Philadelphia Fire Department (PFD) emergency response employee (ERE) mucous membrane & non-intact skin exposures to blood-borne pathogens (BBP) and other potentially infectious materials (OPIM)

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Problem statement

Emergency response employees (EREs) are at risk from occupational exposure to:

- Bloodborne pathogens (HIV, HBV, HCV)
- Other potentially infectious materials (OPIM)
Few previous reports:
- Many reports very old, small #’s

1 recent report w/ health-care data: Merchant et al (2009): Rhode Island ERE ED visits (BBP events) 1995-2001, used discharge diagnoses

- N = 200
- 23.3 ED visits / 100,000 ambulance runs

~ 21% “of 150,000+ U.S. paramedics reported exposure to blood annually” (Leiss, Sousa & Boal, 2009, 139)
Subjects also reported:

- ... Reported about “25,000 non-intact skin exposures” / year (Leiss, 2009, 884)
- Risk of non-intact skin exposure was 8.7% / year
- Risk reported: 12 exposures / 100,000 ambulance runs / yr.
EREs’ Risks

- Environmental circumstances
- Blood splashes or body fluids from patients
- Incomplete hepatitis B vaccination series
Previous PFD report

- APHA 2012 – DiStefano et al, PFD needlestick injuries (poster)
- N = 62, during 2001 – 2010
- 0 cases seroconversion to HIV, Hep B or Hep C
- No call volume data, so no rates calculated
STUDY
Specific Aims

- Examine causes of mucous membrane and non-intact skin exposures in the PFD
- Examine risk factors that affect the occurrence of exposures
- Calculate risk of exposure
Methods

- Retrospective cohort study; mucous membrane and non-intact skin exposures to BBP and OPIM, 2001 to 2011

- Cases managed, records held by exposure control officer (ECO) at PFD Infection Control Office (ICO) since 2001
Methods

- Subjects – PFD paramedics
- Not reported: firefighter-EMTs, also: civilians, administrative staff, students
- N = 90
  - 9 other cases, data incomplete
- 18 variables studied
  Qualitative and quantitative data
Methods (2)

Variables

- Rank
- Age
- Appointment date
- Longevity date
- Years of experience
Methods (3)

Variables (2)
- Date of reported event
- Day of the week
- Time of day
- Battalion
- Medic unit / platoon
- Non-intact skin exposure (blood / OPIM)
- Eye/ mucous membrane splash / contact (blood or OPIM)
Methods

Variables (3)

- PPE used
- Source patient testing
- Physician disposition
- Sero-conversion post-exposure
- Call volume
Results

- Paramedics had most of the exposures vs. firefighters
  - Paramedic = 90
    - 52 mucous membrane
    - 38 non-intact skin
  - FF = 48
Age at exposure – no association
“Significance” of mucous membrane exposure

Significance of eye/mucous membrane exposure

- Significant Exposure
- Non-Significant Exposure
- Unknown

HCP final disposition

Frequency
“Significance” of non-intact skin exposure

Significance of non-intact skin exposure

HCP final disposition

Significant Exposure
Non-Significant Exposure
Unknown
## Source patient results

<table>
<thead>
<tr>
<th>Source patient testing</th>
<th>Number</th>
<th>% of Significant Exposures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, Positive for BBP</td>
<td>25</td>
<td>29.8</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>21.4</td>
</tr>
<tr>
<td>Not tested, unknown, or data missing</td>
<td>37</td>
<td>43.0</td>
</tr>
</tbody>
</table>
Battalion and platoon

- No significance or trends by battalion or by platoon / medic unit
  - Battalion = by geography
  - Platoon = by shift, and by whether BLS or ALS unit

- Except: fewer exposures on night shift platoons (also had fewer runs)
E.g., non-intact skin exposure by battalion
Day of the week

Exposures by Day of the week

- Non-intact skin
- Eye mucous membrane
- Simultaneous exposure

Day of the week:
- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday
- Sunday
Behavioral and environmental factors

- Handling combative patients
  - Spat blood or salvia 24
  - Scratched, bit or cut paramedics 11
- Fluid splash from intubation (nasal or endotracheal) 11
- Splash when removing gloves 8
- Fluid into open wound 7
- Other (7 = data missing) 22
Mean call volume = 243,182 / yr
Rates per ambulance run

- Rate, mucous membrane exposure:
  1.99 / 100,000 calls

- Rate, non-intact skin exposure:
  1.42 / 100,000 calls
Period total

- PFD paramedics’ exposure over study period (10.7 years) was:
  - Non-intact skin exposure = 1.5 %
  - Eye/ mucous membrane = 2.0 %
None seroconverted

- No sero-conversion to bloodborne infections among PFD or FF’s (during study period)
Discussion

- PFD paramedics’ annual non-intact skin and eye/mucous membrane exposures much lower than in prior studies
  - By %’s: ~1.3% to ~2% (vs. ~20%)
  - By call volume: 1 to 2 / 100,000
    [vs. 12 (Leiss) to ~23 /100,000 (Merchant)]
*Different methodology can produce such differences
Limitations

- Small study size
- Possible underreporting and over-reporting of exposures
- Recall and reporting issues
- Misclassification of exposure
- Incomplete information
- No database software at PFD
Conclusion

- No seroconversions to HBV, HCV, and HIV via non-intact skin and mucous membrane exposures (since 2001)

- PFD mucous membrane and non-intact skin exposure rates are low compared to other studies

- Intensive case management might be effective
Now?

- What do you think?
- Further research w/ similar methods
References


