Life Threatening Vocational Hazards Diseases and Toxins
INTRODUCTION

• What is the blood-borne pathogens standard? 29CFR 1910.1030
• Who needs blood-borne pathogens (BBP) training?
• What content needs to be included?
OSHA’s Standard

• The Big 3 are:
  1. Hepatitis B (HBV)
  2. Hepatitis C (HCV)
  3. Human Immunodeficiency Virus (HIV)

Workers exposed to blood-borne pathogens are at risk for serious or life-threatening illnesses.
OSHA’S EXPECTATIONS

• Employers Duties
  – identify job risks and classify
  – provide appropriate training
  – provide a plan
  – provide appropriate equipment

• Employees Duties
  – follow employer’s plan
  – know job classification
  – complete training
  – use equipment provided by employer
BLOOD-BORNE PATHOGENS DEFINED

- Disease-causing microorganisms that may be present in human blood or OPIM (other potentially infectious material)
  - Viruses
  - Bacteria
  - Parasites
MODES OF TRANSMISSION

• Puncture wounds or cuts
• Contact (touch, splash, or spray) with blood or OPIM on:
  – mucous membrane
  – non-intact skin
    • cuts, abrasions, burns
    • acne, rashes
    • Paper cuts, hangnails
  – contaminated sharps
Objective of BBP standard is to minimize or eliminate the hazard posed by work that may expose one to blood or OPIM
OCCUPATIONAL EXPOSURE INCIDENTS

- Occupational contact with blood or OPIM is considered an exposure incident
- If an exposure occurs:
  - wash with soap & water
  - report incident
  - document incident
  - seek “immediate” medical evaluation
MEDICAL EVALUATION POST EXPOSURE

- Entitled to confidential medical evaluation
- Personal decision about blood testing
- Blood may be tested only with consent
- Blood may be stored for 90 days, while considering testing
- Interpretation of any test results occurs with health care provider
SPECIFIC BLOODBORNE PATHOGENS

- Definition
- Signs and symptoms
- Course of infection
- Prevention and control
HIV DEFINED

• HIV is Human Immunodeficiency Virus
• HIV can cause acquired immune deficiency syndrome (AIDS)
• Risk of HIV infection from a puncture injury exposure to HIV infected blood is very low -- 0.3%
SIGNS & SYMPTOMS OF HIV

• Signs and symptoms include:
  – Weight loss
  – Night sweats or fever
  – Gland swelling or pain
  – Muscle and/or joint pain

• Cannot rely on signs and symptoms to confirm if one is infected
COURSE OF INFECTION WITH HIV

• Incubation period from HIV infection to AIDS can be 8 to 10 years

• Varies greatly among individuals
HIV PREVENTION

• There is no vaccine to prevent HIV infection

• Follow Universal Precautions
HCV DEFINED

- HCV is Hepatitis C Virus
- It affects the liver
- It is most common chronic bloodborne infection in US
- Needle stick injury is only occupational risk factor associated with HCV
- Risk of HCV infection after exposure to HCV infected blood is 1.8%
- 70 to 75% of those with acute HCV infection have no symptoms
SIGNS & SYMPTOMS OF HCV

• Jaundice - yellow color to skin and whites of eyes
• Fatigue
• Headache
• Abdominal Pain
• Loss of appetite
• Nausea and vomiting
COURSE OF HCV INFECTION

• Incubation period averages 7 weeks

• Chronic liver disease may occur in 70% of those infected with HCV
HCV PREVENTION

• No vaccine exists to prevent HCV infection

• Follow Universal Precautions
HBV DEFINED

- HBV is Hepatitis B Virus
- It affects the liver
- Prevalence of HBV infection among healthcare workers is 10 times greater than HCV infection
SIGNS & SYMPTOMS OF HBV

- Jaundice - yellow color to the skin and whites of eyes
- Fatigue
- Headache
- Abdominal Pain
- Loss of appetite
- Nausea and vomiting
COURSE OF HBV INFECTION

- Incubation period averages 12 weeks
- Most cases of HBV resolve without complications
- Chronic liver disease may occur in 6 to 7% of those infected with HBV
HBV PREVENTION

• A vaccine does exist to prevent HBV infection

• Employers are required to offer HBV vaccination to employees covered under BBP standard

• Follow Universal Precautions
HBV IMMUNIZATION

- Employees with routine occupational exposure to blood/OPIM have right to HepB vaccination at no personal expense
- Employee refusal established by signing HepB vaccination declination form
- Vaccine is Energix-B
- Must be made available within 10 working days of initial assignment to job
HBV VACCINATION SCHEDULE

• Vaccine given in 3 doses over 6 months
  – 1st on initial assignment
  – 2nd one month later
  – 3rd five months after 2nd dose
• CDC recommends HepB antibody testing 1 to 2 months following 3rd dose
• Employer cannot require employee to use health insurance to cover test cost
• Pre-screening is not required
• HBV is declining because of vaccine use!
PREVENTION

• Engineering Controls

• Work Practice Controls

• Personal Protective Equipment

• Universal Precautions
ENGINEERING CONTROLS

• Design safety into work tools and work space organization

• Engineering controls can:
  – Decrease risk of exposure to hazards
  – Eliminate hazards
  – Isolate hazards
EXAMPLES OF ENGINEERING CONTROLS

- Hand and eye washing facilities
- Sharps container use
- Biohazard labeling
- Self-sheathing needles
- Needleless IV systems
CLEANING

• Clean work surfaces according to employer’s exposure control plan
• Use PPE and EPA-approved solution
• 10% bleach and water must be replaced weekly
• Place contaminated laundry in color-coded laundry bag, use PPE, and handle as little as possible
• DO NOT take contaminated materials home to launder!
Wastewater Treatment

• In addition to the diseases cited in the blood borne pathogens, diseases associated with worker exposure in WWTP’s include:
  • Hepatitis A
  • Enteric Viruses
  • Parasites
  • Mycobacteria

Wastewater Treatment

- Toxins can be introduced from industrial plants, dumping by homeowners or transportation accidents.
- PCBs, pesticides, asbestos and mercury are just some of the toxins that may find their way into the wastewater stream.
- Concentrated toxins may be received from freshwater treatment plants if filters are back-flushed into the sanitary system.
Exposure Scenarios

• The largest exposure risk is through inhalation.
• Processing wastewater may generate mists or aerosols that can contain pathogens or toxins.
• These may be inhaled. Bacteria and some enteric viruses are infectious via inhalation.
Exposure Scenarios

- Other exposure pathways involve ingestion, injection and absorption through the skin.
- Ingestion of toxins and pathogens can happen as a result of poor hygiene practices or the contamination of food and drink from splatters or aerosols.
Exposure Scenarios

• Broken skin is a pathway for many disease agents.
• However, some infectious agents can penetrate intact skin (e.g. hookworm)
• Needles and other infectious articles will be found in the grit removal system.
Exposure Scenarios

- HIV, HBV and HCV are relatively fragile compared to, for example, enteric viruses and parasites.
- Most disease agents found in wastewater have evolved to be transmitted via the fecal route.
- Most of these are susceptible to treatment processes, but some are resistant.
Exposure Scenarios

• Toxins on the other hand may not be reduced by wastewater treatment processes.

• Some volatile compounds will be stripped by exposure to air. Trickle filters and surface aeration seem to more effective at this.

• Others may be persistent, and concentrate in sludges or form scales inside pipes and tanks.
Exposure Scenarios

- Giardia and the eggs of A. lumbracoides (roundworm) are examples of highly resistant bugs.
- Sunlight (UV), dry air and air movement all serve to reduce the number of infectious organisms in the air and on surfaces.
- Some bacteria release endotoxins when killed that can themselves cause illness.
Exposure Risk

- WWTP personnel have acquired diseases and disease symptoms due to exposure at work.
- Studies have shown that antibodies are often present in the blood, showing exposure to disease causing organisms.
- The infections may be acute or sub-clinical.
Exposure Risk

• It appears that WWTP workers develop immunities to many of these disease agents.
• No significant increases in morbidity or mortality in the population of WWTP workers have been demonstrated.
• However, individual case studies show where workers were infected and fell ill.
Exposure Risk

• The risks of acquiring an illness are low, but not zero.
• Higher risk areas appear to be near aeration tanks, dewatering systems and sludge handling.
• Newer workers and workers new to a process area have higher rates of symptoms.
• This may be due to more experienced workers developed immunities.
Thank You!