driven by Angela Igwe. Three of Igwe’s four children, Akintunde Morak, 2, Olusegun Morak, 5, and Damilola Morak, 7, were killed.

The ambulance driver pleaded guilty to criminally negligent homicide.


Assaults

- EMS assault fatality rate seven times higher than for health care workers
- Non-fatal assault rate 22 times higher than the national average
- Risk likely varies by gender and age group
- Some interventions may increase risk

Suicide

- No data
- Rate could be many times higher than the national average

Summary

- The overall rate of injuries and illnesses among EMS workers is six times higher than the national average
- The rate of lifting injuries is 21 times the national average
- The rate of transportation injuries is 30 times higher than the U.S. average
- Violence-related injuries is 22 times higher than the national average
Conclusion

• The research documents a clear and immediate public health emergency faced by the many thousands of EMS personnel who put their lives on the line every day in order to provide emergency medical services to the citizens of their communities.

Immediate interventions must be initiated to mitigate this problem

Challenges

• Problems with existing data
• No standard terminology
• No linkages to other databases
• Poor awareness of problem
• Limited resources
• Untested “solutions” such as ballistic vests

Recommendations

• Improved databases (local and national) with uniform data
• Money for research
• Injury epidemiology research
• Development, implementation and evaluation of risk reduction interventions
• Mechanism to develop and share best practices related to training/education, enforce/enact and engineering (including patient transfer equip, PPE and clothing/footwear).

Similarities between EMS and Public Health

♦ Assessment
  • EMS - History and vital signs
  • Public Health
    • History – literature review and historical evidence
    • Vital signs – current rates

A team approach

• EMS personnel
• Managers
• Epidemiologists
• Engineers
• Physicians/nurses
• Local officials
Pinnellas County

The four Es of injury prevention
- Education
- Engineering
- Enactment of policy/legislation
- Enforcement of policy/legislation

Determine priorities
- Highest rate
- Most serious
  - Lost work days
  - Termination
- Most costly
- Cost benefit analysis

The cost
- “For every one dollar invested in safety there is a savings of three to six dollars”
  - Liberty Mutual Research Institute for Safety*

*The ROI of Safety. Business Week. September 12, 2005

The steps
- Identify problem
- Develop interventions
- Implement
- Evaluate
- Repeat
State, local and agency leadership actions

- Support research
- Evaluate culture
- Develop and implement standards
- Encourage and promote safety
- Get involved!

A personal approach

- No smoking
- Five hours of exercise per week
- Healthy diet
- Sleep
- De-stress

Questions

Related research


References


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