Economic Impact of Firefighter Injuries

2019-09-18|Birgitte Messerschmidt & Ben Evarts|Urban Fire Forum
AGENDA

Ben Evarts
• Data Collection & Methods
• Injury trends
• Injury types and scenarios
• Exposures and other hazards
• What this research doesn’t cover

Birgitte Messersschmidt
• Fire Protection Research Foundation Project
## How we get the data

### PART VI: FIRE SERVICE EXPOSURES AND INJURIES

Total number of firefighters that were exposed to infectious diseases (hepatitis, meningitis, HIV, other) in 2018 (severity 1, cause 4, and object 25, 51):

Total number of firefighters that were exposed to hazardous conditions (asbestos, chemicals, fumes, radioactive materials, other) in 2018 (severity 1, cause 4, and object 41, 52, 53, 56):

Total number of nonfatal firefighter injuries (not exposures) during all types of duty in 2018 (severity 1 (not exposures), and severity 2 thru 6):

On- Duty Firefighter Injuries (not exposures to infectious diseases) by Type of Duty, and Nature of Most Serious Injury. Departments using NFIRS 5.0 should include results on cases where severity is 1 (not exposures), and severity is 2 thru 6. Primary apparent symptom (PAS) codes are noted in parenthesis for each category. At non-fire emergencies includes EMS and rescue calls, and hazardous condition calls, while other on-duty includes inspection and maintenance duties.

### FIREGROUND INJURIES BY CAUSE

In the following table, include injuries that occurred at the fireground as reported in column B above. Report the number of injuries that occurred at the fireground by cause, based on the initial factor leading to the injury. Departments using NFIRS 5.0 can find cause and object involved in injury codes in parentheses.

<table>
<thead>
<tr>
<th>Nature of Most Serious Injury (Primary Apparent Symptom (PAS) codes in parenthesis)</th>
<th>Type of Duty</th>
<th>(A) Responding to or Returning from Incidents</th>
<th>(B)</th>
<th>(C) At Non-Fire Emergencies</th>
<th>(D) Training</th>
<th>(E) Other On-Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Burns (PAS 12, 13, 14, 16)</td>
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<tr>
<td>2a. Smoke or Gas Inhalation (PAS 01, 02)</td>
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<td>2b. Other Respiratory Distress (PAS 03, 04, 05, 06)</td>
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<tr>
<td>3. Burn and Smoke Inhalation (PAS 11)</td>
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<tr>
<td>4. Wound, Cut, Bleeding, Bruise (PAS 21–23, 30, 36, 71, 72)</td>
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<td>5. Dislocation, Fracture (PAS 31, 32, 63)</td>
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<tr>
<td>6. Heart Attack or Stroke (PAS 41, 42, 43)</td>
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<tr>
<td>7. Strain, Sprain, Muscular Pain (PAS 33, 34, and 36)</td>
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<tr>
<td>8. Thermal Stress (frostatte, heat exhaustion) (PAS 57, 83–85)</td>
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<tr>
<td>9. Other (PAS All other codes)</td>
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<tr>
<td>10. TOTAL</td>
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</tbody>
</table>

Other (please specify): ___________________________

Please report the number of injuries that resulted in lost time (severity 4 thru 6):

How many hours were lost as a result of these injuries?

### FIRE DEPARTMENT VEHICLE CRASHES

Please report below the number of crashes involving fire department emergency vehicles or fire fighter’s personal vehicles while responding to or returning from incidents in 2018. (If none, report 0).

Accidents involving fire department emergency vehicles: ____________

Resulting fire fighter injuries: ____________

Accidents involving fire fighter’s personal vehicles: ____________

Resulting fire fighter injuries: ____________
Good news, injuries are falling
The number and likelihood of fireground injuries has also been falling.
Fireground injuries by cause, 2017

- Overexertion, strain, 29%
- Fall, jump, slip, trip, 20%
- Extreme weather, 3%
- Struck by, 6%
- Contact with object, 11%
- Other, 16%
- Exposure to Fire Products, 11%
- Exposure to Chemicals or Radiation, 4%

Source: NFPA Survey for Fire Experience
Injuries don’t only occur at fires

<table>
<thead>
<tr>
<th>Type of Duty</th>
<th>Number of Firefighter Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responding to or returning from</td>
<td>4,555</td>
</tr>
<tr>
<td>Incidents</td>
<td></td>
</tr>
<tr>
<td>At the Fire Ground</td>
<td>24,495</td>
</tr>
<tr>
<td>At Non-Fire Emergencies</td>
<td>12,240</td>
</tr>
<tr>
<td>Training</td>
<td>8,380</td>
</tr>
<tr>
<td>Other On-Duty</td>
<td>9,165</td>
</tr>
</tbody>
</table>

Source: NFPA Survey for Fire Experience
Exposures and hazardous conditions

- 7,345 exposures to infections diseases
- 44,530 exposures to hazardous conditions

Source: NFPA Survey for Fire Experience
What this doesn’t cover and the future

• Response Rates and Survey Data
• Exposures over time
• Emerging issues
Fire Protection Research Foundation Study
Research Team

• David Butry, Chief of Applied Economics Office, NIST
• Stanley Gilbert, Economist, NIST
• David Webb, Economist, NIST
• Jennifer Taylor, Director, Center for Firefighter Injury Research and Safety Trends (FIRST) & Associate Professor, Drexel University
Objectives & Goals

• To assess the economic impact of firefighter injuries in the US.
  – NFPA’s firefighter injury studies indicate that the rate of firefighter injury per fire incident is not declining at the same rate as the number of fire incidents.
  – A deeper understanding of the costs associated with these injuries will illuminate their impact on the Nation’s resources decided to fire safety and provide benchmarks to evaluate strategies to reduce these numbers in the future

• Focus of presentation is on linking existing injury statistics with existing economic loss estimates
‘Injury Typology’

• Injuries
  – E.g., burns, fractures

• Illnesses & Occupational Disease
  – E.g., post-traumatic stress disorder, cancer

• Health Exposures
  – E.g., HIV exposure
General Approach

• Characterize the annual number and types of firefighter injuries using existing data sources
  – NFPA’s Survey of Fire Departments
  – National Fire Incident Reporting System (NFIRS)
  – Bureau of Labor Statistics (BLS) Survey of Occupational Injuries and Illnesses

• Research direct and indirect costs of injuries reported in the economic literature

• Establish and utilize a framework to assess and benchmark these costs
Advantages of Linking Cost Estimates to Injury Statistics

• Provides an injury metric that accounts for consequences
  – The total economic impact is driven by both the number and type of injuries
    • Linking allows more significant injuries to be valued (weighted) higher

• Ability to track injury costs and losses by year
# Injury Data Sources (Annual & Nationwide)

<table>
<thead>
<tr>
<th>Category</th>
<th>NFPA</th>
<th>NFIRS</th>
<th>SOII</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample</strong></td>
<td>Survey: US Fire Departments (n = 2769)</td>
<td>Partial Census: US Fire Incidents (n = 928)(\times)160)</td>
<td>Survey: US Employers (n \geq 200,000)</td>
</tr>
<tr>
<td><strong>Number of Injuries</strong></td>
<td>Number of Injuries and Exposures</td>
<td>Number of Injuries and Exposures</td>
<td>Number of Injuries, Illnesses, Exposures</td>
</tr>
<tr>
<td><strong>Firefighter Characteristics</strong></td>
<td>Affiliation</td>
<td>Affiliation (Paid-Only)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>Age</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physical Condition Just Prior to Injury Responses</td>
<td>Length of Service with Employer Hours Worked</td>
<td></td>
</tr>
<tr>
<td><strong>Cause of Injury</strong></td>
<td>Cause of Injury</td>
<td>Cause of Firefighter Injury Factor Contributing to Injury</td>
<td>Event or Exposure</td>
</tr>
<tr>
<td><strong>Type of Injury</strong></td>
<td>Nature of Injury</td>
<td>Primary Apparent Symptom Object Involved in Injury Primary Body Part Injured</td>
<td>Nature of Injury, Illness Primary Source of Injury, Illness Secondary Source of Injury, Illness Part of Body Affected</td>
</tr>
<tr>
<td><strong>Activity</strong></td>
<td>Type of Duty</td>
<td>Activity at Time of Injury Where Injury Occurred Specific Location Where Injury Occurred</td>
<td></td>
</tr>
<tr>
<td><strong>Severity</strong></td>
<td>Lost Time</td>
<td>Severity (minimum is first aid treatment) Taken To</td>
<td>Number of Days Away from Work Cases with Job Transfer or Restriction</td>
</tr>
</tbody>
</table>

Measured Economic Impacts

After matching statistics with costs reported in the economic literature, three ranges (‘tiers’) of aggregated estimates were produced:

• Tier 1: Impacts ≤ $100 million
  – *Based on lower bound ranges of reported per injury cost data*

• Tier 2: $100 million < Impacts < $1 billion
  – *Based on literature limited (1) to a subset of injuries or (2) based on workers compensation claims only.*

• Tier 3: Impacts > $1 billion
  – Range from $1.2 billion to $18 billion
  • Dropping highs/lows: $1.6 billion to $5.9 billion
Key Challenges

• Injury data sources cover different pieces of the firefighter injury story
  – Long term occupational disease lacking
  – Occupational disease not tracked for volunteer firefighters at all

• Existing economic injury cost data varies
  – Focuses on direct medical costs and some include work or productivity losses
  – Estimates based on physical injuries
    • Mental health, illnesses, and occupation disease lacking
  – Most studies based on general population or entire workforce
    • Little data specific to firefighters exist
Data Collection Needs

• Tracking incidence of occupational disease and long-term health consequences
  – Data can help establish links to exposure for long term disease
  – To establish links requires better and more consistent reporting of incidents

• Better understanding of mental health and post-traumatic stress injuries, impact on fire departments, and direction of future trends

• Better understanding of costs related to:
  – Direct and indirect cost data specific to firefighting activities
  – Injury litigation and backfill
Incentives for Increased Data Collection

• To reduce the frequency and severity of injuries, illnesses, health exposures, and occupational disease
• To improve cost management by establishing industry injury cost benchmarks.
  – This data can inform discussions with decision makers.
  – Fire departments can compare costs to costs found in the report to see how injuries and costs compare with peers.
• To estimate return-on-investment on activities and equipment to enhance firefighter health
• To create friendly competitions between battalions or to provide recognition at national conferences
Mechanisms to Increase Data Collection and Early Warning

• Use of pre-existing systems/tools through following channels:
  – NFORS & Fire Exposure Module
  – NFIRS
  – CAD
  – Workers compensation reports of injuries
• Link hospital discharge data with industry and occupation data
• Regular health screenings