Occupational Medicine in Health Care Facilities: Infection Prevention

Kristine Hansen-Cain, MSN, APRN

Objectives

- Role of Occupational Health Service (OHS) in health care facility
- Discuss key elements of OHS
- Case study in post-exposure program

What is Occupational Health??

- Healthcare one of the fastest growing sector in U.S. economy
- 80% of the healthcare work force is female
- 6.8 work-related injuries and illnesses for every 100 full-time employees (2011)
- The nonfatal injury / illness rate high in health care vs. construction or manufacturing
- Workplace violence and biologic exposures two growing concerns
- OHS fits worker to the job, reduces risk to worker, co-worker and patients

Occupational Safety and Health Administration. Facts About Hospital Worker Safety. https://www.osha.gov/

Roles of Occupational Health Services

- Drug testing
- Exposure care (biologic, chemical, radioactive)
- Respiratory Protection Plan
- Risk Assessment / Fitness for duty program
- Prevention programs
- Workers Compensation injury / illness care
- Disability
- Coordination with other departments
- Record keeping

Infection Prevention Hierarchy of Controls

- Hazard elimination
- Engineering controls
- Administrative control (work practices)
- Personal protective equipment

Components of OHS in Health Care Settings

1. Baseline / Health Inventory
   - Post-offer
   - Immunization update
2. Pre-exposure Program
   - Respiratory Protection / Fit testing for respirator use
   - Risk Assessment / Fitness for Duty programs
   - Surveillance / follow up programs
3. Post-exposure Program
   - Medical evaluation for all potential exposures
   - Guidance by regulatory bodies

Respiratory Protection Types of Masks

Facemasks

- Placed over nose/mouth
- Loose fitting 'barrier'
- No protection against airborne particles
- No increased work of breathing (no fit testing)
- Many types (surgical, laser, dental)

Respiratory Protection Types of Masks (con't)

Particulate (air purifying) Respirators

- Filters particles from air
- No protection against gases or vapors
- NIOSH approval
- Increases work of breathing
- Requires medical evaluation and fit testing
- Many names for NIOSH N95 (1860, 1870)

N = **N**ot resistant to oil
R = somewhat **R**esistant to oil
P = oil **P**roof
95 = filters out **95%** or airborne particles

Respiratory Protection Types of Masks (con't)

Powered Air-Purifying Respirator (PAPR)*

- Blower to force air through filters
- Creates positive pressure inside hood
- Higher level of protection
- OSHA = Assigned Protection Factor (APF)
- Requires maintenance and storage

Fit Testing for Particulate Respirator Use

- Medical evaluation prior to fit testing
- Provides "fit factor" for wearer
- Not valid with facial hair or facial deformity
- Annual and prn

Risk Assessment/Fitness for Duty Programs

- Fitness for Duty evaluates if employee is fit for performance of *essential functions* of the job
- Restrictions based on *possibility* for direct threat to self, co-workers, patients
- Strongly encouraged by American College of Occupational and Environmental Medicine

Risk Assessment/ Fitness for Duty (con't)

Characteristics of program

- Provides 'surveillance gap' between home and work
- Institutional benefit
- Other departments involved
- Service for risk reduction
- Clarifies poor performance vs. legitimate health concern
- Must have written policy*

Risk Assessment/Fitness for Duty Programs (con't)

Documentation

- Full duty or restricted duty – document specifically
- Do *not* specify illness (duty status only)
- Employee/Manager to receive copy
- Clear medical notes

Benefits of OHS Provider on site

- Knowledgeable about work environment
- Better able to review job description
- Established relationships with other departments
- Cost effective

Risk Assessment / Fitness for Duty (con't)

35 y/o female presents, no PMH, no medications, nonsmoker, URI for 4 days. Husband, 2 young children well. No known exposure. No travel. Immunization UTD. PCP diagnoses viral illness.

Cough worse and she comes to clinic wondering if she is safe as RN on Medical Surgical Floor

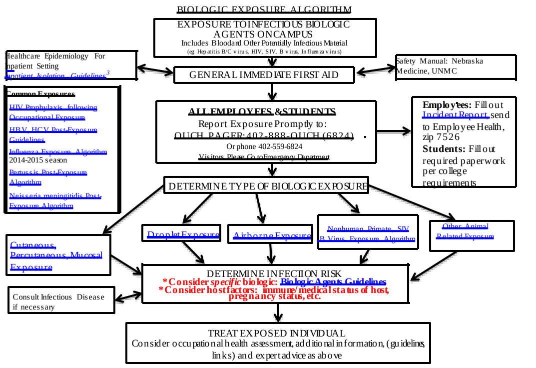
Table 3. Continued

Disease/problem	Work restriction	Duration	Category
Measles			
Active	Exclude from duty	Until 7 days after the rash appears	IA
Postexposure (susceptible personnel)	Exclude from duty	From 5th day after 1st exposure through 21st day after last exposure and/or 4 days after rash appears	IB
Meningococcal infections	Exclude from duty	Until 24 hours after start of effective therapy	IA
Mumps			
Active	Exclude from duty	Until 9 days after onset of parotitis	IB
Postexposure (susceptible personnel)	Exclude from duty	From 12th day after 1st exposure through 26th day after last exposure or until 9 days after onset of parotitis	II
Pediculosis	Restrict from patient contact	Until treated and observed to be free of adult and immature lice	IB
Pertussis			
Active	Exclude from duty	From beginning of catarrhal stage through 3rd wk after onset of paroxysms or until 5 days after start of effective antimicrobial therapy	IB
Postexposure (asymptomatic personnel)	No restriction, prophylaxis recommended		II
Postexposure (symptomatic personnel)	Exclude from duty	Until 5 days after start of effective antimicrobial therapy	IB

Post-Exposure Programs

Biologic Exposure Algorithm
Case Study

- Medical facilities increasingly complex
- Improve efficiency
- Develop clinician understanding
- Prevent delayed reporting
- Coordinate with Safety, Infection Prevention
- Track outcomes


BIOLOGIC EXPOSURE ALGORITHM
EXPOSURE TO INFECTIOUS BIOLOGIC AGENTS ON CAMPUS
Includes Blood and Other Potentially Infectious Material
(eg Hepatitis B/C virus, HIV, SIV, B virus, Influenza virus)
Healthcare Epidemiology For Inpatient Setting
Inpatient Isolation Guidelines[3]
GENERAL IMMEDIATE FIRST AID
Safety Manual: Nebraska Medicine, UNMC
Common Exposures
HIV Prophylaxis following Occupational Exposure
HBV, HCV Post-Exposure Guidelines
Influenza Exposure Algorithm 2014-2015 season
Pertussis Post-Exposure Algorithm
Neisseria meningitidis Post-Exposure Algorithm
ALL EMPLOYEES & STUDENTS
Report Exposure Promptly to:
OUCH PAGER: 402-888-OUCH (6824)
Or phone 402-559-6824
Visitors Please Go to Emergency Department
Employees: Fill out Incident Report, send to Employee Health, zip 7526
Students: Fill out required paperwork per college requirements
DETERMINE TYPE OF BIOLOGIC EXPOSURE
Cutaneous, Percutaneous, Mucosal Exposure
Droplet Exposure
Airborne Exposure
Nonhuman Primate, SIV B Virus Exposure Algorithm
Other Animal Related Exposure
DETERMINE INFECTION RISK
*Consider specific biologic: Biologic Agents Guidelines
*Consider host factors: immune/medical status of host, pregnancy status, etc.
Consult Infectious Disease if necessary
TREAT EXPOSED INDIVIDUAL
Consider occupational health assessment, additional information, (guidelines, links) and expert advice as above

1. New York State Department of Health. HIV Clinical Resource: HIV Prophylaxis Following Occupational Exposure. MMWR (2014).
2. Updated US Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV: Recommendations for Post-Exposure Prophylaxis. MMWR June 2001/Vol 50/No RR 11.
3. Seigel, JD, Rhinehart E, Jackson M, Chiarello, L and the Healthcare Infection Control Practices Advisory Committee. (2007) Guidelines for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings.

Airborne Exposures - Definitions:

Patient care: Exposure to a patient with an airborne communicable* disease. Examples of infectious agents transmitted by airborne route: *Mycobacterium tuberculosis*, rubeola (measles), varicella-zoster virus (chickenpox), smallpox, anthrax spores.

Laboratory: Unprotected exposure to a patient or animal with an airborne communicable disease, or an aerosolized source of particles (eg, a centrifuge). Consider all moderate or high risk exposures defined below as true exposures. Minimal risk exposures to highly pathogenic organisms should also be treated as a true exposure.

Airborne Exposures — (Definitions Con't)

1. Exposure must be unprotected.
Example: A healthcare worker enters a Tuberculosis isolation room wearing a properly fitted N95 mask. This exposure is protected.
Example: A healthcare worker enters a Tuberculosis isolation room wearing a surgical mask. This exposure is not protected.

2.Exposed individual must be nonimmune.
Example: A healthcare worker enters the room of a patient with disseminated varicella-zoster virus. The health care worker has a previous history of chickenpox or a positive varicella-zoster antibody titer. This HCW is immune.
Example: A healthcare worker enters the room of a patient with disseminated varicella-zoster virus. The health care worker has no previous history of clinical chickenpox infection or vaccination. Varicella-Zoster antibody titer is performed and is negative. This patient is nonimmune.

Airborne Exposures (con't)

TABLE 1B: Risk Stratification of Assessment of Aerosolized Exposures to Infectious Agents

Moderate- or high-risk exposures

1. While not wearing a respirator, direct splash of an infectious agent or aerosolization of a dried agent outside the biological safety cabinet (BSC)

2. While not wearing a respirator, exposure from centrifuge accident with viable organisms

3. Break in respiratory protection in an environment with an infectious agent or infected animal, and agent likely to be aerosolized and an inadequate suit air current (air entered into protective suit in BSL-4 laboratory).

(Rusnak et al. "Management Guidelines for Laboratory Exposure to Agents of Bioterrorism." JOEM volume 46, number 8, August 2004)

Airborne Exposures (con't)

TABLE 1B: Risk Stratification of Assessment of Aerosolized Exposures to Infectious Agents

Minimal-risk exposures:

1. Exposure to culture not likely to aerosolize, such as dropping culture plates and losing lids

2. Exposure from a splash or spill *inside* the BSC of an agent *likely to be viable*, and while not wearing a respirator

3. Exposure from a splash or spill *outside* the BSC of agent *unlikely to be viable*, without appropriate respiratory protection (respirator)

4. Exposure to equipment (outside the BSC) that may have been exposed to agent when under the BSC (excluding a dried agent that could be aerosolized easily)

(Rusnak et al. "Management Guidelines for Laboratory Exposure to Agents of Bioterrorism." JOEM volume 46, number 8. August 2004)

Airborne Exposures (con't)

TABLE 1B: Risk Stratification of Assessment of Aerosolized Exposures to Infectious Agents

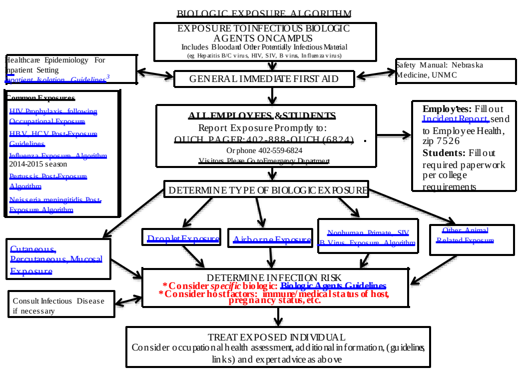
Negligible-risk exposures

1. Aerosolized exposure to a solution or liquid *highly unlikely to be infectious*.

No-risk exposure

1. Exposure to unknown material, later verified not infectious (and no other identifiable risk factors for exposure).
2. A break in respiratory protection in an environment without an infectious agent or infected animals.
3. No discernible increased risk than would normally occur from entering a biosafety laboratory (used appropriate personal protective measures and no breaches in laboratory technique).

(Rusnak et al. "Management Guidelines for Laboratory Exposure to Agents of Bioterrorism." JOEM volume 46, number 8. August 2004)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Biologic Agents Guidelines

Agent: Hepatitis E Virus (HEV)

Disease Manifestations:
HEV generally causes a self-limited acute infection with an incubation period from 15 to 60 days. Jaundice, malaise, anorexia, nausea, vomiting, abdominal pain, fever, and hepatomegaly may be seen in acute infection. Chronic HEV has been described in the setting of organ transplantation and potent immunosuppression. Fulminant hepatitis is more likely in those who are pregnant and in those who are malnourished or have pre-existing liver disease.

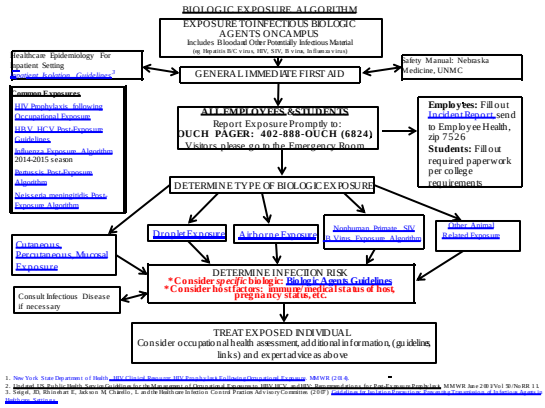
Mechanism of Transmission:
HEV is transmitted primarily through fecal-oral routes. Large scale outbreaks have been associated with contaminated water sources. Person-to-person transmission is uncommon. HEV can be transmitted by blood transfusion, particularly in endemic areas.

Post-Exposure Prophylaxis Treatment:
Treatment is supportive. Little information exists regarding the efficacy of pre- or post-exposure immune globulin prophylaxis for the prevention of HEV. The diagnosis is based upon the detection of the HEV genome in serum or feces by polymerase chain reaction (PCR) or by the detection of IgM antibodies to HEV.

Vaccine Available:
An effective vaccine against HEV has been developed but is not yet commercially available.

Isolation/Quarantine/Decontamination:
HEV is classified as Biosafety Level-2 pathogen. Wear PPE: masks, laboratory coats, gloves.

Additional Information:
Recommend Infectious Disease Consult



1. New York State Department of Health. HIV Clinical Resource. HIV Prophylaxis Following Occupational Exposure. MMWR (2013).
2. Hadler SC, Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV, Recommendations for Post-Exposure Prophylaxis. MMWR June 29 (RR-9);Vol 50/No RR 11.
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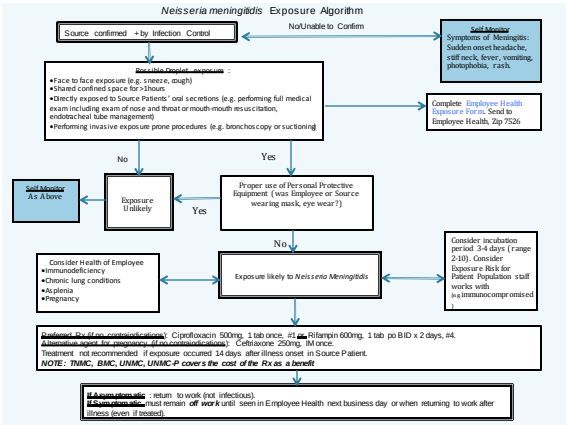

Conclusion

- HCPs work in unpredictable environment and are often viewed as "immune" to injury or illness
- Non-occupational programs may help risk reduction
- An integrated, one point of access approach may improve post-exposure reporting and timely medical follow up

References

- 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (Appendix A) Siegel JD, Rhinehart E, Jackson M, Chiarello L, and the Healthcare Infection Control Practices Advisory Committee. http://www.cdc.gov/ncidod/dhqp/pdf/isolation2007.pdf
- Hospital Respiratory Protection Toolkit, 2015. https://www.osha.gov/Publications/OSHA3767.pdf
- Center for Disease Control. Guidelines for infection control for health care personnel 1998, Bolyard E, et al. AJIC: American Journal of Infection Control (1998:26:289-354) (Table 3; summary of suggested work restrictions for HCW with exposure or infection to communicable illness)