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## **OSHA Bloodborne Pathogens: Infectious Diseases**



### Objectives:

- Review of OSHA Standards
- Define bloodborne pathogens
- Identify tasks involving exposure
- Discuss control measures to reduce exposure
- List various types of personal protective equipment
- Differentiate the most common types of bloodborne pathogens
- Recognize the types of body fluids that can transmit illnesses
- Outline the various modes of bloodborne pathogen transmission
- State the benefits of vaccinations
- Discuss pathogen epidemiology, transmission, and treatment
- Identify the legal issues surrounding OSHA workplace compliance

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## **OSHA Bloodborne Pathogens: Infectious Diseases**

In 1991, OSHA (Occupation Safety and Health Administration) issued in the Bloodborne pathogen standards; which must be followed in all workplaces where employees can be expected to come in contact with blood or other body fluids. The standard's requirement states what employers must do to protect workers who are occupationally exposed to blood or other potentially infectious materials (OPIM). It was revised in 2001 and included Needle Stick Safety and Prevention Act. Bloodborne pathogens are listed under Federal Law 29 CFR 1910.1030.

If your job puts you at risk, your employer must:

- Develop exposure control plan
- ***Train staff on occupational risks***
- Maintain records (training, medical, exposure)
- Update the plan annually
- Use labels and signs to communicate hazards
- Identify and use engineering controls
- Implement programs for worker protection
- Provide Hepatitis B vaccine at no cost
- Provide exam & treatment following exposure
- Make personal protective equipment available
- Provide additional protection



**Bloodborne pathogens** are defined as disease causing microorganisms, including viruses and bacteria that are present in human blood. They may cause illness in people and can be spread to another individual through contact with contaminated blood and body fluids.

Other potentially infectious materials (OPIM) we should be aware of include:

- Semen
- Vaginal fluid
- Cerebrospinal fluid
- Pleural fluid
- Saliva (in dental procedures)
- Any body fluids visibly contaminated with blood
- Amniotic fluid
- Pericardial fluid
- Peritoneal fluid
- Tissue or organ cultures



At this time the only body fluid that is not associated with any risk of transfer of bloodborne pathogens is sweat. All other fluids must be treated as though they are potentially infectious.

Examples of bloodborne pathogens include:

- HBV-Hepatitis B virus
- HCV-Hepatitis C virus
- HIV-Human Immunodeficiency virus
- Malaria
- Syphilis
- Brucellosis

In order to maintain guidelines and appropriate treatment for these infectious diseases, OSHA along with the CDC (Center for Disease Control) developed the following guidelines and recommendations. These

standards have greatly improved the safety and welfare of healthcare workers secondary to improved training and prevention measures. These compliance methods are outlined in the following categories:

- **Engineering and Work Practice Controls-** Outlines the procedures that must be used to eliminate or minimize employee exposure (example: sharps containers). Sharp containers must be puncture resistant, sealable, leak-proof and properly labeled. These containers must be readily available to the healthcare worker for easy disposal of needles and sharp objects. The containers should be closed when they are two thirds full and transported in an upright position. Recapping of needles is no longer allowed except in certain circumstances in which a mechanical device or the “scoop method” must be utilized. Breaking of contaminated needles is strictly prohibited. The use of needleless or needle protected systems is the current safety standard for healthcare facilities.
- **Personal Protective Equipment (PPE) -** The employer is responsible for providing, replacing and disposing of PPE at no cost to the employee. Employees must be trained in the proper use of personal protective equipment and the potential circumstances in which utilization of PPE is necessary. It is important to note that PPE is available in different sizes and it must fit properly to provide adequate protection. Some examples of personal protection equipment include disposable gloves, goggles, face shields, gowns, shoe covers and appropriate resuscitation devices. Contaminated PPE must be removed as soon as possible and properly disposed of in a biohazard container.
- **Housekeeping-** Employee worksite areas must be kept clean and surfaces need to be disinfected on a scheduled plan as well as after any blood or body fluid contamination. All disinfectants used must meet OSHA requirements for effective decontamination procedures. Special care also needs to be taken to adequately clean frequently touched surfaces such as doorknobs and light switches. Disposable towels used to clean up a blood or body fluid spill must be disposed of in a biohazard red bag. Any contaminated laundry should be handled as little as possible before disposal.
- **Exposure Control Plan-** This is a written plan that outlines the employer’s procedures to identify workers at risk and to eliminate or greatly minimize the possibility of exposures. Employers must update the plan annually to reflect pertinent changes that might affect occupational hazard control. The employee must be educated on the location and contents of the written plan and how to obtain a copy, if indicated.
- **Information and Training-** the employer must provide education to the worker upon initial hire on bloodborne pathogens and the methods that are utilized to control occupational exposure and, if necessary, post exposure procedures. Furthermore, workers must have the opportunity to ask questions and the material must be presented at the level of education and in the language the worker understands. This training must be reviewed on an annual basis.
- **Record Keeping-** Employers must retain a record for each employee that contains the following components---medical and training records, and a sharps injury log. An employee’s medical record must be maintained for the duration of employment, plus 30 years. The training record must be available for 3 years after training occurred and is to be accessible to the employee or OSHA upon request.
- **Use of Universal Precautions-** Designed to prevent contact with blood and other potentially infectious materials (OPIM). This is also more currently known as Standard Precautions. Standard precautions incorporates the principles of Universal Precautions (blood), and Body Substance Isolation into one policy. Standard Precautions are based on the principle that all blood or body fluids, except sweat, pose a risk of transmission of infectious agents. Standard precautions include prevention practices that involve all patients, good hand hygiene, the correct use of personal protective equipment and safe injection practices.

**ALL BODY FLUIDS ARE CONSIDERED POTENTIALLY INFECTIOUS.**

(Except sweat)

## Protect yourself:

- Hand washing (#1)
- Wear personal protective equipment: ex: Gloves to protect hands
- Masks and protective eye wear for aerosol droplets or splashes
- Gowns and aprons - when splashing could occur

## Who is at risk of exposure?

- Any employee with a reasonable chance of skin, mucous membrane, or parenteral contact with blood or other potentially infectious materials during the course of duty.

## Transmission:

-Depends on the pathogen (the organism). It generally is related to having direct contact with blood or other potentially infectious material (OPIM).



## Preventing transmission of bloodborne viruses in healthcare settings include:

Preventing transmission of bloodborne viruses in healthcare settings requires a multifaceted approach, including promoting hepatitis B vaccinations of all healthcare personnel who may have contact with blood, considering all fluids as potentially infectious, using appropriate personal protective equipment to prevent blood and body fluid contact, and preventing percutaneous injuries, by eliminating unnecessary needle use, implementing safety devices (devices with safety features), using safe work practices when handling needles and other sharp devices, and safely disposing sharps and blood-contaminated materials.

Infectious Diseases in this section include the following Bloodborne Pathogens in detail:

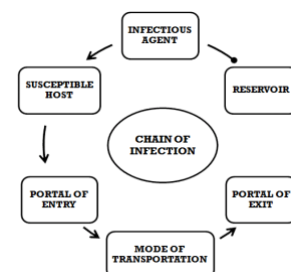
- HIV- Human Immunodeficiency Virus
- HBV-Hepatitis B
- HCV-Hepatitis C

Transmission of these BBP in the workplace is possible if:

- The skin is punctured with contaminated sharp object
- Blood or other OPIM gets in to an open cut or sore
- Splash of blood or OPIM occurs to a mucous membrane

First, for an opportunity of exposure to occur: the Chain of Infection must be present.

- Pathogen must be present (patient must have a bloodborne disease)
- The host is susceptible to the pathogen
- The pathogen must enter the body
- The pathogen must be virulent (potent) enough to infect the host



The best way to avoid exposure is to have a break in the chain of infection. This can include hand washing at any point in the cycle. **Hand washing is the best way to break the chain of infection and prevent illness.**

Hand washing standards for healthcare workers include:

- Washing hands before and after patient contact as well as any procedure that may involve blood or body fluid contact, even if gloves are worn.
- Apply a generous amount of soap to wet hands.
- Wash for a minimum of 20 seconds utilizing good friction to cleanse the hands taking care to include the area between the fingers and the nail beds.
- Rings need to be removed or moved around so the skin under and around the jewelry can be cleaned
- Rinse hands thoroughly with running water and fingertips pointed downward.
- Dry hands with a paper towel and use that towel to turn the faucet off.

CAUTION! High Risk Pathogens:

Hepatitis: A, B, C, D, E, F, G.....

Hepatitis is a disease of the liver, characterized by inflammation of the liver. The liver is the filter for the body.

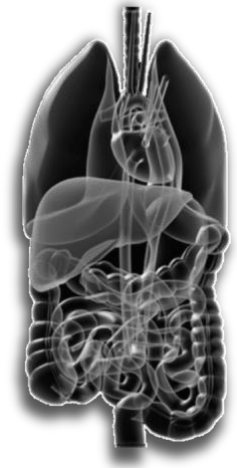
Death often results as a result of cirrhosis or liver cancer.

The function of the liver includes:

- Promotes digestion through the production of bile
- Storage of vitamins, minerals, iron
- Regulates fat and storage
- Produces blood clotting factors

Exposure to Hepatitis can result in three types of Hepatitis. The three common types of Hepatitis include:

- Hepatitis A- (HAV) contracted by ingested food/water contaminated with human waste –fecal oral transference
- Hepatitis B- (HBV) can be chronic and may lead to permanent liver damage, directly related to the degree of contact with blood/body fluids in the work place. Can be transmitted into scratches, abrasions, burns. It can survive on surfaces for weeks.
- Hepatitis C- (HCV) Approximately 4 million Americans are infected; it may take 20 years for signs of infection to develop.



## Hepatitis B:

Hepatitis B Transmission:

- Parenteral (stick or cut through the skin)



- Mucous membrane
- Contaminated objects
  - (virus may live outside for weeks)
- Sexual contact

Symptoms of Hepatitis B (HBV) can include acute or chronic infections and liver damage. The CDC recommends vaccination of all infants as part of routine vaccines and any unvaccinated school age children.

Adults in high-risk groups:

- Those at risk of exposure due to job
- Those with other STD's or greater than 1 sex partner within 6 months
- Sharing a home with chronic HBV patient
- IV drug users
- Sexually active homosexual & bisexual men
- Recipients of clotting factor concentrates

The current Hepatitis B vaccination strategy in the United States has an overall goal of eliminating HBV transmission.

Because most of the serious consequences related to HBV occur among persons with chronic HBV infection, the primary objectives of this strategy are to prevent chronic HBV infection and its consequences, cirrhosis and liver cancer. A secondary objective is to prevent symptomatic illness associated with acute HBV infection.

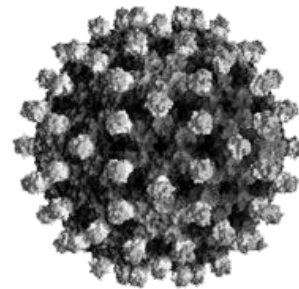
Symptoms of acute Hepatitis B infection include:

Jaundice, fatigue & joint pain

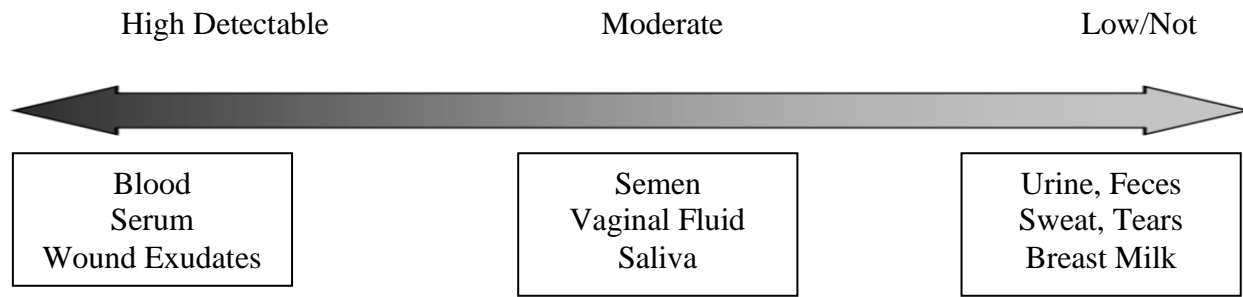
Nausea & vomiting; abdominal pain

People with chronic HBV infection are often asymptomatic, but these people are at high risk for developing chronic hepatitis, and approximately 15%-25% may die prematurely from either cirrhosis or liver cancer.

- Incubation: 45-180 days (avg.60-90)
- Jaundice: in 50% of patients
- Chronic infection: up to 90% in children <5  
10% adults & older children
- Premature mortality: 15-25%



As mentioned earlier, one factor to consider in assessing the risk of infection is the type of body substance to which healthcare personnel are exposed. The following graph shows the concentration of HBV in various body fluids. On the left (the darkened area) are the fluids with the highest concentration of virus. Moving from the left to the right side, the concentration decreases. Blood, for instance, has a higher virus concentration than urine or sweat.



## HEPATITIS A:

### Hepatitis A Transmission:

- Oral-fecal
  - Ingestion of virus shed in the feces of an infected person
- Close personal contact is most common mode
  - Children in daycare centers
  - Household & sexual contacts of infected persons
- Contaminated food/water also common vehicle
  - Uncooked foods
  - Foods handled by people with unwashed hands
  - Shellfish harvested from water in sewage-contaminated areas

Although rare, HAV transmission can also occur as a result of blood exposures such as injectable drug use or blood transfusion (this occurs when the virus is in blood prior to onset of disease in infected persons).

- |                      |   |
|----------------------|---|
| ❖ Incubation period: | 15-50 days (avg. 30)                          |
| ❖ Jaundice:          | most often in patients greater than 14yrs old |
| ❖ Complications:     | fulminant hepatitis, relapsing hepatitis      |
| ❖ Chronic infection? | No  |

Incidence of Hepatitis A in the US tends to be cyclical; with epidemics happening every 10-15 years- last one was in 2003 from tainted green onions traced back to Mexico. The virus has also been found in studies with animals, but no documented transmission via saliva has been documented in humans.

The Hepatitis A Vaccine is 94-100% effective in protecting against clinical disease. The CDC recommends a HAV vaccination for travelers to countries where HAV is endemic (where an infection is found in an area without subject from external influence), for homosexual and bisexual men, for IV drug users with chronic liver disease, and for children in communities with high rates of HAV infection. Hepatitis A occurs in very high rates in Central and South America, Africa and Asia.

## Hepatitis C:

### Hepatitis C Transmission

- ❖ Needlesticks
- ❖ IV drug users
- ❖ Transfusion/transplant
- ❖ Therapeutic (contaminated equipment)
- ❖ Occupational (needlestick)



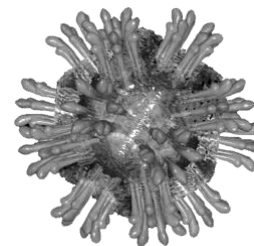


- ❖ Mucosal
- ❖ Perinatal
- ❖ Sexual

HCV is transmitted primarily through large or repeated direct percutaneous (sticks through the skin) exposures to blood. In the United States, the relative importance of the two most common exposures associated with transmission of HCV, (blood transfusion and injecting-drug use) has changed over time. Blood transfusion accounted for a large portion of HCV transmission 15 years ago, but now is almost nonexistent. (Since 1994, risk for transfusion-transmitted HCV infection has been so low that CDC's sentinel counties viral hepatitis surveillance system has been unable to detect any transfusion-associated cases of acute hepatitis C, although the risk is not zero.) In contrast, the incidence of injecting-drug use contributing the HCV transmission continues to be significant. It is a highly efficient infectious agent in the IV drug user, it is 4 times more common than HIV infection in this population, and it occurs in 60-90% of IV drug users after 5 years in this high risk group. BE CAREFUL with this patient population!

**However, according to the CDC:**

- Inefficiently transmitted by occupational exposures
- Average incidence 1.8% following needle stick from HCV-positive source
- Associated with hollow-bore needles
- Case reports of transmission from blood splash to eye
- No reports of transmission from skin exposures to blood
- Prevalence 1-2% among health care workers
- Lower than adults in the general population
- 10 times lower than for HBV infection



**Hepatitis C**

- Incubation: 2-26 weeks (average 6-7 weeks)
- Jaundice: less than 20% of patients
- Chronic infection: 75% - 85% of patients
- Chronic hepatitis: 70% (most asymptomatic)
- Mortality: 1 - 5%

Hepatitis C virus (HCV) infection is the most common chronic bloodborne infection in the United States. Approximately 130 - 170 million people are chronically infected with the Hepatitis C virus, and more than 350,000 people die from Hepatitis C-related liver diseases each year. Current estimates of medical and work-loss costs of HCV-related acute and chronic liver disease are greater than \$600 million annually, and HCV-associated end-stage liver disease is the most frequent indication for liver transplantation among adults. Because most HCV-infected persons are aged 30 - 49 years, the number of deaths attributable to HCV-related chronic liver disease could increase substantially during the next 10 -20 years as this group of infected persons reaches ages at which complications from chronic liver disease typically occur.

Hepatitis D Transmission

-Is the same as for Hepatitis B. IV drug use is the most common way while sexual transmission is less common and perinatal transmission is rare. Hep D exists only as a co-infection or super-infection with Hepatitis B. HDV is a defective single stranded RNA virus that *relies upon the HBV to replicate*, so HDV infection cannot exist without HBV infection. HDV is a major factor in the development of chronic liver disease for people with HBV. In long-term studies of chronic HBV carriers with HDV superinfection, 70%-80% have developed evidence of chronic liver diseases with cirrhosis compared with 15%-30% of patients with chronic HBV infection alone.

## Hepatitis E Transmission

Hep E is usually passed via oral or fecal route from contaminated drinking water. Person to person transmission is rare, and most US cases have been reported in travelers returning from HEV endemic areas (for instance, Mexico and Africa). The best prevention: “Don’t drink the water”, and care in eating uncooked food or peeling fruits and vegetables when traveling. There is no vaccine. Most often reported symptoms are similar to other forms of viral hepatitis, which are: abdominal pain, anorexia - no appetite, nausea/vomiting, dark urine, fever, hepatomegaly-swollen liver, jaundice, and malaise. Other less common symptoms include arthralgia (joint pain), diarrhea, pruritus (itching), and urticarial rash (erythematous wheals) (rash). Symptoms seem to be worse in older individuals and children tend to have subclinical cases.

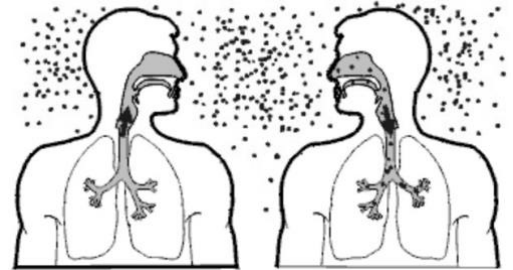
- Incubation period: 15-60 days (avg. 40)
- Case fatality rate: 1-3%
- Pregnant women: 25%
- Chronic disease? No

## Tuberculosis

-Is not bloodborne, but still a major player. It was almost eliminated after treatment was discovered in the 1940’s, but then lost funding and attention and in 1993, and the number of cases began to increase. It is spread by droplet (inhalation). Chances of contraction depend on many things, how infectious the source is, the type of exposure, (in same room vs. cough in face), and length of exposure. This airborne pathogen is spread through the air when an infected person coughs, sneezes or is suctioned and another person inhales the tiny microbes. Individuals who are immunosuppressed are more susceptible to develop TB following an exposure to the bacillus.

### Infection:

- Exposure is followed by development of antibodies (*latent* disease)
- Skin test positive; chest x-ray may be negative, if no *active* disease
- With *active* disease, bacteria will multiply in the lungs and elsewhere.
- Individual is infectious to others at this time
- Often cough, fever, weight loss



### Signs and Symptoms of TB Disease:

- Cough that lasts >2 weeks
- Weakness or fatigue
- Chills
- Chronic chest pain
- Weight loss
- Fever
- Hemoptysis
- Anorexia
- Night sweats

## Tuberculosis testing and treatment

Testing is now limited to high-risk groups who can comply with treatment, (decision to test is a decision to treat). Treatment regimes may be shorter if compliance is absolutely assured (DOT- Directly Observed Therapy). The skin test indicates TB infection, or the body’s formation of antibodies to a foreign invader. If a skin test is positive, further exam (Sputum cultures, chest x-ray) should be done to see if disease exists. People with severely impaired immune systems (HIV, for example) may have negative skin tests in the presence of disease or infection because they are unable to mount an immune response) The BCG is a vaccine used in some parts of the world- in our area, we see many people raised in the islands who have

been vaccinated with BCG. BCG is not necessarily protection against TB. It will produce a positive skin test (the size of that positive test decreases over time, so a very reactive test in an adult may indicate infection) most people who have been BCG vaccinated skip the skin test altogether and have a chest x-ray for screening. **Compliance is a major issue.** People who cannot or will not comply with medications should not be treated, according to CDC. (If we give someone medications, and then they stop, the only bacteria left are the stronger, more resistant ones- this pattern of non-compliance leads to drug resistant forms of the virus). People can take fewer medications for shorter periods of time if they take part in DOT. In DOT, a healthcare worker observes the ingestion of EVERY dose of medication to ensure compliance. (The patient may go to health department or a public health nurse may go to them at home, work, or school).

## HIV/AIDS

**HIV** - Human Immunodeficiency Virus - is a lentivirus - a subgroup of retrovirus (a unique virus that reproduces by continually mutating and changing). This virus damages and kills cells of the immune system in humans. Over a period of time, it destroys the body's ability to fight off infections and certain cancers. This virus was first identified in 1983 and diagnostic blood tests were developed in 1985 (CDC).

**AIDS** - Acquired Immunodeficiency Syndrome, Chronic, is an advanced stage of HIV causing nearly every organ in the body to be affected. If a person does not receive treatment for the virus at the HIV stage, it will typically progress to full blown AIDS in less than 10 years, although it has been known to convert in as little as 1-2 years or as long as 20 years. Once it has progressed to the full-blown AIDS stage, death usually occurs in less than 2 years. A person is known to have AIDS when the T-cell count (immune system cells) is below 200 per micro liter of blood. At this point a person becomes highly susceptible to opportunistic infections that would not normally cause illness in a person who had a healthy immune system.

HIV may be initially transmitted through unprotected sex, including anal and even oral sex. **Unprotected sex is the most common way the virus is passed from one person to the next.**

Healthcare workers may come in to contact with the virus via a contaminated needle stick or sharp injury, blood or OPIM that gets into an open cut or sore or a splash to their mucous membranes.

It is a bloodborne pathogen and may also occur from contaminated blood transfusions or sharing of needles during drug usage. A pregnant woman can pass it on to her unborn baby during delivery or through breast-feeding. The method of transmission does not appear to affect the progression of HIV disease, although people who are drug abusers seem to have a shorter lifespan due to other complicated health issues. HIV infection is NOT spread through casual contact.

Certain individuals may have an increased risk of HIV infection, including the following:

- People with a history of a sexually transmitted disease
- Sexual partners of people who are infected with HIV
- Victims of sexual assault
- Men and women who have unprotected sex with multiple partners
- Men and women who exchange sex for money or drugs or have sex partners who do
- Men who have sex with men
- Injection drug users who share needles or "works"
- Anyone who is accidentally stuck with a contaminated needle or sharp in a healthcare facility

Once HIV infection has occurred, symptoms often develop in 60-90% of individuals. Symptoms usually begin in 2-4 weeks after exposure to HIV. This is described as the *primary stage of HIV* and most people do

not initially realize they have been infected and often pass the symptoms off as the flu. Common symptoms of initial HIV infection include:

- ✓ Fever
- ✓ Fatigue
- ✓ Rash
- ✓ Headache
- ✓ Swollen lymph nodes
- ✓ Sore throat
- ✓ Muscle or joint pain
- ✓ Painful ulcers in the mouth
- ✓ Nausea vomiting or diarrhea
- ✓ Dry cough

Recognizing these symptoms and seeking early treatment is crucial because the HIV infection is **highly contagious** at this stage due to very large amounts of the virus, which is present in the blood at this time. Testing for HIV antibodies is the only way to know for sure if a person has contracted the virus. However there is a window of time where the initial infection might not be diagnosed because the infected individual's immune system may not have developed antibodies to the virus yet. This period of time where the virus antibody is undetectable can range from 2 weeks to 6 months. Currently new testing is available that can diagnose HIV during the "window period" as it looks for the presence of the HIV virus rather than the body's immune or antibody response to the illness. Early symptom recognition and starting treatment as soon as possible can help to decrease the risk of transmission from one individual to another.

If the initial symptoms of HIV remain undetected or untreated, the virus will eventually cause excessive weakening of the immune system. It may take several years for the damage to progress to the stage known as AIDS in which the individual becomes easily infected with organisms or cancers that do not normally cause illness in healthy immune systems. Once the opportunistic infections set in they cause serious damage to the body's defense systems. The following symptoms could be characteristics of AIDS:

- Shortness of breath
- Persistent cough
- Seizure
- Painful/difficult swallowing
- Nausea, painful stomach aches
- Severe headaches, neck stiffness
- Confusion/forgetfulness
- Unexplained fevers
- Extreme fatigue/weight loss
- Vision impairments/loss
- Coma

While the Federal government's investment in treatment and research is helping people with HIV/AIDS live longer more productive lives, HIV continues to spread at an alarming rate. The Center for Disease Control, (CDC) data reviewed 48,100 new HIV infections in 2010. The Florida Department of Health estimated that 10% or 5,500 of those new infections occurred in Florida.

Although much has been accomplished in the HIV/Aids epidemic, there is still a long way to go. Many private and government agencies continue to work together to utilize research and prevention strategies at the community, state, national and global level.

At this point, **only a vaccine is thought to be able to stop this pandemic.** However, after 20 years of research the vaccine still eludes scientists. Currently, programs are focused on improving treatment, care and support for those living with HIV/AIDS in the United States and around the world. Researchers remain hopeful that new treatments will be on the horizon to either eradicate or cure the virus.

## POST EXPOSURE PROTOCOL:

Some blood borne, pathogens are deadly- so what do you do if exposure occurs?

Exposure is defined as contact with blood, blood products, and body fluids through a contaminated needle stick or other sharp item puncture. Also includes exposure via non-intact skin or a splash to a mucous membrane.

If blood or any other potentially infectious materials comes in contact with your eyes, nose, mouth, or open skin, immediately flood eyes with gentle flowing water for at least 15-20 minutes. Wash wounds with soap and water. If no water is available, alcohol-based hand cleanser is acceptable. **Report the potential exposure to your employer or supervisor immediately.** Medical Attention is a must. CDC recommends prophylactic treatments begin within 2 hours of the exposure, if indicated.

### Post Exposure Prophylaxis (PEP)

The US Department of Public Health recommends prophylactic treatment following a “significant exposure”.

PEP has been standard procedure since 1996 for healthcare workers exposed to HIV. Workers start taking the medications within a few hours of exposure. Usually the exposure is from a "needle stick", when a health care worker accidentally gets poked with a needle containing HIV-infected blood. PEP reduced the rate of HIV infection from workplace exposures by 79%. However, some health care workers who take PEP still get HIV infection. PEP should be started as soon as possible after exposure to HIV within 1-2 hours. The medications used in PEP depend on the exposure to HIV.

The following situations are considered **serious** exposure:

- Exposure to a large amount of blood
- Blood came in contact with cuts or open sores on the skin
- Visible blood is present on a needle that stuck someone
- Exposure to blood from someone who has a high viral load (a large amount of virus in the blood)



For serious exposures, the U.S. Public Health Service recommends using a combination of approved antiviral drugs for four weeks. For less serious exposure, the guidelines recommend four weeks of treatment with two drugs: [AZT](#) and [3TC](#). In January 2001, the Centers for Disease Control warned against using nevirapine for PEP because of the risk of liver damage.

### Workplace Exposures:

Risk for HIV transmission after a percutaneous exposure to HIV-infected blood is approximately 0.3% (which is 1 in 300). 99.7% of needle stick/cut exposures **do not** lead to infection. The risk after exposure of the eye, nose or mouth to HIV - infected blood is estimated to be on average, 0.1% (which is 1 in 1000). The risk of exposure of non-intact skin to HIV - infected blood is estimated to be less than 0.1% (1 in 1,000). In a review of 57 documented cases of healthcare workers sero-converting after documented exposure, 47 of those involved *blood exposures* and 41 of those exposures involved a *needle stick*. Of those healthcare workers that sero-converted after exposure, 95% of them converted within 6 months of exposure and the rest converted within 12 months. Other modes of exposure included body fluid exposure via broken

glass vial, scalpels, and other sharps. The HIV virus is very fragile; does not live outside of the body and 1 mL of blood contains only .06 parts of infectious organisms.

In contrast, the Hepatitis B virus is very concentrated in blood and 1 mL may contain millions of infectious doses. The virus will live in blood outside the body including in dry blood. Hepatitis B is much easier to contract through blood contact.

So...the highest risk of exposure involves visible HIV+ blood and puncture with a hollow bore needle. Also, evidence shows that risk for infection increases with the amount of blood involved in the exposure. There are another 50+ healthcare workers who probably sero-converted after a workplace exposure, but never reported the initial incident.... document, document, document!

### The Hepatitis B Vaccination

All employers are required by OSHA standards to offer the three injection Hepatitis B Vaccination series. It should be free of charge to all employees that may be exposed to blood or any other potentially infectious material.

The Hep B vaccine is a non-infectious vaccine; it cannot cause Hepatitis infections in humans, but does fuel the development of antibodies that fight the disease. It is a series of three injections, the second injection should be given within one month of the first injection, and the third injection should be given within six months of the original injection. All three injections are required to make certain of immunity.

Employees may refuse the vaccination, but must sign a declination form, which verifies that they were offered the vaccination but that they declined. If the employee changes their mind at any time during employment and wants the injections, they can still receive the injections per the OSHA standards and get the injections at no cost.

### Workplace Exposure of Hepatitis Elements of Post-Exposure Management:

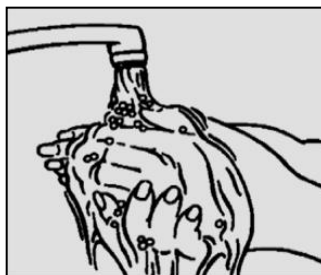
The key elements of post-exposure management are listed next. The review includes wound management, exposure reporting, assessment of the infection risk by type and severity of exposure (blood splash, needle stick, cut, etc.), determination of the bloodborne status of the source person (the patient's blood can be tested for HIV and Hepatitis), and appropriate treatment, follow-up, and counseling. Every employee should be evaluated by a physician and offered information on the exposure type, infection potential, and any medications, which might be considered for post exposure protection.

#### Post-exposure Management: Wound Care

- Clean wounds with soap and water
- Flush mucous membranes with water

#### **Do not:**

- Apply antiseptics or disinfectants
- Squeeze ("milking") puncture sites
- Apply bleach and other caustic agents



The first element in post-exposure management is wound care. Wounds should be cleaned with soap and water. Mucous membranes should be flushed with water. Eyes should be flushed with eye irrigant or clean water. There is no evidence that application of antiseptics or disinfectants, or squeezing (or milking) puncture sites provides any benefit. The use of bleach and other agents that are caustic to the skin should be avoided.

## Post-exposure Management:

It is important to collect and record information about the exposure on an exposure report, and to maintain the confidentiality of both the worker and the source patient. An exposure report should include the date and time that the exposure occurred, as well as details of what procedure was being performed, where, how, and what device (if any) was involved. If a device was involved, OSHA requires that the brand and manufacturer of the device be recorded. Details such as the route of exposure, body substance involved, and volume or duration of contact also should be included. Additionally, information about the source person and exposed person, if known, is critical, along with exposure management details.

## Post-exposure Management: Assessment of Infection Risk

- Type of exposure:
  - Via “sharps” (needlestick or cut-percutaneous)
  - Mucous membrane
  - Non-intact skin
  - Bites resulting in blood exposure
- Body substance:
  - Blood
  - Bloody fluid
  - Other potentially infectious fluid or tissue (OPIM)
- Source person- blood level known or tested for:
  - Presence of HBsAg
  - Presence of HCV antibody
  - Presence of HIV antibody
  - If source unknown, assess epidemiologic and clinical evidence



To assess the risk of infection, the first thing to consider is the **type** of exposure involved. Those that pose a risk of infection are percutaneous injuries, mucous membrane exposures, exposures to non-intact skin, and bites resulting in blood exposure. In general, percutaneous injuries (needle stick or sharp injuries) that pierce the skin with contaminated blood or OPIM pose a greater risk than mucous membrane and non-intact skin exposures.

The next thing to consider is the **body substance** involved in the exposure. Although blood and bloody fluid exposures are the most risky, there are other potentially infectious fluids or tissues, such as semen, vaginal secretions, cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluid.

Finally, the **infection status of the source** of the exposure must be evaluated. If the source is known but infection status unknown, HBV, HCV, and HIV testing should be performed. However, if the source is unknown, other information will need to be considered before deciding on a treatment plan.

If exposed to any bloodborne pathogen, your Hepatitis levels should be checked and your Hepatitis antigen levels tested. If the titer levels are low, you can be given Hepatitis gamma globulin injections.



### Post-exposure Management: Evaluating the Source:

It is important to keep in mind the rights of the source person. Informed consent should be obtained from the source person, in accordance with state and local laws. Confidentiality of the source person should be maintained at all times.

### Rationale for post-exposure prophylaxis:

Evidence suggests that infection does not happen immediately after exposure and there may be a “window of opportunity” to prevent viral replication and therefore infection, shortly after exposure.

- Studies show that the use of some agents in post exposure prophylaxis have reduced the infection rate by 79% in exposed healthcare workers
- Some factors that may contribute to drug failure:
  - Resistance to the particular agents used
  - We may not know drug resistance status of the source
  - High titers or massive exposure to the virus
  - Delayed initiation or short duration of med therapy
  - Compromised immune system in the host

### Side effects of drugs used to treat long-term HIV patients:

The uses of protease inhibitors have helped decrease the death rates noted in a study done from 1995-1999. However, we are now seeing significant side effects, which include lipodystrophy, glucose intolerance, hyperlipidemia, peripheral neuropathies, and acute pancreatitis.

The decision to begin prophylactic treatment is based on the factors mentioned previously. Obviously, the decision to treat a splash of blood from an HIV negative patient vs. a needle stick involving a large amount of blood from an HIV+ patient with advanced AIDS would be different. In cases where the line is blurred, the physician may consider withholding a recommendation and leave the decision up to the healthcare worker.

### Situations Where PEP is rarely, if ever, warranted:

There are some situations where postexposure prophylaxis is rarely if ever warranted, including intact skin contact with blood and potentially infectious body fluids, exposure to an unknown source in populations where HIV prevalence is low, and a low-risk exposure to an unknown source.

### Post exposure regimes what you should know:

The efficacy and toxicity of drugs used in PEP is limited. Only Zidovudine (ZDV) has been shown in studies to prevent HIV transmission in humans, although other agents may be used in PEP. Experts recommend combination drug regimes because of concerns about drug resistant viruses. For exposures where medical treatment is not recommended, the risks of side effects and toxicity outweigh the benefits. Occupational exposure should be considered an urgent medical concern; PEP should be started within a few hours for maximum benefit. If the source’s HIV status is unknown, providers may opt to begin prophylaxis until lab results are available.

Typical regimes consist of multiple drugs and last 4 weeks. The exposed worker will need to be monitored for drug toxicity during therapy. Most common side effects and reasons healthcare workers fail to complete the regime: nausea and diarrhea. Side effects are most often well controlled with antiemetic and anti-motility drugs or modifying the dose interval (ex: giving smaller amount of drug more frequently). In



January 2001, the CDC recommended against the use of Nevirapine (Viramune) for PEP due to risk of liver damage. Be sure your health care provider is up to date. Up to 50% of people on post-exposure regimes report 1 or more side effects (nausea, diarrhea, malaise, headache, loss of appetite).

Toxic effects include hyperglycemia, renal and hepatic effects. Toxicity seems to be mild, reversible, and not unusual. The decision to begin prophylactic treatment should be made quickly after exposure and be a collaborative process between the healthcare worker and medical provider, weighing all possible factors.

In closing - your most significant risks are going to be off duty. So keep yourself free from the possibility of a bloodborne illness in your personal life by “keepin’ it clean”. Practice *really* safe sex and do not even think about sharing drug paraphernalia as it also carries significant risk for exposure to many different types of pathogens.

In the work environment, remember to be aware of the risks that you are exposed to every day. Don’t be quick to judge or assume that a patient is clean (free from contagious pathogens), simply based on their looks or economic status. **ALL** patients should be treated as though they are a potential risk to the healthcare worker if an exposure occurs. The best way to protect yourself from infectious pathogens is to know of, and understand, the policies that your facility has implemented to protect you from exposure. Actively participate in your annual training sessions and always wear personal protective equipment, when indicated, to minimize your contact with blood and all potentially infectious body fluids. Most importantly, wash your hands well and wash them often to break the cycle of infection that is invading our healthcare system at an alarming rate.

If, despite your best efforts an exposure occurs, do not hesitate to report it immediately and be prepared to work your way through a system that is designed to provide you with rapid testing and the best possible options available, depending on the occurrence. Having a thorough understanding of the process will assist you to correctly use it and make informed decisions, if the need arises. Hopefully it won’t. Be careful out there...