Amber Hogan Mitchell, DrPH, MPH, CPH

LOW RISK IS THE NEW HIGH RISK:

Implications of National Policy on Occupational Exposure to Blood and Body Fluids in US Hospitals

Abstract # 299069

Presenter Disclosures

The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

No relationships to disclose.

Presentation Objectives

- Public Health Significance
- Study Aims
- Methods
- Results
- Discussion

Public Health Significance

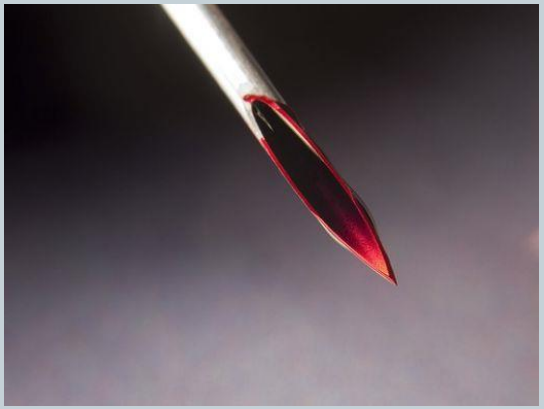
BACKGROUND

Population Risk

- 17 million healthcare workers in 790,000 facilities
- Healthcare is sector with the largest growth
  - +2.4% per year in healthcare
  - -1.1% per year in manufacturing
- Changing reimbursement, Affordable Care Act
  - Pressure to fill beds
- 35 million patient discharges per year
  - 185,000 HIV positive with co-morbidities (HCV, TB)
  - 46 per 1,000 MRSA positive

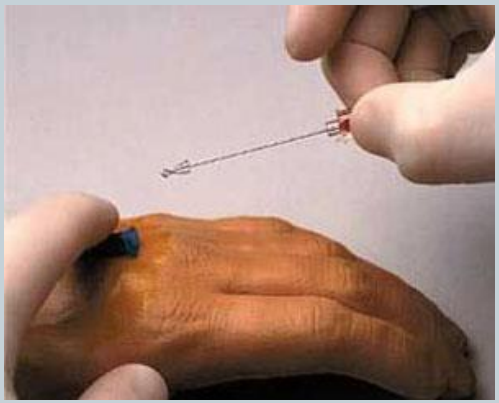
Occupational Infection / Illness Risk

- Modes of Transmission
  - Infectious Disease
    - Contact, Aerosols
  - Bloodborne Pathogens
    - Needlesticks, sharps injuries
  - **Infectious & Bloodborne**
    - **Splashes, splatters**



Hierarchy of Controls

- Modes of Prevention
  - Administrative Controls, National Policy
    - Standard Precautions (1988)
    - **Needlestick Safety and Prevention Act (2000)**
    - OSHA Bloodborne Pathogens Standard (1993, 2001)
  - Engineering Controls
    - Safety-engineered sharps
  - Personal Protective Equipment (PPE)
    - Respirators, masks, goggles, gowns



Reliance on PPE: Current Upending of the Hierarchy

- Emerging Infectious Diseases, like Ebola Virus
- Reliance on PPE availability & use
- Compliance with PPE use, not well studied
- Risk Gap
  - Patient arrives to ED feeling "unwell" → gloves?
  - History, testing, diagnosis → gloves
  - Suspected or confirmed case → PPE beyond gloves indicated

Summary

- Healthcare largest work sector
- New pressures for cost containment, rushed care
- Occupational risk associated with infection, disease
- Limited published information on occupational infection
- Previous focus from national policy on engineering controls, not PPE
- Current focus from national policy on PPE, not engineering controls

Research

Study Aims

- Examine impact of national policy on mucotaneous splash and splatter incidents (MSSIs) for differences between:
  - Hospital risk area
  - PPE use
  - PPE type

Methods

Data

- Exposure Prevention Information Network (EPINet)
  - University of Virginia International Healthcare Worker Safety Center
- 68 U.S. Hospitals
- 32,000+ Incident Reports
  - Blood and Body Fluid Form

    (Mucotaneous Splash or Splatter Incident MSSI)
- 1995-2007
- Voluntary, self-report
- Pooled incident data, no hospital demographics

Dependent Variables

1. Any PPE Use
   - Any use of PPE for face for MSSI only

2. Appropriate PPE Use
   - Incident-type of PPE and report of specific MSSI type (eyes, nose, mouth)
     - If nose incident, employee was wearing mask or faceshield

Independent Variables

- Hospital Area
  - High = labor/delivery, ED, OR, patient room
  - Low = outside patient room, lab, autopsy, clinic
  - *A priori* from literature
- Time Period
  - Pre-NSPA (1995-1999)
  - NSPA (2000-2002) Reference Period
  - Post-NSPA (2003-2007)

Results: Hypothesis 1

Healthcare workers that report an MSSI are wearing *any* PPE more in high risk hospital areas than in low risk hospital areas

The Frequency of Eyes, Nose, Mouth MSSI by Hospital Area during the Study Period 1995-2007

	Low Risk	High Risk	Total
Eyes	1,316	2,680	3,996 (79%)
Nose	113	197	310 (6%)
Mouth	266	466	732 (15%)
Total	1,695 (34%)	3,343 (66%)	5,038 (100%)

The Frequency of PPE Use by Hospital Area during the Study Period 1995-2007

	Low Risk	High Risk	Total
Eyeglasses	278	593	871 (39%)
Side Shield	6	30	36 (2%)
Goggles	65	163	228 (10%)
Faceshield	46	190	236 (10%)
Mask	178	707	885 (39%)
Total	573 (25%)	1,683 (75%)	2,256 (100%)

Logistic Regression of Each PPE Type by Hospital Area for the Study Period 1995-2007

	OR	95% CI
ANY PPE	1.53	(1.35, 1.72)
Eyeglasses	1.03	(0.88, 1.20)
Sideshield	1.97	(1.78, 2.57)
Goggles	0.95	(0.71, 1.29)
Faceshield	1.51	(1.78, 2.57)
Mask	2.14	(1.63, 1.82)

*Low Risk Hospital Area is the Referent Group

Hypothesis 1: TRUE

- Eye incidents are the most frequent; twice as frequent in high risk areas
- Eyeglasses & masks are most frequently worn PPE
- Higher odds in high risk areas that:
  - Any PPE is worn
  - Mask & eyeglasses with sideshields are worn

Results: Hypothesis 2

Healthcare workers who experience MSSI wear *appropriate* PPE more in high risk hospital areas than in low risk hospital areas

Frequency of MSSI Type by Appropriateness of PPE Use for the Study Period 1995-2007

	Eyeglasses	Side Shield	Goggles	Faceshield	Mask	ALL
Eyes: Low Risk	149	5	27	28		209 (22%)
High Risk	360	23	101	116	N/A	579 (65%)
Nose: Low Risk				5	9	14 (2%)
High Risk	N/A	N/A	N/A	9	15	24 (3%)
Mouth: Low Risk				4	6	10 (2%)
High Risk	N/A	N/A	N/A	12	18	30 (3%)
						887 (100%)

Logistic Regression of MSSI by type and *Appropriate* PPE for High and Low* Risk Hospital Area

	OR	(95% CI)
Appropriate PPE	1.58	(1.40, 1.78)
Eyes	1.41	(1.18, 1.68)
Nose	0.98	(0.47, 2.14)
Mouth	1.71	(0.80, 4.00)

*Low Risk Hospital Area is the Referent Group

Hypothesis 2: TRUE

- Higher odds that:
  - Appropriate PPE is worn in high risk areas
  - Mask is appropriately worn in high risk areas
  - Appropriate PPE was worn during the NSPA Time Period (not before or after)

Discussion

Scientific Curiosity

Expected	Not Expected
• PPE worn more frequently in high risk areas • Masks worn most frequently in high risk areas	• No difference between MSSI and PCSI after National Policy • Eyeglasses worn with greater odds in high risk areas, eyeglasses not however considered PPE • PPE less appropriately worn in low risk areas

Comparisons to Published Literature & Policy

Support	Refute
• Eyeglasses worn most frequently in OR • PPE compliance is poor • MSSIs occurring because of poor PPE use	• Low risk hospital areas are NOT lower occupational risk • Needlesticks did NOT decline compared to MSSIs • MSSIs are NOT occurring infrequently

Contributions to Science & Policy

Implications

- Attention to low risk hospital areas
- Attention to PPE availability, use, and appropriate selection
- Attention to PPE compliance!
- Provides analysis to evaluate implications of national policy

Future Research

- More information on hospital demographics
- Availability of new engineering controls
- Role of other PPE, including gowns, gloves
- Role of other protective apparel, innovations

Thank You, Healthcare Workers

Without you, there would be no healthcare.

Stay safe, be well.

Contact Me

Amber.Mitchell@internationalsafetycenter.org

ambermitchell@luckymail.com

713-816-0013

Back Up Slides

Analysis

- Descriptive
  - Comparison of counts, ratios
  - Establish sample size/units of measure
- Preliminary
  - *t*-test, difference of means (H1)
  - Odds Ratios and 95% Confidence Intervals (H2,H3)
- Formal Test
  - Linear Regression (H1)
  - Logistic Regression (H2, H3)

Comparisons of this Research to Others

Strengths	Limitations
• Largest Dataset • Largest Timeframe • Exhaustive Analysis • Generalizability across Hospital Areas • Quantifies Exposure Risk	• Inability to calculate rates • Inability to link incident to hospital • Healthy “Hospital” Effect • Recall Bias • Reporting Bias • Incidents do not imply infection