

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

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

- **Bloodborne pathogens (HIV, HBV, HCV)**
- **Other potentially infectious materials (OPIM)**

Background

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- **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**

Background (2)

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- **National Survey to Prevent Blood Exposure in Paramedics – series of papers, 2002-2003 mail recall survey: 2664 paramedics in 11 states**
- **~ 21% “of 150,000+ U.S. paramedics reported exposure to blood annually” (Leiss, Sousa & Boal, 2009, 139)**

Background (3)

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- **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

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- **Environmental circumstances**
- **Blood splashes or body fluids from patients**
- **Incomplete hepatitis B vaccination series**

Previous PFD report

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- **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**

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STUDY

Specific Aims

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- **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

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- **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)

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Variables

- Rank**
- Age**
- Appointment date**
- Longevity date**
- Years of experience**

Methods (3)

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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

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Variables (3)

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

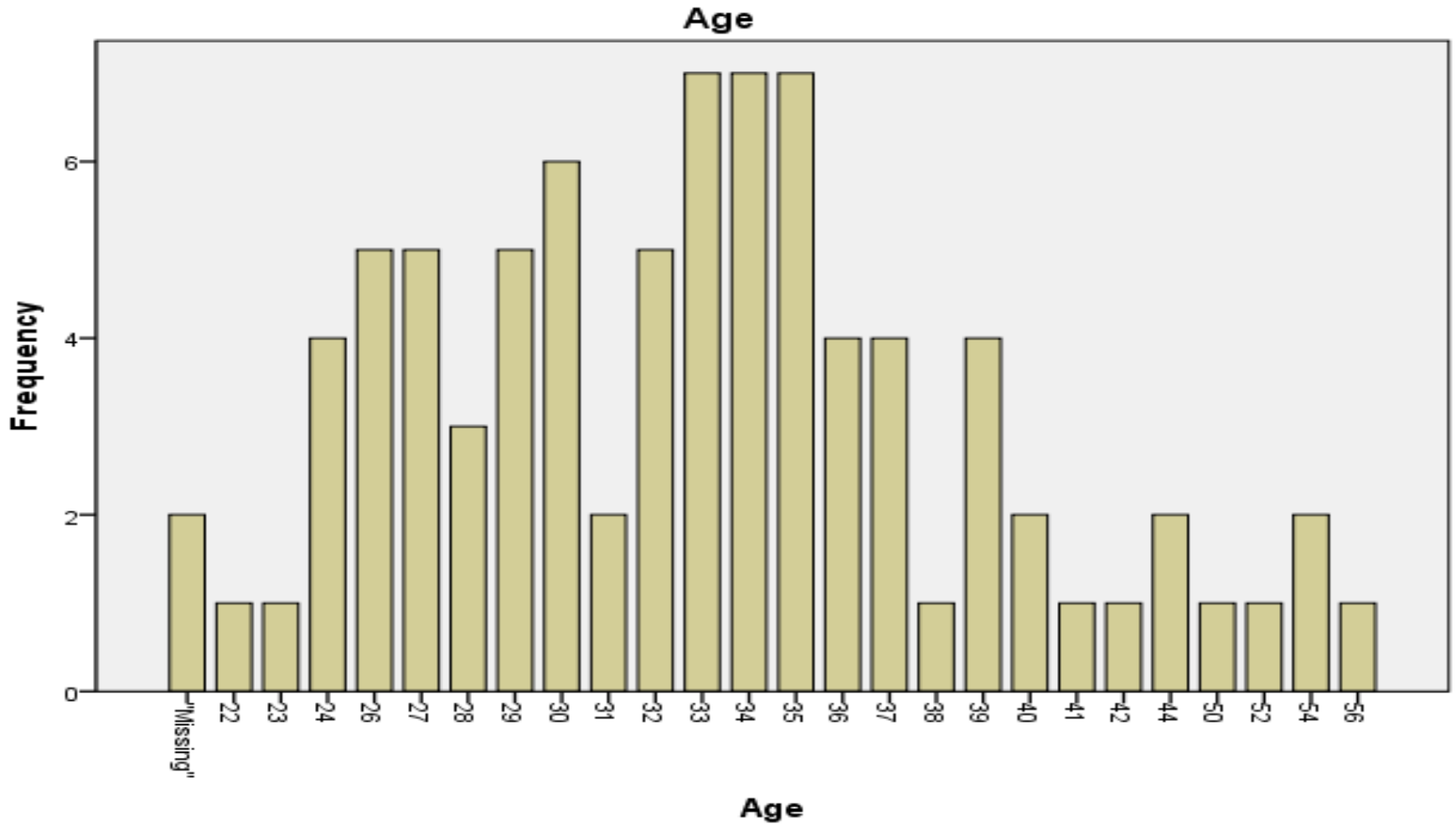
Results

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- **Paramedics had most of the exposures vs. firefighters**
 - **Paramedic = 90**
 - **52 mucous membrane**
 - **38 non-intact skin**
 - **FF = 48**

Age at exposure - no association

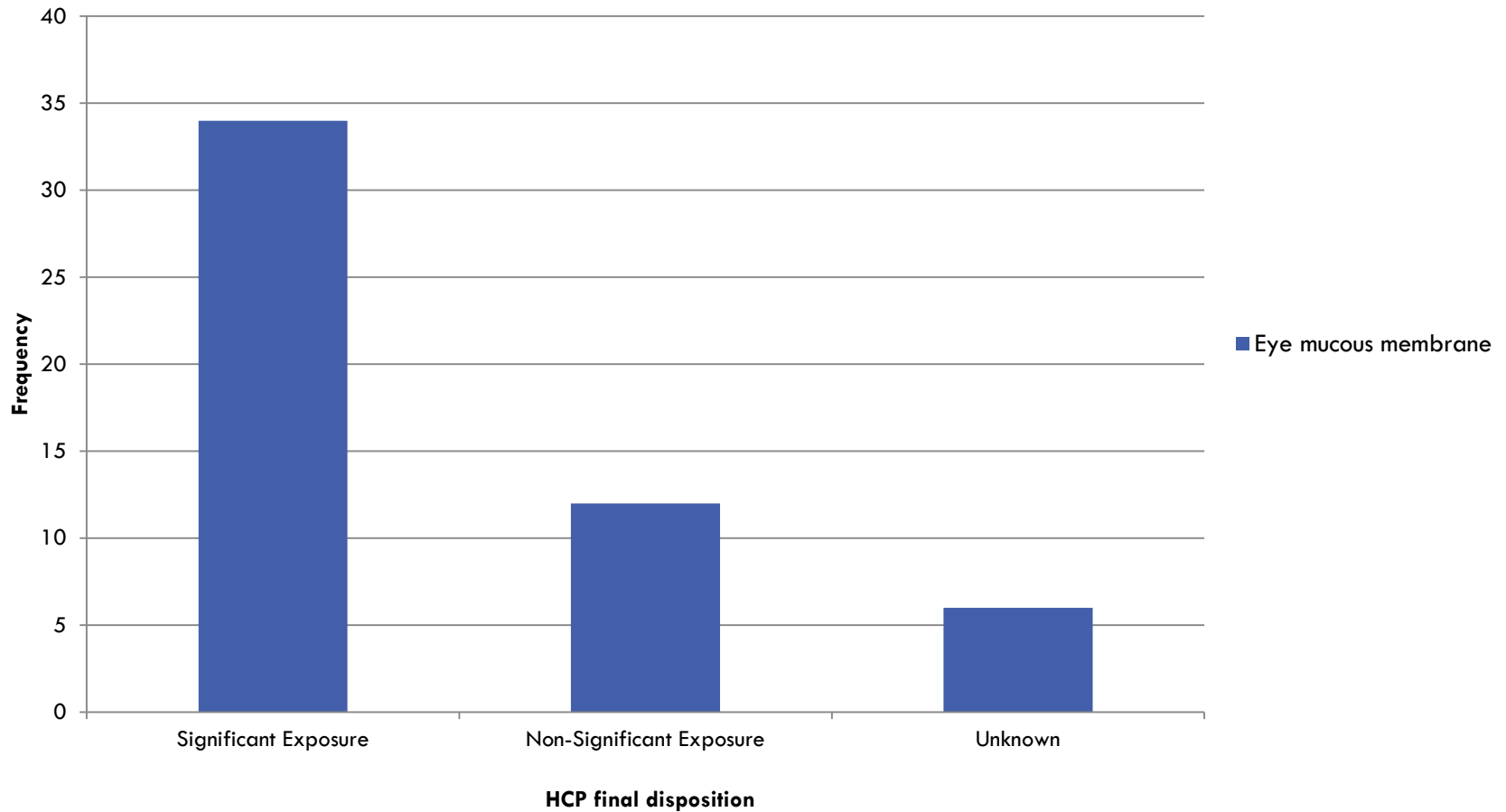
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“Significance” of mucous membrane exposure

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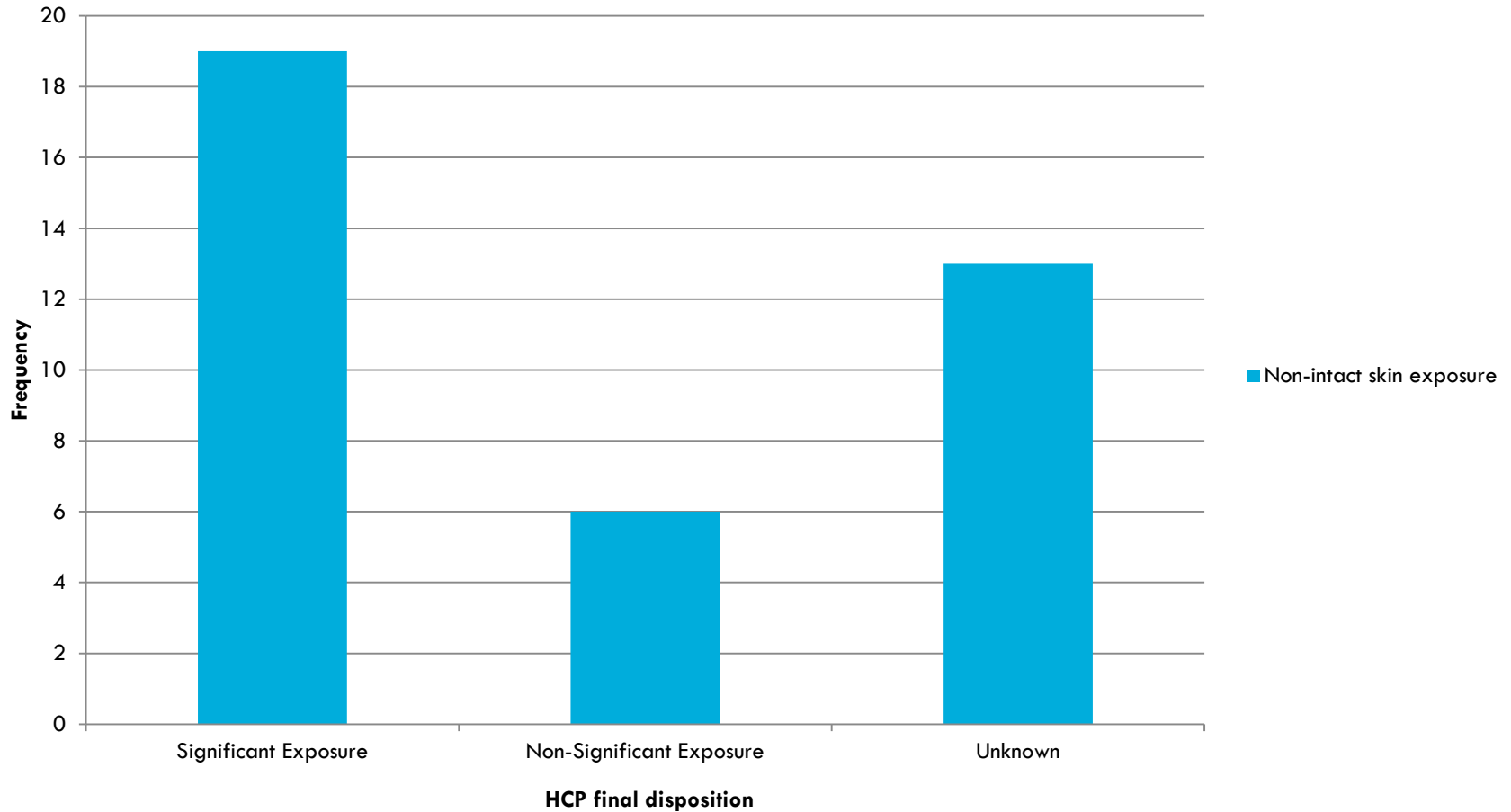
Significance of eye/mucous membrane exposure



"Significance" of non-intact skin exposure

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Significance of non-intact skin exposure



Source patient results

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Source patient testing	Number	% of Significant Exposures
Yes	25	29.8
Positive for BBP	18	21.4
No	4	4.8
Not tested, unknown, or data missing	37	43.0

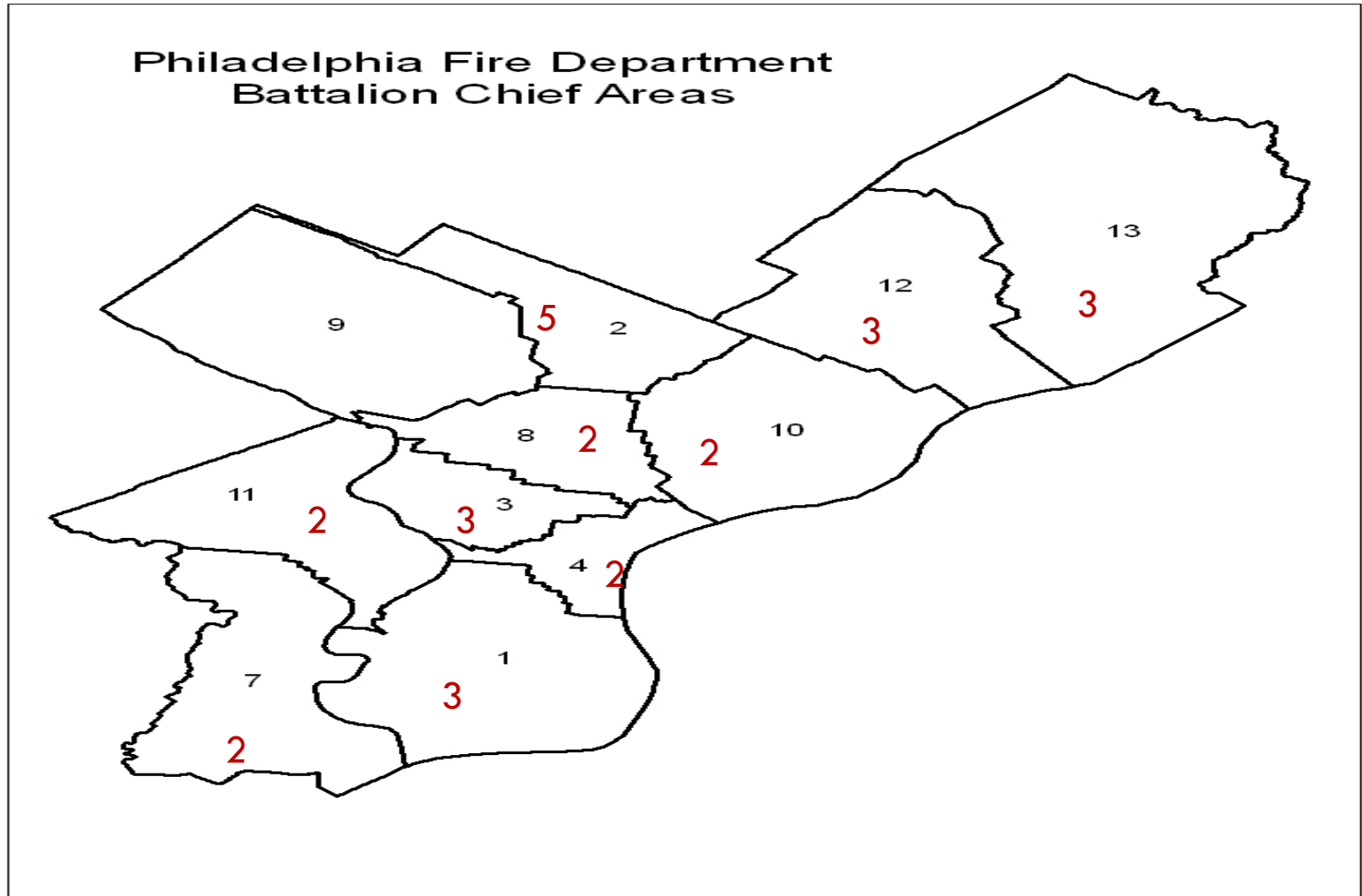
Battalion and platoon

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- ❑ **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

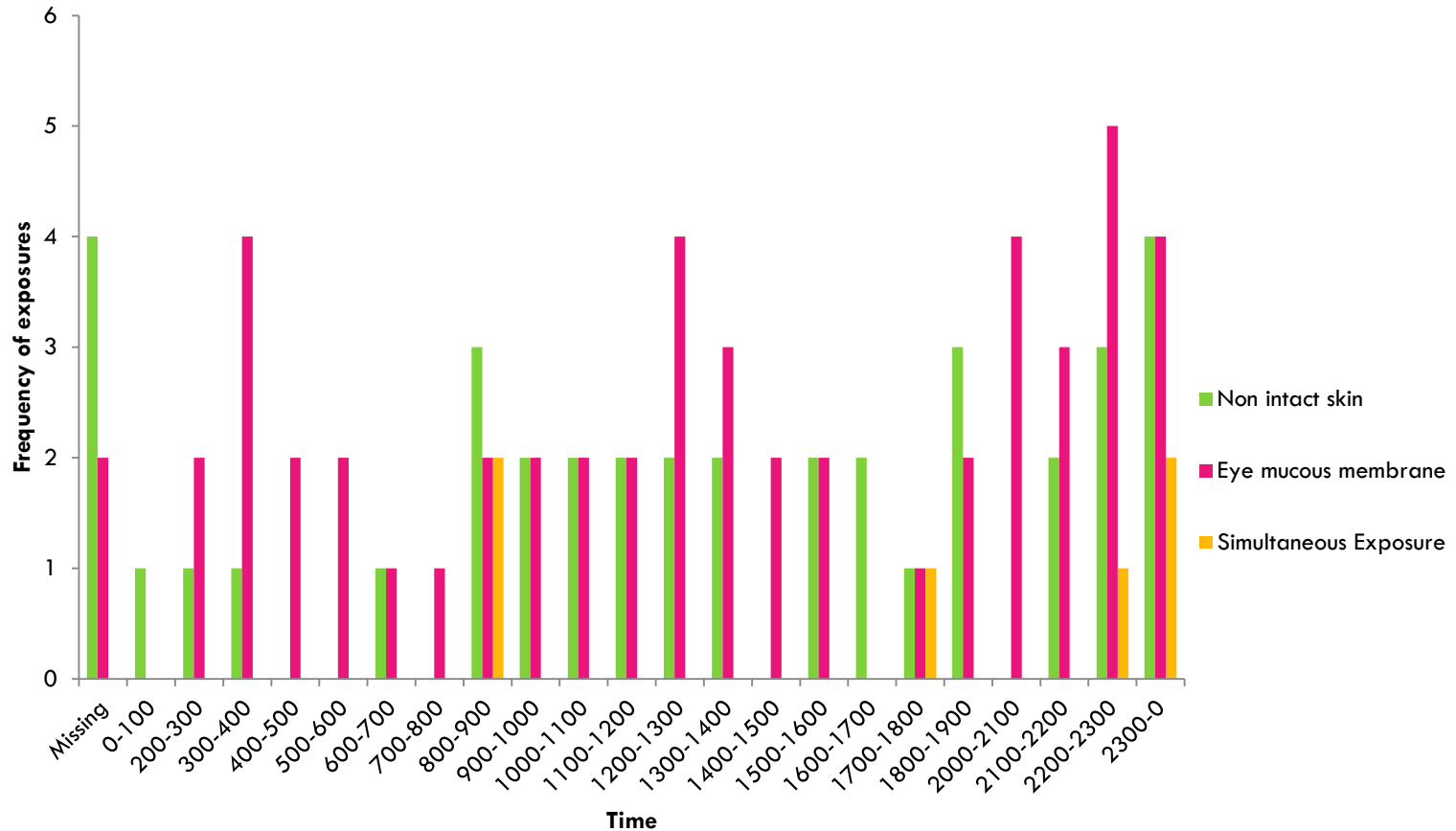
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Time of day

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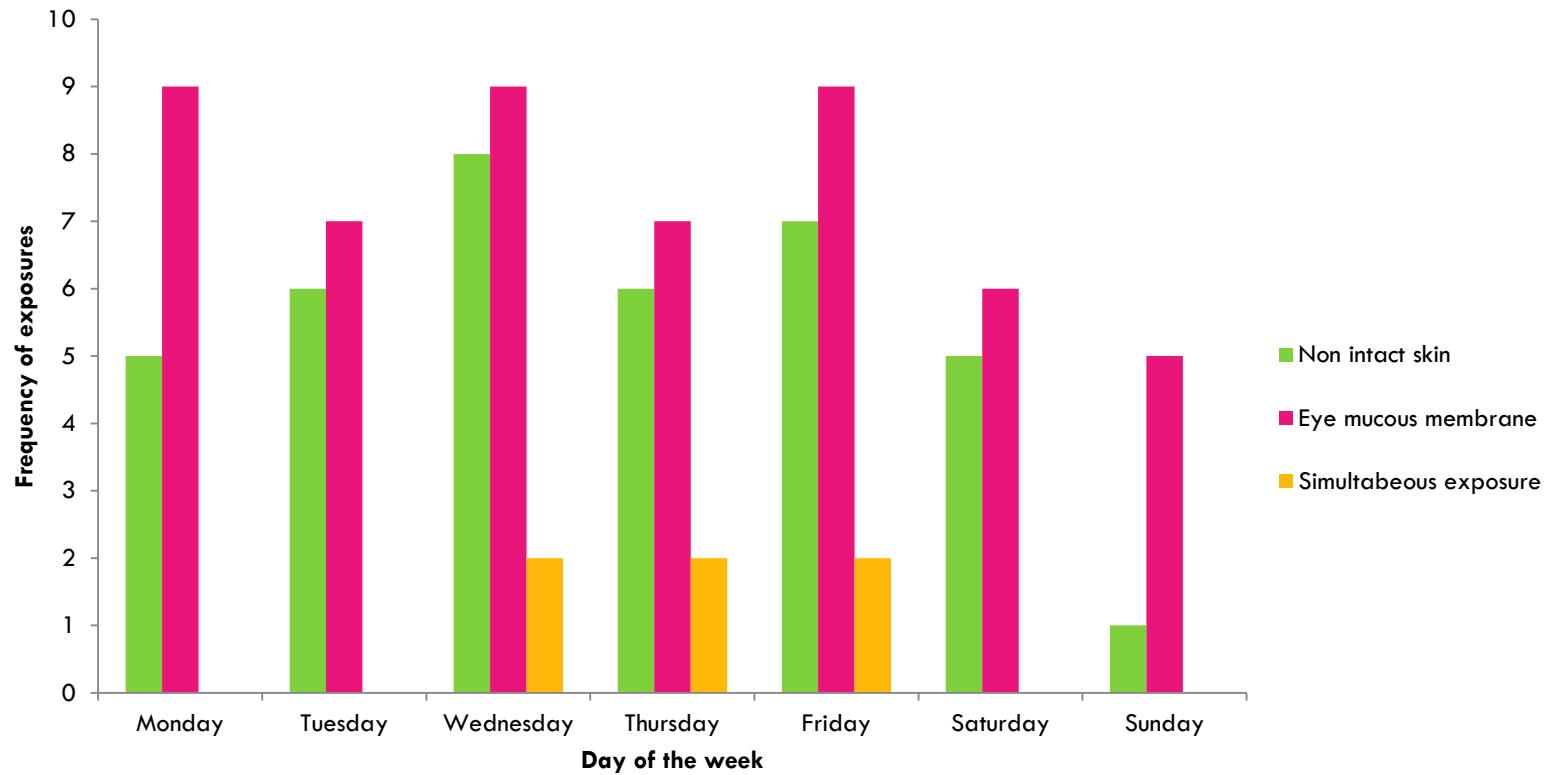
Exposures by Time of Day



Day of the week

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Exposures by Day of the week



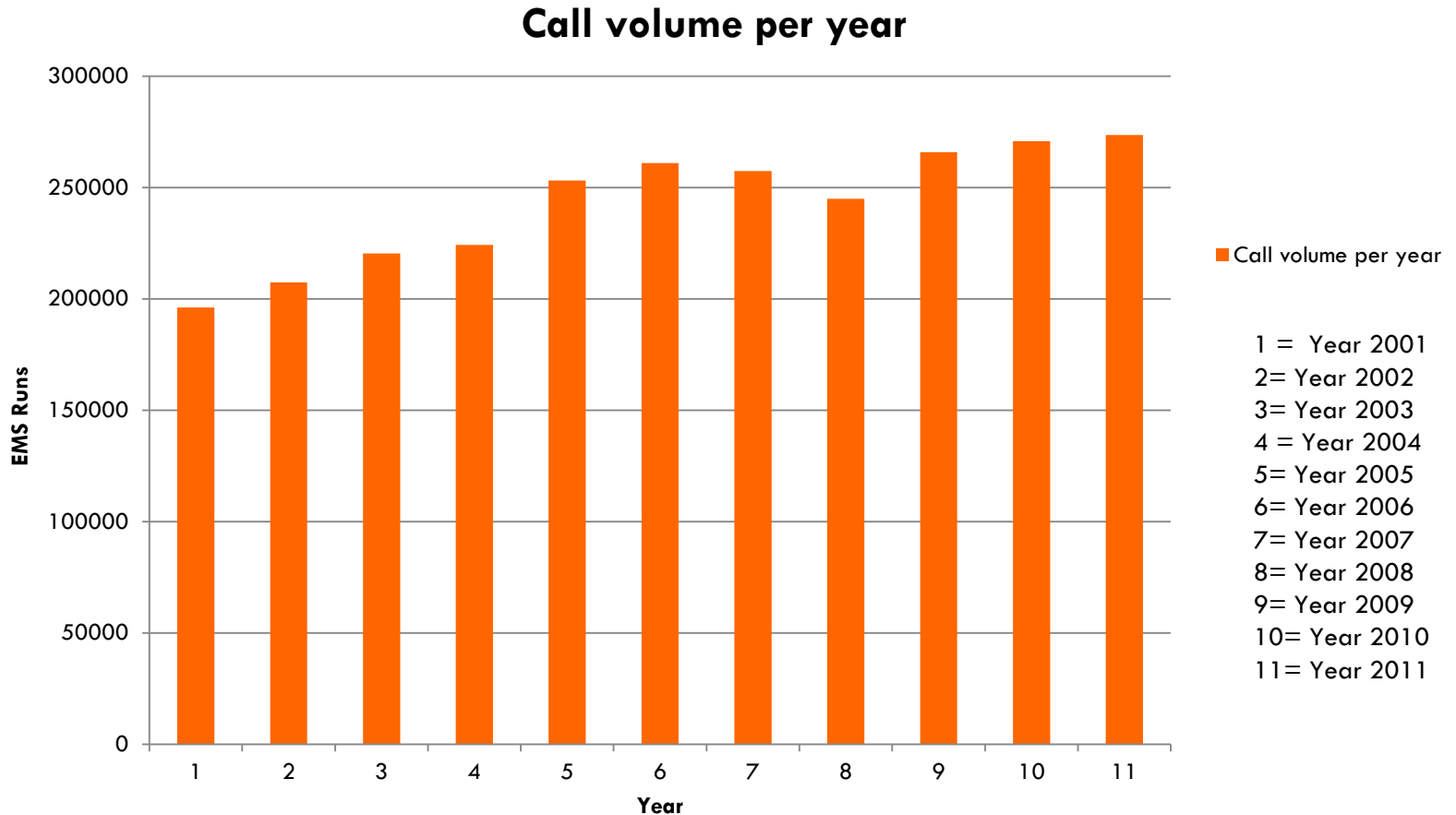
Behavioral and environmental factors

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	<u>N =</u>
□ Handling combative patients	
■ Spat blood or saliva	24
■ Scratched, bit or cut paramedics	11
□ Fluid splash from intubation	11
(nasal or endotracheal)	
□ Splash when removing gloves	8
□ Fluid into open wound	7
□ Other (7 = data missing)	22

Call volume

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Mean call volume = 243,182 / yr

Rates per ambulance run

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- **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

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- **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

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- **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?

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

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