



Preventing Employee Infections

Basics of Infection Prevention

2-Day Mini Course

November 2017





Objectives

- Identify integral elements of employee health (EH) program and infection prevention
- Apply protection principles of personnel and other patients from patients with infections
- Immunization of health care personnel, general recommendations
- Review prophylaxis and follow-up after exposure, general recommendations
- Describe personnel restriction because of infectious illnesses or special conditions, general recommendations
- Provide support for the prevention of nosocomial transmission of selected infections



Integral elements of employee health (EH) program and infection prevention

- Healthcare workers may be both:
 - Recipients of infections from patients
 - Carriers of infections to patients
- EH Activities
 - ✓ Focus is on the employee
 - ✓ Provide a safe working environment
 - ✓ Provide the necessary tools and knowledge for employee to do their job safely.
 - ✓ Promote health and well-being of employee.

The most crucial aspect is to keep both patients and health care workers safe and infection free



EH Activities

Pre-employment

- Physical
- Communicable disease screening- immunity by titer or vaccine history
- Drug screening
- Latex allergy screening
- TB screening
- Respirator Fit-testing

Annual

- TB testing
- Vaccines
 - Annual influenza
 - Tdap
- Respirator Fit testing

Education



EH Activities, continued

- Infectious disease exposure investigations
- Post-exposure management
- Counseling
 - Infectious disease exposure risk
 - Work restrictions
 - Latex Allergies
- Wellness promotion
 - Ergonomic worksite evaluation
 - Smoking cessation
 - BP Checks
 - Bloodborne pathogen injury prevention



Protection principles of personnel and other patients from patients with infections

Centers for Disease Control and Prevention
MMWR
Recommendations and Reports / Vol. 60 / No. 7

Morbidity and Mortality Weekly Report
November 25, 2011

Immunization of Health-Care Personnel Recommendations of the Advisory Committee on Immunization Practices (ACIP)

Healthcare Worker (HCW) Immunization



Continuing Education Examination available at <http://www.cdc.gov/mmwr/cme/conted.html>.



U.S. Department of Health and Human Services
Centers for Disease Control and Prevention



Healthcare Worker (HCW) Immunization

Healthcare Personnel Vaccination Recommendations¹

Vaccine	Recommendations in brief
Hepatitis B	Give 3-dose series (dose #1 now, #2 in 1 month, #3 approximately 5 months after #2). Give IM. Obtain anti-HBs serologic testing 1–2 months after dose #3.
Influenza	Give 1 dose of influenza vaccine annually. Give inactivated injectable vaccine intramuscularly or live attenuated influenza vaccine (LAIV) intranasally.
MMR	For healthcare personnel (HCP) born in 1957 or later without serologic evidence of immunity or prior vaccination, give 2 doses of MMR, 4 weeks apart. For HCP born prior to 1957, see below. Give SC.
Varicella (chickenpox)	For HCP who have no serologic proof of immunity, prior vaccination, or history of varicella disease, give 2 doses of varicella vaccine, 4 weeks apart. Give SC.
Tetanus, diphtheria, pertussis	Give a dose of Tdap as soon as feasible to all HCP who have not received Tdap previously and to pregnant HCP with each pregnancy (see below). Give Td boosters every 10 years thereafter. Give IM.
Meningococcal	Give 1 dose to microbiologists who are routinely exposed to isolates of <i>N. meningitidis</i> and boost every 5 years if risk continues. Give MCV4 IM; if necessary to use MPSV4, give SC.

Hepatitis A, typhoid, and polio vaccines are not routinely recommended for HCP who may have on-the-job exposure to fecal material.

Immunization Action Coalition

Technical content reviewed by CDC

www.immunize.org/catg.d/p2017.pdf



Employee Exposure Investigations

Warranted when staff are exposed to infectious diseases

Is it...

➤ patient-to-staff or

➤ visitor-to-staff

1. Evaluate type of exposure and risk of transmission
2. Make list of who was exposed: staff, patients visitors
3. Evaluate need for post-exposure management
 - Prophylaxis
 - Vaccination
 - TB skin testing
4. Determine if local public health or state should be notified



Preventing HCW Bloodborne Pathogen (BBP) exposure

- Standard Precautions mandatory
- HBV vaccination series offered to all staff with potential for blood exposure
- Hierarchy of prevention methods applies
 - Engineering controls: needless devices
 - Work practice controls – no recapping
 - Appropriate cleaning, linen-handling, disposal of sharps
- BBP Training required upon hire, annually and as needed
- Facilities must have a BBP Exposure Control Plan
 - Employees must be given opportunity to contribute to product evaluation for sharps safety
- Post-exposure prophylaxis (PEP) immediately available



Selecting Safety designed sharps

- ▶ Needlestick Prevention Act 2001
- ▶ Review your Exposure Log for trends
- ▶ Search top sharp manufacturers for devices available, work with MM
- ▶ Conduct trials for staff input.
- ▶ Work with Nursing Leadership for final selection and implementation.



BLOODBORNE PATHOGENS

STANDARD PRECAUTIONS FOR THOSE EXPOSED TO BLOOD OR OTHER POTENTIALLY INFECTIOUS MATERIALS IN THEIR OCCUPATION

PROTECT YOURSELF

ALL BLOOD AND BODILY FLUID MUST BE TREATED AS IF THEY WERE INFECTED WITH:

- HUMAN IMMUNODEFICIENCY VIRUS (HIV) WHICH FREQUENTLY LEADS TO AIDS.
- HEPATITIS B VIRUS (HBV).
- OTHER BLOODBORNE PATHOGENS (MICROORGANISMS FOUND IN HUMAN BLOOD WHICH CAN CAUSE DISEASE).

KNOW THE RULES

BE FAMILIAR WITH YOUR ORGANIZATION'S EXPOSURE CONTROL PLAN.

MAKE SURE YOU KNOW:

- VACCINATION REQUIREMENTS
- PROCEDURES
- PRACTICES
- PROPER REPORTING REQUIREMENTS FOR INCIDENTS OF EXPOSURE.



KNOW YOUR COLORS

- RED BAGS OR CONTAINERS DON'T NEED TO BE LABELED - THEIR COLOR INDICATES THEY MAY CONTAIN BIOHAZARDS.
- FLUORESCENT ORANGE-RED LABELS AND SIGNS WITH CONTRASTING LETTERING OR SYMBOLS ARE APPROPRIATE

READ ALL LABELS AND SIGNS

WEAR THE RIGHT EQUIPMENT



PROPER PROCEDURE CAN REDUCE YOUR RISK OF INFECTION TO ZERO

WASH HANDS



AND FOLLOW SAFE HYGIENE AND WORK PRACTICES.

DISPOSE OF NEEDLES IN APPROPRIATE CONTAINERS.



FOLLOW PROPER DISPOSAL PROCEDURES.

CONTAMINATED LAUNDRY AND PERSONAL PROTECTIVE EQUIPMENT SHOULD BE DISPOSED OF IN PROPERLY DESIGNATED AREAS.



KEEP IT CLEAN

CLEAN WORKSITE AND DECONTAMINATE EQUIPMENT. FOLLOW ALL SAFE HANDLING PROCEDURES.

DON'T FORGET

ALL BODY FLUIDS SHOULD BE HANDLED AS IF POTENTIALLY INFECTIOUS.



Post Exposure BBP Diseases:

Risk for transmission in healthcare settings

Hepatitis B Virus (HBV)

- 1-6 % if e-antigen negative (HBeAg-)
- 22-30% if e-antigen positive (HBeAg+)

Hepatitis C Virus (HCV)

- 1.8%, range 0-7%

Human Immunodeficiency Virus (HIV)

- 0.3% (1 in 300 exposures), range 0.2%-0.5%

Less common or rare BBP

- Syphyilis
- Malaria
- Viral hemorrhagic diseases
- Leptospirosis
- Prion diseases

Body Fluid Exposure Risk

Higher risk body fluids

- Blood
- Amniotic fluid
- Peritoneal fluid
- Cerebrospinal fluid
- Pleural fluid
- Vaginal fluid/Semen
- Any body fluid with visible blood (saliva after dentist)

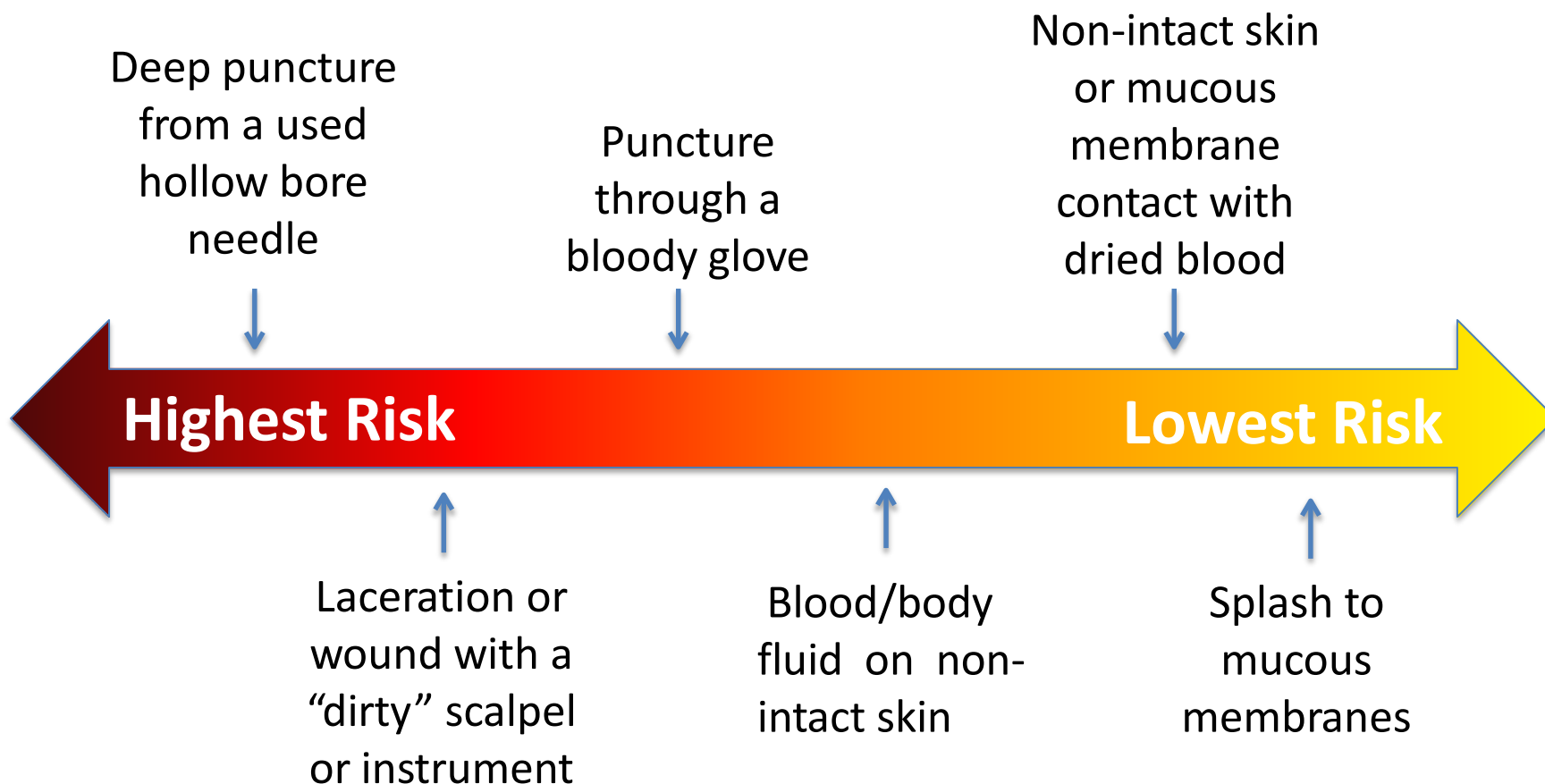
Low/No Risk* body fluids

- Sweat
- Tears
- Feces
- Saliva
- Urine

* Unless visibly contaminated with blood

Exposure Risk by Injury Type:

Infection risk is dependent on type of exposure



BBP Post-exposure Management: Assessing Infection Risk

- Type of exposure
 - Percutaneous
 - Mucous membrane
 - Non-intact skin
 - Bites resulting in blood exposure
 - Depth, quantity, or duration of exposure
- Body fluid
 - Blood, tissue, or other bodily fluid
- Assess viral load of source
 - HBsAg
 - HCV antibody
 - HIV antibody
- If source unknown, assess epidemiologic and clinical evidence to determine post-exposure treatment





BBP Disease Post-exposure Management

Emergency Response Procedures

Immediate care: Provide first aid and care per Emergency Response Plan*(Eyewash, shower, soap and water , incident protocol)



Reporting: Report incident to your supervisor



Medical Attention: Employee Health OR
Emergency Room



Reporting: File an incident report with the
Biosafety Office



Follow-up: healthcare professional's
written opinion, testing

Emergency Response -Eyewash

If blood or body fluid splashes in the eye , immediately go to the eyewash

Hold or have someone hold open both your eyelids

Wash eyes for at least 15 minutes

Notify supervisor

Seek medical attention for evaluation of exposure

Complete incident report



Emergency Response- Needlestick

Remove any contaminated or torn PPE

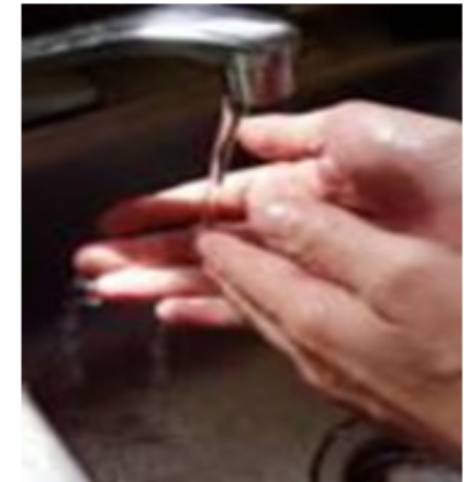
Wash area and hands for 15 minutes with soap and warm water

Notify supervisor

Seek medical attention

Complete an incident report

Follow-up with healthcare provider



Spill Clean Up

Notify others of the spill and let aerosols settle for 15 minutes

Discard contaminated PPE and put on new PPE

Prevent/Control spreading with absorbent material

Apply disinfectant and allow to work; then collect residues

Decontaminate area and equipment

Complete an incident report





BBP Post-exposure Management: Medical Evaluation

- Immediate testing:

Source	Employee
Rapid HIV	Rapid HIV
HBsAG	HBsAB (if status unknown)
Hepatitis C Antibody	Hepatitis C Antibody
	Hepatic Function Panel

- Employee follow up:
 - At 6 & 12 weeks and 6 months (4 months with newer PEP therapies)
 - Test for HCV antibody, HIV, liver function



Post-exposure Prophylaxis for Hepatitis B

Vaccination and antibody status of <u>Exposed</u>	Treatment for <u>Employee</u> when <u>source is HBsAg-</u>	Treatment for <u>Employee</u> when <u>source is HBsAg+</u>
Unvaccinated	Initiate Hepatitis B vaccine series	HBIG x1 & initiate Hepatitis B vaccine series
Previously Vaccinated:		
Known Responder	No treatment	No treatment
Known-non-responder	If known high risk source, treat as if source were HBsAg positive	HBIG x1 & initiate re-vaccination –or– HBIG x 2
Antibody Response unknown	Test exposed person for anti-HBs 1. If adequate, no treatment 2. If inadequate vaccine booster and recheck titer in 1-2months	Test exposed person for anti-HBs 1. If adequate, no treatment 2. If inadequate HBIG x1 & vaccine booster



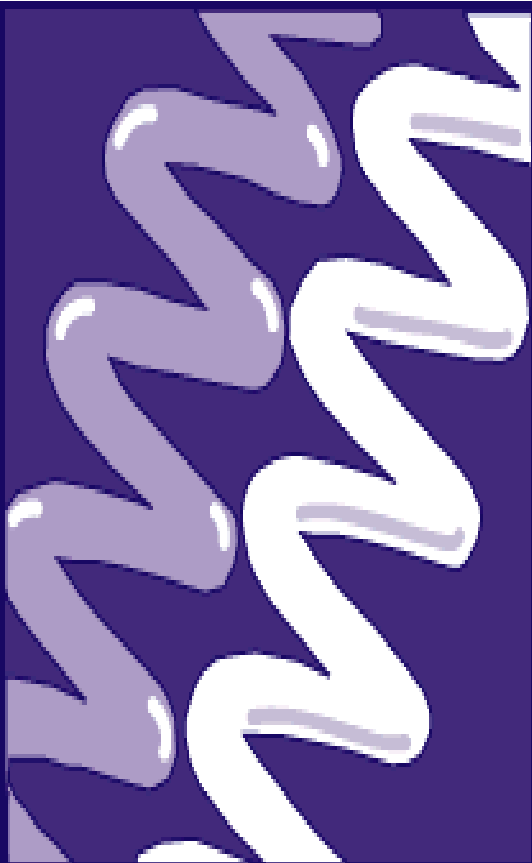
Post-exposure Prophylaxis for Hepatitis C

- Prompt wound care or flushing of mucous membranes
- Prophylaxis not recommended
 - Immunoglobulin not effective
 - No data support use of antivirals (e.g. interferon) for preventing infection; may be effective only with established infection
 - Antivirals not FDA-approved for this setting
- Consider expert consultation



Post-exposure Prophylaxis for HIV

- If indicated, send to MD for assessment for PEP management as soon as possible after exposure
 - Regard as an urgent medical concern; hours rather than days
 - Ensure CBC, liver panel, pregnancy test done prior to initiation of meds
 - Provide counseling about potential side effects of medications
 - Monitor for potential toxicity
- Interval after which PEP is no longer effective is unknown
 - Initiating days or weeks after exposure might be considered for higher risk exposure



National Clinicians' Post-Exposure Prophylaxis Hotline (**PEpline**)

Free consultation for clinicians treating occupational exposures to HIV and other BBPs

- 9:00 am – 2:00 am
- 7 days a week
- 1-888-HIV-4911

nccc.ucsf.edu/clinician-consultation/post-exposure-prophylaxis-pep/

PEpline

Joint program of UCSF/SFGH Supported by HRSA and CDC



Prevention of Airborne Transmissible Diseases (ATD) in HCW

Risk reduction strategies include

- Follow Standard precautions
 - Routinely wear mask if patient coughing or has uncontained respiratory secretions
- Cough etiquette by patients, visitors, health care workers
- Apply mask on ill/coughing person for source control
- TB screening upon hire and annually
- Annual influenza vaccination
- Comply with Aerosol Transmissible Disease (ATD) Standard

Pulmonary Tuberculosis (TB)

- Caused by bacteria *Mycobacterium tuberculosis*
- **A**cid **F**ast **B**acilli (**AFB**) can be seen on a stained slide
- Serious chronic illness; can be fatal if untreated
- Transmitted by airborne route
 - Patient contact not required for exposure
 - Droplets can stay afloat for hours and travel on air currents
- Likelihood of transmission affected by
 - infectiousness of patient
 - environmental conditions
 - duration of exposure
 - Most persons exposed do not become infected

AFB smear



AFB (shown in red) are tubercle bacilli

Transmission of TB

- Increased risk of transmission
- From infection person with
 - Forceful cough
 - Acid-fast bacilli (AFB) in sputum
 - Laryngeal disease
 - Cavitation on chest xray
- Undergoing cough-inducing procedures
- In small closed spaces with poor ventilation
- Failing to cover nose/mouth when coughing





CDC Tuberculosis (TB) Transmission
and Pathogenesis Video

Risk of TB Infection and Disease

Highest Risk for Infection

- Medically under-served, low income
- High-risk minority populations
- Persons who inject drugs
- Close contacts to suspect/ known cases
- Foreign-born from high prevalence areas
- Healthcare workers serving high risk patients

Highest Risk for Progression to Disease

- HIV infected, or otherwise immune compromised
- Recently infected with TB
- Certain chronic medical conditions
- IV drug abusers
- History of inadequately treated TB
- Stressors, such as recent immigration

Annual TB Testing

- Identifies health care workers newly infected with TB
 - Enables prompt treatment to minimize risk of respiratory disease



- Serves as an ongoing evaluation for effectiveness of TB prevention strategies
 - May identify improvement needs in control measures



TB Risk Assessment

- Determine HCW to be included in annual TB screening program
 - Annual skin testing
 - Review symptoms with previously positive employees
 - Annual chest xray not required
- Determine HCW to be included in Respiratory Protection Program, require fit testing
- Identify areas with increased risk for TB transmission
- Assess if adequate number of Airborne Infection Isolation Rooms
- Conduct periodic reviews of TB prevention strategies



Airborne Transmissible Disease (ATD) Standard

- Applies to all health care settings Includes
 - Hospitals
 - Skilled nursing facilities
 - Hospices
 - Private medical offices
 - Paramedic and emergency services
 - And many others
- Exceptions: dental offices and outpatient settings where ATDs are not diagnosed or treated



ATD Requirements

- Written ATD Plan
- Policies & Procedures addressing ATD
 - Education & training for prevention
 - TB Screening
 - Post exposure management
- Provide seasonal influenza vaccination to all employees with potential for occupational exposure
- Engineering controls for management of patients with ATDs
- Fit testing for respiratory protection
- Maintenance of employee health records

RESPIRATORY PROTECTION

Filters to 1 micron
Effective rate 11.05 to
97.86 (brand dependent)



SURGICAL MASK

Filters to 0.5 micron
Effective rate 98.4- 99.8 (NIOSH)
Requires fit testing



N- 95 RESPIRATOR

Additional options

- Antiviral mask
- Influenza only



BioMask



PAPR

ATD Requirements – Engineering Controls

- Airborne Infection Isolation Room (AIIR)
 - 12 air exchanges per hour (ACH)
AND
 - Daily verification of negative pressure (via smoke stick or flutter test) while room is occupied

Powered Air Purifying Respirators (PAPR) for **high hazard procedures**

- Includes sputum induction, bronchoscopy, intubation, open system suctioning, aerosolized nebulizer treatment





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Subchapter 7. General Industry Safety Orders
Group 16. Control of Hazardous Substances
Article 109. Hazardous Substances and Processes

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§5199. Appendix A.

**ATD Standard Appendix A:
Specifies diseases that require
airborne or droplet precautions**

Appendix A – Aerosol Transmissible Diseases/Pathogens (Mandatory)

This appendix contains a list of diseases and pathogens which are to be considered aerosol transmissible pathogens or diseases for the purpose of Section 5199. Employers are required to provide the protections required by Section 5199 according to whether the disease or pathogen requires airborne infection isolation or droplet precautions as indicated by the two lists below.

Diseases/Pathogens Requiring Airborne Infection Isolation

Aerosolizable spore-containing powder or other substance that is capable of causing serious human disease, e.g. Anthrax/*Bacillus anthracis*
Avian influenza/Avian influenza A viruses (strains capable of causing serious disease in humans)
Varicella disease (chickenpox, shingles)/Varicella zoster and Herpes zoster viruses, disseminated disease in any patient. Localized disease in immunocompromised patient until disseminated infection ruled out
Measles (rubeola)/Measles virus
Monkeypox/Monkeypox virus
Novel or unknown pathogens
Severe acute respiratory syndrome (SARS)
Smallpox (variola)/Variola virus
Tuberculosis (TB)/*Mycobacterium tuberculosis* -- Extrapulmonary, draining lesion; Pulmonary or laryngeal disease, confirmed; Pulmonary or laryngeal disease, suspected
Any other disease for which public health guidelines recommend airborne infection isolation

Diseases/Pathogens Requiring Droplet Precautions

Diphtheria pharyngeal
Epiglottitis, due to *Haemophilus influenzae* type b
Haemophilus influenzae Serotype b (Hib) disease/*Haemophilus influenzae* serotype b -- Infants and children
Influenza, human (typical seasonal variations)/influenza viruses
Meningitis
Haemophilus influenzae, type b known or suspected
Neisseria meningitidis (meningococcal) known or suspected
Meningococcal disease sepsis, pneumonia (see also meningitis)
Mumps (infectious parotitis)/Mumps virus
Mycoplasmal pneumonia
Parvovirus B19 infection (erythema infectiosum)
Pertussis (whooping cough)



ATD Standard in Facilities Other than Hospitals

Many health care facilities are not equipped to care for persons ill with an ATD

- If a resident develops respiratory illness
 - Transfer within 5 hours
 - Do not transfer if detrimental to resident's condition
- In absence of AIIR, place ill patient in single room with door closed
 - May cohort with other ill patients
 - Employees wear an N95 respirator to enter



ATD Standard in Outpatient Settings

- Outpatient clinics do not provide same level of care as inpatient settings
 - Shorter duration of exposure
- Apply ATD Standard to extent feasible
 - Place person in separate room or area
 - Provide separate ventilation or filtration
 - Source control is primary; mask patient
 - In absence of source control, employee must wear N95 respirator or above when entering room or area



References and Resources

- California Code Regulations, Title 8, Section 5193 (BBP ECP)
- CAL-OSHA ATD Standard <http://www.dir.ca.gov/title8/5199.html>
- CDC Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Setting
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5417a1.htm?s_cid=rr5417a1_e
- Cal/OSHA Guidance for the 2010-2011 Influenza Season regarding the Application of the Aerosol Transmissible Diseases Standard (Issue Date: 11/5/2010)
- [PEPline at http://nccc.ucsf.edu/clinician-consultation/post-exposure-prophylaxis-pep](http://nccc.ucsf.edu/clinician-consultation/post-exposure-prophylaxis-pep); telephone 888-448-4911
- Joint Guidelines for Prevention and Control of Tuberculosis in CA Long Term Health Facilities. California Department of Public Health www.cdph.ca.gov/
- <http://stacks.cdc.gov/view/cdc/20711>



References and Resources

- *Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV and HIV and Recommendations for Postexposure Prophylaxis*, CDC, MMWR, June 29, 2001 / Vol 50 / No. RR-11
- Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HIV and Recommendations for Postexposure Prophylaxis. (2013). <http://stacks.cdc.gov/view/cdc/20711>



Questions?
Thank you

