UNIT-5
INFECTION CONTROL, PREVENTION AND PATIENT SAFETY

Healthcare Immunizations, Centers for Disease Control and Prevention, Disinfectants, Sterilants, and Antiseptics, OSHA Bloodborne Pathogens Standard, Tuberculosis, Healthcare Opportunistic Infections, Healthcare-Associated Infections, Medication Safety.

5.1 HEALTHCARE IMMUNIZATIONS P1

Healthcare organizations should establish a comprehensive written policy regarding immunizing personnel, develop a listing of all required and recommended immunizations, and refer all staff to the employee health function to receive education needed for their positions. The employee health function should consider medical history and job position exposure risk to determine needed vaccinations.

- Infection Control Plan Development Considerations
- Device-related, intravascular devices, ventilators, and tube feeding infections
- Surgical site infections and healthcare-acquired infection in special care units
- Infections caused by organisms that are antibiotic resistant
- Tuberculosis and other communicable diseases
- Infections in the neonate population
- Geographic location of the facility
- Volume of patient or resident encounters
- Patient populations served
- Clinical focus of the facility
- Number of employees and staff

Healthcare Vaccine Categories

- Strongly recommended: Diseases posing special risks, which include hepatitis B, influenza, measles, mumps, rubella, and varicella
- Recommended in some situations: Active and/or passive immunizations as indicated in job circumstances to prevent occurrences of tuberculosis, hepatitis A, meningitis, and typhoid fever
- Recommended for all adults: Immunization of all adults for tetanus, diphtheria, and pneumonia disease

Guidelines Of The Advisory Committee For Immunization Practice

Healthcare personnel should meet the Advisory Committee for Immunization Practice (ACIP) guidelines for immunization against mumps, rubella, diphtheria, and measles. Consider the need for the following vaccinations:

- Rubella—Require for individuals considered at risk including those with direct contact with pregnant patients.
- Hepatitis B—Offer the vaccine within 10 days of their job assignment as mandated by

OSHA to all staff members with any potential exposure to bloodborne pathogens.

- Measles—Consider immunization for persons susceptible by history or serology

- Influenza—Healthcare personnel should receive flu immunization to help prevent the spread of influenza.

Other Vaccination Considerations

Healthcare organizations must develop comprehensive policies and protocols for the management and control of outbreaks of vaccine preventable diseases as described in the ACIP Guidelines. Healthcare employees working abroad should consider vaccinations for diseases such as hepatitis A, poliomyelitis, encephalitis, meningitis, plague, rabies, typhoid, and yellow fever. Healthcare organizations should develop written policies regarding work restrictions or exclusion from duty

5.2 CENTERS FOR DISEASE CONTROL AND PREVENTION P2

The CDC publishes guidelines, advisories, and recommendations that do not carry the force of law. The CDC bases their guidance and recommendations on scientific studies. However, some infection control practices applicable to one setting may not apply in all healthcare situations. The guidance offered by the CDC gives healthcare infection control personnel the information necessary to make informed decisions. Organizations must provide proper education and training on current infection control and prevention practices including the latest OSHA requirements and CDC recommendations.

The continuous evaluation of care practices under the supervision of the infection control staff can help ensure continued adherence to correct practices. The Association for Professionals in Infection Control and Epidemiology publishes up-to-date articles and guidelines on healthcare infection control for immunization and infection control reasons. Require healthcare staff members to report any illnesses, medical conditions, or treatments that could make them susceptible to opportunistic infections.

CDC Guidelines For Hand Hygiene In Healthcare Settings

- CDC guidelines highly recommend the placement of alcohol-based hand-rub solutions in convenient locations of patient care areas of healthcare organizations.
- Clinical studies indicate that the frequency of hand washing relates to the accessibility of hand-hygiene facilities.
- Installing hand-rub dispensers immediately outside patient or resident rooms or within suites of rooms improves the overall efficacy of staff use by over 20%.

Guidelines For Environmental Infection Control In Healthcare Facilities

- The guidelines provide excellent information on maintaining a safe healthcare environment and include infection control tips to follow during inspection, construction, or renovation activities in patient care and treatment areas.
- The guidelines provide a comprehensive review of the relevant literature with a focus on conducting a risk assessment before undertaking any activities that could generate dust or water aerosols.
- The guidelines also review infection control measures for catastrophic events such as flooding, sewage spills, and loss of utilities, including ventilation.
- Environmental infection control procedures must consider disease transmission via surfaces, laundry, plants, animals, medical wastes, cloth furnishings, and carpeting. These

guidelines do not apply to sick buildings, terrorism, or food safety. Key suggestions include

Evaluating the impact of activities on ventilation and water systems

- Creating a multidisciplinary team to conduct infection control risk assessment (ICRA)
- Using dust-control procedures and barriers during construction activities
- Implementing special control measures in any areas with patients at high risk
- Using air sampling to monitor air filtration and dust-control measures
- Controlling tuberculosis risks in operating rooms when infectious patients require surgery
- Culturing water as part of a control plan for Legionella if appropriate
- Recovering from water system disruptions, leaks, and natural disasters
- Disinfecting surfaces to control antibiotic-resistant microorganisms
- Developing specific infection-control procedures for laundries
- Establishing control procedures for using animals in activities and therapy
- Managing the use of all service animals in healthcare facilities
- Developing strategies for animals receiving treatment in human facilities
- Measuring water use from main lines for dialysis, ice machines, hydrotherapy, dental water lines, and automated endoscope reprocessing equipment

Other CDC Infection Control Guidelines

- CDC Position Statement on Reuse of Single Dose Vials (2012)
- Basic Infection Control and Prevention Plan for Outpatient Oncology Settings
- Guide to Infection Prevention in Outpatient Settings: Minimum Expectations for Safe Care
- CDC Issues Checklist for Infection Prevention in Out-Patient Settings to Accompany New
- Guideline for the Prevention and Control of Norovirus Gastroenteritis Outbreaks in Healthcare Settings (2011)
- Guideline for Disinfection and Sterilization in Healthcare Facilities (2008)
- Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (2007)
- Guideline-Management of Multidrug-Resistant Organisms in Healthcare Settings (2006)
- Public Reporting of Healthcare-Associated Infections (2005)
- Bloodstream Infection: Guideline for the Prevention of Intravascular Catheter-Related Infections (2011)
- Dialysis–Multi-Dose Vials Infection Control (2008)
- Environmental Infection Control (2003)
- Hand Hygiene (2002)
- Infection Control-Healthcare Personnel (1998)
- Occupational Exposures (2005)
- Pneumonia (2003)
- Surgical Site Infection (1999)
- Guidelines for Preventing Transmission of Mycobacterium tuberculosis in Healthcare
- Urinary Tract Infection (2009)

CDC Standard Precautions

- Consider hand washing as the first line of defense in preventing exposures to diseases, bloodborne pathogens, and infections. The CDC's Standard Precautions provide the major features of blood and body fluid precautions designed to reduce the risk of transmission of bloodborne pathogens.
- Use Standard Precautions to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infection in hospitals.
- After using the Standard Precautions, facilities should then apply the appropriate Tiered Precautions for airborne, droplet, and contact routes of infection.
- Facilities should learn to recognize the pathogenic risk of body fluids, secretions, and excretions and should take precautions against the various routes of transmission by designing processes that eliminate confusion with regard to infection control or isolation requirements.
- Facilities should refer to the guidelines for information on clinical syndromes and empiric precautions. They should also adhere to specific transmission precautions for patients colonized with pathogens. CDC's tier precautions provide guidelines with regard to
    - Hand washing, glove use, and patient placement procedures, including transport
    - Use of masks, gowns, and other protective apparel
    - Procedures for patient care equipment, linen, and laundry
    - Cleaning dishes, glasses, cups, and eating utensils

Disease And Infection Transmission Routes

Federal, state, and local health agencies publish rules and guidelines that define isolation procedures. Healthcare organizations should follow these guidelines because infectious agents can be transmitted by several routes:

- Contact—Contamination due to close proximity with persons with a contagious disease
- Indirect contact—Contamination by contacting an object contaminated by an infected person
- Droplet—Contamination caused by a person sneezing, coughing, or talking
- Common vehicle—Disease spread by food, water, drugs, devices, or equipment
- Airborne—Air-suspended infectious nuclei or dust that could be inhaled or digested
- Vector-borne—Organisms carried by animals or insects

Airborne Precautions

- Airborne precautions reduce the risk of airborne transmission of infectious agents disseminated by airborne droplet nuclei (small-particle residue 5 μm or smaller), evaporated droplets that may remain suspended in the air for long periods of time, or dust particles containing the infectious agent.
- Microorganisms disperse widely by air currents and may become inhaled or deposited on a susceptible host within the same room.
- Depending on environmental factors, use special air han- dling and ventilation to prevent airborne transmission.
- Airborne precautions apply to patients with known or suspected pathogens such as measles, varicella, and tuberculosis.

Droplet Precautions

- Droplet precautions reduce the risk of droplet transmission of infectious agents. Droplet transmission involves contact of the conjunctive or mucous membranes of the nose or mouth of a susceptible person with large-particle droplets (larger than 5 μm).
- The droplets contain microorganisms generated from a person with a clinical disease or who serves as a carrier of the microorganism. Droplets generated from the source person during coughing, sneezing, or talking and during performance of certain procedures such as suctioning and bronchoscopy can result in exposure risks.
- Transmission of a disease via large-particle droplets requires close contact between the source and the recipient. Droplets do not remain suspended in the air and generally travel only short distances (3 ft or less).
- Special air handling and ventilation are not required to prevent droplet transmission.
- Droplet pre- cautions apply to any patient with known or suspected infections such as meningitis, pneumonia, sepsis, pharyngeal diphtheria, mycoplasma pneumonia, pertussis, streptococcal group A pharyngitis, scarlet fever, Rubella, and pneumonic plague.

Contact Precautions

- Contact precautions reduce the risk of transmission of epidemiologically important microorganisms by direct or indirect contact.
- Direct contact transmission involves skin-to-skin contact or the physical transfer of microorganisms to a susceptible host.
- This can occur when caregivers turn patients, bathe patients, or perform other patient-related activities with physical contact.
- Direct contact transmission can also occur between patients. Indirect contact transmission involves contact of a susceptible host with a contaminated object or surface in the patient environment.
- Contact precautions apply to specific patients with a known or suspected infection with epidemiologically important microorganisms transmitted by contact via gastrointestinal tract, respiratory system, skin surface, wounds, and multidrug-resistant bacteria.
- Use contact precautions for hepatitis A, contagious skin infections, herpes simplex viruses, scabies, and viral or hemorrhagic infections.

New Infection Risk

- The CDC recently released information that 4% of US hospitals and 18% of nursing homes had treated at least one patient with the bacteria, called carbapenem-resistant enterobacteriaceae (CRE) during the first 6 months of 2012.
- CRE are in a family of more than 70 bacteria called enterobac- teriaceae, including Klebsiella pneumonia and Escherichia coli that normally live in the digestive system.
- In recent years, some of these bacteria became resistant to last-resort antibiotics known as carbapenems.
- Most CRE infections occur in patients with prolonged stays in hospitals, long-term facilities, and nursing homes. These bacteria can kill up to 50% of infected patients.
- According to CDC, these bacteria can easily spread from patient to patient on the hands of caregivers according to CDC. CRE bacteria can transfer their antibiotic resistance to

other bacteria of the same type. To reduce the spread of these bacteria, the CDC wants hospitals and other healthcare facilities to take the following steps:

- Enforce infection-control precautions.
- Group together patients with CRE.
- Segregate staff, rooms, and equipment with CRE patients.
- Inform facilities about the transfer of patients with CRE.
- Use antibiotics carefully.

5.3 DISINFECTANTS, STERILANTS, AND ANTISEPTICS P3

We can divide chemical germicides into three general categories:

- Sterilizing agents, used to eliminate all microbial life on objects or surfaces, including bacterial spores that can survive other germicides
- Disinfectants, classified as high, medium, or low, depending on the strength required, and which can destroy nearly all microbial life on objects or surfaces except for bacterial spores
- Antiseptics, used to inactivate or destroy organisms on skin or living tissue

Germicidal Effectiveness

- Bacterial spores exhibit the most resistance to germicides followed by mycobacteria, nonlipid viruses, fungi, and vegetative bacteria.
- Lipid viruses exhibit the least resistance. Facilities should use FDA- or EPA-approved cleaning agents and should read and follow the manufacturer's instructions to ensure proper use. Their effectiveness depends on
    - Shape and texture of surface
    - Amount of contamination on the surface
    - Resistance of contaminants to the germicide
    - Amount of soil buildup, including blood, mucus, or tissue
    - Chemical composition of the germicide
    - Time of exposure to the germicide
    - Temperature of the germicide

Regulatory Approval Of Disinfectants

- The EPA oversees the manufacture, distribution, and use of disinfectants. Manufacturers must use preestablished test procedures to ensure product stability, determine toxicity to humans, and assess microbial activity.
- If the product passes these requirements, the EPA registers the sub- stance for use. The EPA regulates disinfectants under the authority of the FIFRA.
- The FDA regulates liquid chemical sterilants and high-level disinfectants such as hydrogen peroxide and peracetic acid under the authority of the Medical Devices Amendment to the Food, Drug, and Cosmetic Act of 1976.
- The FDA regulates the chemical germicides if marketed for use on specific medical devices. Regulatory authority requires the manufacturer to provide instructions for the safe and effective use of substances with that device.

- The FDA uses the same basic terminology and classification scheme as does the CDC, which categorizes medical devices as critical, semi- critical, and noncritical. The scheme classifies antimicrobial effectiveness or sterilization as high, intermediate, and low levels.
- The EPA registers environmental surface disinfectants based on the manufacturer's microbiological activity claims.
- The EPA does not use the terms intermediate level and low level when classifying disinfectants. The CDC designates any EPA-registered hospital disinfectant without a tuberculocidal claim as a low-level disinfectant.
- Consider an EPA-registered hospital disinfectant effective against tuberculosis as an intermediate-level disinfectant.
- The EPA also lists disinfectant products according to their labeled use against certain organisms.
- The Occupational Safety and Health Administration requires the use of EPA-registered hospital tuberculocidal disinfectants or EPA-registered hospital disinfectants labeled effective against human immunodeficiency virus (HIV) and hepatitis B virus (HBV) for decontaminating work surfaces.
- Hospital can use disinfectants with HIV and HBV claims if surfaces contain no contamination requiring the use of a higher-level disinfectant ePa's registered sterilizers, tB, and antimicrobial
- All EPA's registered pesticides must possess an assigned EPA registration number. Alternative brand names possess the same EPA registration number as the primary product name.
- The EPA product registration number remains the key way to identity of the substance. An EPA establishment number refers to the production location.
- The formulation or a device uses a set of codes that consist of the registrant's ID number followed by the state where they were produced including the facility number. The EPA updates their registered disinfectant lists periodically to reflect label changes, cancellations, and transfers of product registrations.
- Information on the earlier list does not con- stitute a label replacement. Inclusion of products in these lists does not constitute an endorsement of one product over another. The EPA organizes the lists alphabetically by product names and by numerical order of their EPA registration numbers.

CDC Recommendations **P4**

- The CDC does not test, evaluate, or otherwise recommend specific brand-name products of chemical germicides.
- The CDC recommends disinfecting environmental surfaces or sterilizing or disinfecting medical equipment with products approved by EPA and FDA.
- When no registered or approved products are available for a specific pathogen or use situation, the CDC suggests following specific guidance regarding unregistered uses for various chemical germicides.
- No antimicrobial products hold registered status for use against SARS, Norwalk virus, or Creutzfeldt–Jakob disease agents routinely interchange disinfectants.
- Proper selection and use of disinfectants provide the key to effective safety and quality control. Alcohols demonstrate variable effectiveness against some bacteria and fungi.

- Alcohols act fast, leave no residue, and can compatibly combine with other disinfectants such as quaternaries, phenolic substances, and iodine to form tinctures. Aldehydes can prove effective against a wide spectrum of bacteria and viruses including spores when used properly.
- They also demonstrate activity against other pathogens, including vegetative bacteria and viruses.
- Chlorine works very well for cleaning up blood or body fluid spills. Chlorine compounds work as effective biocides on tuberculosis and vegetative bacteria. Chlorine compounds prove effective against HIV after 10–20 min and demonstrate effectiveness at a 1:5 dilution against bacterial spores and mycobacteria.
- Diluted chlorine neutralizes rapidly in the presence of organic matter. Chlorine compounds work very well for the decontamination of HBV, HCV, and cleanup of biohazardous spills.

EPA Registration Categories

- List A: EPA's Registered Antimicrobial Products as Sterilizers
- List B: EPA's Registered Tuberculocide Products Effective against Mycobacterium TB
- List C: EPA's Registered Antimicrobial Products Effective against Human HIV-1 Virus
- List D: EPA's Registered Antimicrobial Products Effective against Human HIV-1 and HBV
- List E: EPA's Registered Antimicrobial Products Effective against TB, HIV-1, and HBV
- List F: EPA's Registered Antimicrobial Products Effective against HCV
- List G: EPA's Registered Antimicrobial Products Effective against Norovirus
- List H: EPA's Registered Antimicrobial Products Effective against MRSA and VRE
- List J: EPA's Registered Antimicrobial Products for Medical Waste Treatment
- List K: EPA's Registered Antimicrobial Products Effective against Clostridium Difficile Spores

CDC Disinfecting Levels

- High-level disinfection processes can expect to destroy all microorganisms with the exception of high numbers of bacterial spores.
- Intermediate-level disinfection, which inactivates M. tuberculosis, vegetative bacteria, most viruses, and most fungi but does not necessarily kill bacterial spores.
- Low-level disinfection, which can kill most bacteria, some viruses, and some fungi but does not kill resistant microorganisms such as tubercle bacilli or bacterial spores.

OSHA BLOODBORNE PATHOGENS STANDARD (29 CFR 1910.1030) P5

- On November 6, 2000, President Clinton signed the Needlestick Safety and Prevention Act (Pub. L. 106 – 430).
- The act required OSHA to revise the OSHA Bloodborne Pathogens standard within 6 months of enactment of the act.
- To facilitate expeditious completion of this directive, Congress explicitly exempted OSHA from procedural requirements generally required under the rule-making provision of the act (paragraph 6(b)) and from the procedural requirements of the Administrative Procedure Act (5 USC 500 et seq.).

- The Bloodborne Pathogens standard sets forth requirements for employers with employees exposed to blood or other potentially infectious materials. In order to reduce or eliminate the hazards of occupational exposure, an employer must implement an exposure control plan for the worksite with details on employee protection measures.
- The plan must also describe how an employer will use a combination of engineering and work practice controls, ensure the use of personal protective clothing and equipment, and provide training, medical surveillance, hepatitis B vaccinations, and signs and labels, among other provisions
- Engineering controls provide the primary means of eliminating or minimizing employee exposure and include the use of safer medical devices, such as needleless devices, shielded needle devices, and plastic capillary tubes.
- Many different medical devices can now reduce the risk of needlesticks and other sharps injuries.
- These devices replace sharps with nonneedle devices or incorporate safety features designed to reduce injury.
- Despite advances in technology, needlesticks and other sharps injuries continue to occur at high rates. The revised OSHA standard became effective on April 18, 2001, adding new requirements for employers, including additions to the exposure control plan and keeping a sharps injury log.
- It did not impose any new requirements for employers to protect employees from sharps injuries.
- The original standard already required employers to adopt engineering and work practice controls that would eliminate or minimize employee exposure from hazards associated with bloodborne pathogens.
- The revision requires organizations to implement engineering controls such as using safer medical devices to reduce or eliminate exposure risks.
- Exposure control plan requirements must make clear that employers must implement safer medical devices proven appropriate, commercially available, and effective.
- Organizations must get input on selecting devices from those responsible for direct patient care.
- The updated standard also requires employers to maintain a log of injuries occurring from contaminated sharps.

Exposure Control Plan

- The revision included new requirements regarding the employer's exposure control plan, including an annual review and update to reflect changes in technology that eliminate or reduce exposures to bloodborne pathogens.
- The employer must Consider new innovations in medical procedures and technology that reduce the risk of exposure to needle sticks
- Consider and document use of appropriate, commercially available, and effective safer needles
- Realize that no single medical device can prove effective for all circumstances
- Identify devices used, the method in place to evaluate those devices, and justification for the eventual selection

- Select devices based on reasonable judgment but never jeopardize patient or employee safety
- Select devices that will make an exposure incident involving a contaminated sharp less likely to occur

Osha Hand Hygiene Requirements

- The OSHA Bloodborne Pathogen Standard requires that personnel to wash their hands immediately or as soon as feasible after removal of gloves or other PPE.
- OSHA requires employees to wash their hands and any other skin with soap and water or flush mucous membranes with water immediately or as soon as feasible following contact of such body areas with blood or other potentially infectious materials.
- Personnel removing gloves after exposure to blood or other potentially infectious materials must wash their hands using an appropriate soap and running water.
- Staff members with no access to a readily available sink after an exposure may decontaminate hands with a hand cleanser or towelette.
- However, staff must wash their hands with soap and running water as soon as feasible. If no exposure or contact occurs with blood or other potentially infectious materials, consider the use of alcohol-based hand cleansers as appropriate.
- Use alcohol-based sanitizing solutions when the location does not support hand washing facilities. Use a sanitizer with an alcohol concentration of62% or greater.
- It is important to note that hand sanitizers are effective against common diseases but they are ineffective against certain organisms such as bacterial spores. Never use sanitizers as a substitute for soap and water.
- Research shows that with just three applications of an alcohol-based sanitizer, the effectiveness of the sanitizer decreases.
- The reason for the decreased effectiveness is alcohol in the sanitizers can remove natural oils from your hands, which will cause your hands to dry out and crack.

Employee Involvement

- Employers must solicit input from nonmanagerial employees responsible for direct patient care regarding the identification, evaluation, and selection of effective engineering controls, includ- ing safer medical devices.
- Employees selected should represent the range of exposure situa- tions encountered in the workplace, such as those in geriatric, pediatric, or nuclear medicine and others involved in the direct care of patients.
- OSHA will check for compliance with this provision during inspections by questioning a representative number of employees to determine if and how their input was requested. Employers must document in the exposure control plan how they received input from employees.
- Organizations can meet this obligation by listing the employees involved and describing the process used to obtain their input.
- Employers can also present other documentation, including references to the minutes of meetings, copies of documents used to request employee participation, or records of responses received from employees.

Recordkeeping

- Employers with employees experiencing occupational exposure to blood or other potentially infectious materials must maintain a log of occupational injuries and illnesses under existing recordkeeping rules but must also maintain a sharps injury log.
- This log must be maintained in a manner that protects the privacy of employees. The sharps injury log may include additional information on how the employer protects the employee's privacy. Employers can determine the format of the log. At a minimum, the log must contain the following:
    - Type and brand of device involved in the incident
    - Location of the incident
    - Description of the incident

Engineering Controls

- Engineering controls include all control measures that isolate or remove a hazard from the work- place, such as sharps disposal containers and self-sheathing needles. The original Bloodborne Pathogens standard was not specific regarding the applicability of various engineering controls (other than the earlier examples) in the healthcare setting.
- The revision now specifies that safer medical devices, such as sharps with engineered sharps injury protections and needleless systems, constitute an effective engineering control.
- The phrase "sharps with engineered sharps injury pro- tection" describes nonneedle sharps or needle devices containing built-in safety features used for collecting fluids and administering medications or other fluids.
- It can also describe other procedures involving the risk of sharps injury. This description covers a broad array of devices including
    - Syringes with a sliding sheath that shields the attached needle after use
    - Needles that retract into a syringe after use
    - Shielded or retracting catheters
    - IV delivery systems that use a catheter port with a needle housed in a protective covering

Needleless Systems

- The term needleless systems refers to any devices that provide an alternative to needles for pro- cedures with a risk of injury involving contaminated sharps. Examples include IV systems that administer medication or fluids through a catheter port using nonneedle connections. Consider jet injection systems that deliver liquid medication beneath the skin or through a muscle as another example.

Exposure Determination

- Exposure determination involves listing all job classifications in which employees could encounter potential exposure.
- This includes physicians, nurses, and other clinical personnel. Maintenance, environmental services, and laundry personnel can work in situations that could pose exposure risks.
- List any specific procedures or tasks in which exposure could occur without regard to the use of PPE.

Control Measures

- Employers should take appropriate preventative measures against occupational exposure. These include engineering controls and work practice controls.
- Examples of engineering controls include biohazard hoods, puncture-resistant sharps containers, mechanical pipette devices, and other devices that permanently remove the hazard or isolate individuals from exposure.
- Organizations must evaluate and incorporate new safer devices including needleless devices, needles with sheaths, and blunt suture needles. Work practice controls must include hand washing policies, sharps handling procedures, proper waste disposal techniques, and other actions that would reduce the likelihood of exposure.

Personal Protective Equipment

- Employers must provide PPE to all personnel with occupational exposure. Select PPE that does not permit blood or other potentially infectious materials to pass through or reach a person's outer clothing, undergarments, skin, eyes, mouth, or other mucous membranes.
- Ensure that personnel wear gloves when hand contact occurs with blood or other potentially infectious materials.
- Replace disposable gloves as soon as possible when contaminated or no longer in a condition to provide barrier protection.
- Decontaminate reusable utility gloves and discard immediately if cracked, discolored, or punctured, or when they show signs of deterioration.
- Require personnel to wear masks, eye protection, and face protection when exposed to potentially infectious splashes, spray, or droplets.
- Require the use of gowns, aprons, and other clothing to protect against anticipated exposure to the body, head, and feet.

HousekeePing, laundry, and Waste Practices

- Employers should create a schedule for periodic cleaning and appropriate disinfecting to ensure that the worksite remains clean and sanitary.
- Personnel should place and transport contaminated laundry in properly labeled or color-coded bags and containers.
- They should disinfect contaminated work surfaces after completing the task.
- Clean surfaces contaminated by splashes or spills and when surfaces come into contact with blood or other potentially infectious materials.
- Clean the area at the end of the work shift. Place all blood or infectious materials, contaminated items that could release infectious materials, or contaminated sharps in appropriate sharps containers or clos- able, color-coded, or properly labeled leakproof containers or bags.
- Dispose of infectious waste in accordance with federal, state, and local regulations. Attach warning labels to all containers used for the storage or transport of potentially infectious materials.
- Use labels of orange or red-orange color with the biohazard symbol in a contrasting color. Employers can substitute red containers or bags for warning labels.

Hepatitis B Virus

- HBV causes an estimated 2 million deaths annually worldwide, establishes a carrier state in many victims, and generally produces some jaundice along with many of the acute symptoms such as (1) painful joint aches, (2) significant skin rashes, and (3) serve liver damage mediated by host immune reactions to the presence of HBV particles. If jaundice appears, it can persist for 2–6 weeks.
- HBV infection can cause severe fatigue and weakness, brown urine, and pale stools. The virus that causes HBV is found in blood and other body fluids, including semen, vaginal secretions, urine, and even saliva.
- Most people recover, but up to 10% become chronic carriers. These chronic carriers can spread the disease to others for an indefinite period of time and create a high risk for other diseases including cirrhosis of the liver and primary liver cancer.
- Although the blood and blood products provide the key transmission vehicle, viral antigen can also appear in tears, saliva, breast milk, urine, semen, and vaginal secretions.
- The virus can survive for 7 days or more on environmental surfaces exposed to body fluids containing the virus.
- Infection may occur when the virus transmitted by infected body fluids or implanted via mucous surfaces becomes introduced through breaks in the skin.

HePatitis B vaccination

- All healthcare personnel with potential exposure to blood, blood-contaminated body fluids, other body fluids, or sharps should receive vaccination.
- Administer the hepatitis B vaccine using the intramuscular route in the deltoid muscle. The OSHA Bloodborne Pathogens standard requires employers to offer the hepatitis B vaccine free of charge to all potentially exposed employees within 10 days of hire.
- Administer postexposure prophylaxis with hepatitis B immunoglobulin (passive immunization) and/or vaccine (active immunization) when indicated after percutaneous or mucous membrane exposure to blood known or suspected to contain hepatitis B. Needlestick or other percu- taneous exposures of unvaccinated persons should lead to initiation of the hepatitis B vaccine series. HBV vaccination requirements are as follows:
- OSHA requires employers to offer the HBV vaccination series to all personnel with poten- tial occupational exposure to blood or other potentially infectious material within 10 days of hire.
- Employers should always follow US Public Health Service and CDC recommendations for hepatitis B vaccination, serologic testing, follow-up, and booster dosing.
- Employers should test personnel for anti-HBs 12 months after completion of the three doses.
- Healthcare staff members should complete a second three-dose vaccine series or receive evaluation to determine if HBV positive (if no antibody response occurs to the primary vaccine series).
- Retest personnel for anti-HBs at the completion of the second vaccine dose. If no response to the second three-dose series occurs, retest nonresponders for HBV.
- Before vaccinating HBV-negative nonresponders, counsel them regarding their suscepti- bility to HBV infection and precautions.

- Employers should provide employees with appropriate education regarding the risks of HBV transmission and the availability of the vaccine. Employees who decline the vaccination should sign a declination form. Employers must maintain the form.
- Make the vaccination available without cost to the employee, at a reasonable time and place for the employee, by a licensed healthcare professional and according to recommendations of the US Public Health Service, including routine booster doses.
- Provide the healthcare professional designated by the employer to implement this part of the standard with a copy of the Bloodborne Pathogens standard.
- The healthcare professional must provide the employer with a written opinion stating whether the hepatitis B vaccination is indicated for the employee and whether the employee received the vaccination (Table 8.5).

HEPATITIS C VIRUS

- Hepatitis C, a contagious liver disease, results from infection with the hepatitis C virus (HCV). It can range in severity from a mild illness lasting a few weeks to a serious lifelong illness that damages the liver. Hepatitis C can occur in acute or chronic forms. Consider acute hepatitis C
- When the Hepatitis B Vaccination Is Not Required
    - Employees previously completing the hepatitis B vaccination series
    - Immunity confirmed through antibody testing
    - Vaccine contraindicated for medical reasons
    - Following participation in a prescreening plan
    - Employees who decline the vaccination

- Most people with hepatitis C present no symptoms. Symptoms can appear 2 weeks to 6 months after exposure. Symptoms can include fever, fatigue, no appetite, nausea, vomiting, abdominal pain and dark urine, clay-colored bowel movements, joint pain, and jaundice.

Human Immune Deficiency Virus

- HIV affects the immune system, rendering the infected individual vulnerable to a wide range of disorders. Infections typically lead to the death of the patient. Symptoms can occur within a month and can include fever, diarrhea, fatigue, and rash.
- Exposed persons may develop antibodies and not present symptoms for months to years. The infected person may finally develop a wide range of symptoms depending on the opportunistic infections against which the body's immune system cannot defend.

Other Key Topics

- Employees should know what to do when confronted with an emergency involving blood or other potentially infectious materials, postexposure evaluations, the HBV vaccine, and the use of signs and labels.
- After training, make vaccinations available to those who run the risk of exposure. Employers should establish a medical record for each employee with occupational exposure these records on-site or healthcare professionals providing services to the employees can retain the records.

- The medical record contains the employee's name, Social Security number, HBV vaccination status, date of the HBV vaccination (if applicable), and the written opinion of the health- care professional regarding the hepatitis B vaccination.
- Note any occupational exposure in the medical record to document the incident and include the results of testing following the incident. The postevaluation written opinion of the healthcare professional becomes a part of the medical record.
- The medical record must document what information was provided to the healthcare provider. Maintain medical records for 30 years past the last date of employment of the employee. Ensure confidentiality of medical records.
- Never disclose a medical record or part of a medical record without direct written consent of the employee or as required by law.
- Keep training records for 3 years. Training records must include the date, content outline, trainer's name and qualifica- tions, and names and job titles of all persons attending the training sessions. Employers who cease to do business should transfer the medical and training records to the successor employer.
- Upon request, make both medical and training records available to the assistant secretary of labor for Occupational Safety and Health. Make training records available to employee upon request. The employee or anyone given the employee's written consent may obtain medical records.
- Keep this record confidential and keep it separate from other personnel records. Employers can keep
- HIV Exposures and Transmission Routes
- Contact with blood, semen, vaginal secretions, and breast milk
- Sexual intercourse
- Using needles contaminated with the virus
- Contact with HIV-infected blood under the skin, mucous membranes, or broken skin
- Mother-to-child contact at the time of birth
- Blood transfusions or organ transplants

WORKPLACE TRANSMISSION OF HIV

- Body fluids such as saliva, semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, amniotic fluid, and any other body fluids visibly contaminated with blood
- Saliva and blood contacted during dental procedures
- Unfixed tissue or organs other than intact skin from living or dead humans
- Organ cultures, culture media, or similar solutions
- Blood, organs, and tissues from experimental animals infected with HIV or HBV

Means of Transmission

- Accidental injury with a sharp object contaminated with infectious material, such as needles, scalpels, broken glass, and anything that can pierce the skin
- Open cuts, nicks, skin abrasions, dermatitis, acne, and mucous membranes
- Indirect transmission, such as touching a contaminated object or surface and transferring the infectious material to the mouth, eyes, nose, or open skin

Latex Allergies

- OSHA's Bloodborne Pathogens standard requires hand washing after the removal of gloves or other PPE to help minimize the amount of powder or latex remaining in contact with the skin.
- Employees can develop latex sensitivity or latex allergy from exposure to latex in products such as latex gloves. NIOSH estimates that 8%–12% of healthcare personnel may experience latex reactions ranging from contact dermatitis to possibly life-threatening sensitivity.
- Among the alternatives include synthetic, low-protein, and powder-free gloves. Powder-free gloves may reduce systemic aller- gic responses.
- Employees should never wear latex gloves when no risk of exposure to blood or other potentially infectious materials exists. Never assume hypoallergenic gloves, glove liners, or powder-free gloves as latex free. Use good housekeeping practices to remove latex-containing dust from the workplace.
- Frequently clean areas contaminated with latex dust such as upholstery, carpets, and ventilation ducts. Frequently change ventilation filters and vacuum bags used in latex-contaminated areas.
- Employ appropriate work practices to reduce the chance of reactions to latex such as not using oil- based hand creams or lotions that can cause glove deterioration unless shown to reduce latex-related problems and maintain glove barrier protection.
- After removing latex gloves, wash hands with a mild soap and dry thoroughly.

Information And Training

- All employees with occupational exposure must receive initial and annual training on the hazards associated with exposure to bloodborne pathogens.
- The training must also address the protective measures taken to minimize the risk of occupational exposure. Employers must conduct retraining when changes in procedures or tasks occur.
- Consider OSHA employee training requirements as performance oriented. However, employers may tailor their presentations to the employees' back- grounds and responsibilities. Ensure that the training addresses the topics listed in paragraph (g)(2)(vii) of 29 CFR 1910.1030.
- Employers must provide training at the time of initial employment and at least annually thereafter.
- Provide annual retraining for employees within 1 year of their original training date.
- Refresher training must cover topics listed in the standard to the extent needed and must emphasize new information or procedures.
- Employers must train part-time employees, temporary employees, and those referred to as agency or per diem employees.
- OSHA requires training to include an explanation of the use and limitations of methods that will prevent or reduce exposure, including appropriate engi- neering controls, work practices, and PPE.
- Training must include instruction on any new techniques and practices. Use hands-on training if possible.

Training Methods And Interactive Question Opportunities

- Training employees solely by means of a film or video without the opportunity for a discussion period would constitute a violation of 29 CFR 1910.1030(g)(2). Never consider a computer pro- gram, even an interactive one, as appropriate unless the employer supplements such training with site-specific information required.
- Provide trainees with direct access to a qualified trainer during all training sessions. OSHA permits employers to meet the requirement if personnel can directly access a trainer by way of a telephone hotline.
- OSHA does not consider the use of electronic mail systems to answer employee questions unless a trainer answers e-mailed questions at the time the questions arise.

Trainer Qualifications

- OSHA requires persons conducting training to possess knowledge in the subject matter covered by the elements contained in the training plan.
- The trainer must demonstrate expertise in the area of the occupational hazard of bloodborne pathogens and know local procedures.
- Trainers, such as infection control practitioners, registered nurses (RAs), occupational health professionals, PAs, emergency medical technicians, industrial hygienists, and professional trainers, may conduct the training provided they know the subject matter covered in the training plan as it relates to the workplace.
- In dentist and physician offices, individual employers may conduct the training, pro- vided they understand bloodborne pathogen exposure control and the subject matter required by the standard.

Medical Recordkeeping

- Medical recordkeeping, covered by 29 CFR 1910.1020(h), requires employers to keep medical and training records for each employee. OSHA permits employers not to retain medical records of employees working for less than a year need if given to the employee upon termination of employment.
- Keep medical records confidential except for disclosures permitted by the standard or by other federal, state, or local laws. Make all medical records required by the standard available to OSHA.
- The compliance officer must protect the confidentiality of these records. If copied for the case file, follow the provisions of 29 CFR 1913.10. Consider records about employee exposure to bloodborne pathogens and documenting their HIV/HBV status as medical records.

Training Recordkeeping

- OSHA requires accurate recordkeeping of training sessions, including titles of the employees who attend. The records assist the employer and OSHA in determining whether the training plan adequately addresses the risks involved in each job.
- Additionally, this information can prove helpful in tracking the relationship between exposure incidents and the corresponding levels of training. Store training records on-site to permit easy access.

- Do not consider training records as confidential. Retain training records for 3 years from the training date.

Hazardous Waste Operations And Emergency Response (29 Cfr 1910.120)

- The standard covers all personnel expected to respond to emergencies caused by the uncontrolled release of a hazardous substance.
- The definition of hazardous substance includes any biological agent or infectious material that may cause disease or death. Potential scenarios where the
- Bloodborne Pathogens and HAZWOPER standards may interface include healthcare staff members responding to an emergency caused by the uncontrolled release of infectious material.
- Employers of employees engaged in these types of activity must comply with the requirements in 29 CFR 1910.120 as well as the Bloodborne Pathogens standard.
- If there is a conflict or overlap, the provision that is more protective of employee safety and health applies.

Postexposure Evaluation And Follow-Up

- Employers should provide a confidential medical evaluation for any employees involved in an exposure incident.
- The evaluation documents the exposure route and all circumstances related to the incident including blood testing, HIV/HBV status of source, and appropriate medical/psychological treatment.
- An exposure incident can occur to a specific eye, the mouth, mucous membranes, nonintact skin, or any other contact with potentially infectious material that results from the performance of an employee's duties.
- Employees should immediately report exposure incidents to permit timely medical evaluation and follow-up by a healthcare professional. The employer can request testing of the source individual's blood for HIV and HBV.
- Consider a source individual as any patient whose blood or body fluids provide the source of an exposure incident to an employee.
- At the time of expo- sure, the exposed employee must report to a healthcare professional. The employer must provide the healthcare professional with a copy of the Bloodborne Pathogens standard and a description of the employee's job duties as they relate to the incident.
- The employer must also provide a report of the specific exposure, including route of exposure, relevant employee medical records (including hepatitis B vaccination status), and results of the source individual's blood tests, if available.
- Draw a baseline blood sample if the employee consents. If the employee elects to delay HIV testing of the sample, the healthcare professional must preserve the employee's blood sample for at least 90 days.
- Never repeat testing for known HIV- or HBV-positive individuals. Most states require written con- sent before testing. Treat the results of the source individual's blood test as confidential.

- Make the results available to the exposed employee through consultation with the healthcare professional. The healthcare professional will provide a written opinion to the employer.
- The opinion can provide only a statement that the employee received the results of the evaluation. The employer must provide a copy of the written opinion to the employee within 15 days.
- This requirement remains the only information shared with the employer following an exposure incident.
- Treat all other employee medical records as confidential. Provide all evaluations and follow-up visits at no cost to the employee. They must take place at a reasonable time and place.
- Perform evaluations and follow-up visits under the supervision of a licensed physician or another licensed healthcare professional.
- All evaluations must follow the US Public Health Service guidelines current at the time. Conduct all laboratory tests by using an accredited laboratory and at no cost to the employee

5.4 TUBERCULOSIS P6

- Every healthcare setting should conduct initial and ongoing evaluations for the risk of TB transmission.
- The TB risk assessment determines the types of administrative, environmental, and respiratory protection controls needed for a setting and serves as an ongoing evaluation tool of the quality of TB infection control and for the identification of needed improvements in infection-control measures.
- Review the community profile of TB disease in collaboration with the state or local health department.
- Consult the local or state TB-control plan to obtain epidemiologic surveillance data necessary to conduct a TB risk assessment for the healthcare setting. Review the number of patients with sus- pected or confirmed TB disease encountered in the setting during at least the previous 5 years.
- The screening plan should consist of four major components: (1) baseline testing for TB infection, (2) serial testing for TB, (3) serial screening for symptoms or signs of TB disease, and (4) TB training and education. Surveillance data from HCWs can protect both HCWs and patients.
- Screening can prevent future transmission by identifying lapses in infection control and expediting treatment for persons with LTBI or TB disease. Test for TB and document the TB screening according to procedures in the 2005 CDC Guidelines.
- Maintain the protection of privacy and confidentiality of all test results. protection controls needed for a setting and serves as an ongoing evaluation tool of the quality of TB infection control and for the identification of needed improvements in infection-control measures.
- Review the community profile of TB disease in collaboration with the state or local health department.
- Consult the local or state TB-control plan to obtain epidemiologic surveillance data necessary to conduct a TB risk assessment for the healthcare setting. Review the number

of patients with sus- pected or confirmed TB disease encountered in the setting during at least the previous 5 years.

- The screening plan should consist of four major components: (1) baseline testing for TB infection, (2) serial testing for TB, (3) serial screening for symptoms or signs of TB disease, and (4) TB training and education. Surveillance data from HCWs can protect both HCWs and patients.
- Screening can prevent future transmission by identifying lapses in infection control and expediting treatment for persons with LTBI or TB disease.
- Test for TB and document the TB screening according to procedures in the 2005 CDC Guidelines. Maintain the protection of privacy and confidentiality of all test results.

Evaluating the Circumstances Surrounding an

- Exposure Incident
- Engineering controls in use at the time
- Work practices followed
- Description of the device being used
- Protective equipment or clothing used at the time of the exposure incident
- Where the incident occurred
- Procedure being performed when the incident occurred
- Employee's training

Tb Screening Procedures For Settings Classified As Low Risk

- All employees should receive baseline TB screening upon hire, using two-step tuberculin skin test (TST) or a single blood assay for Mycobacterium tuberculosis (BAMT) to test for infection.
- After baseline testing, do not conduct additional screening if an exposure to TB occurs.
- Individuals with a baseline positive or newly positive test result for TB or documentation of treatment for latent TB infection (LTBI) or TB disease should receive one chest radiograph result to exclude TB disease or provide an interpretable copy within a reasonable time frame, such as 6 months.
- Do not repeat radiographs unless symptoms or signs of TB disease develop or as recommended by a clinician.

Tb Screening Procedures For Settings Classified As Medium Risk

- All healthcare personnel should receive baseline TB screening upon hire, using two-step TST or a single BAMT to test for infection.
- After baseline testing, personnel should receive TB screening annually. Personnel with a baseline positive or newly positive test result or documentation of previous treatment for LTBI or TB disease should receive one chest radiograph result to exclude TB disease.
- Instead of participating in serial testing, personnel should receive a symptom screen annually.
- This screen should be accomplished by educating the employees about symptoms of TB disease and instructing them to report any such symptoms immediately. Conduct treatment for LTBI in accordance with CDC guidelines.

Tb Screening Procedures For Settings Classified As Potential Ongoing Transmission

- Perform testing for TB infection every 8–10 weeks until correcting lapses in infection control and no additional evidence of ongoing transmission exists. Consider the classification of potential ongoing

TB Training and Education Topics

- Basic concepts of transmission, pathogenesis, and diagnosis
- Explanation of the difference between latent and active tuberculosis
- Signs and symptoms of active tuberculosis
- Increased risk for those infected with HIV
- Potential for occupational exposure
- Information about prevalence of tuberculosis in the community
- Situations that increase the risk of exposure
- Principles of infection control
- Importance of skin testing and significance of a positive test
- Principles of preventive therapy for latent tuberculosis
- Drug therapy procedures for active tuberculosis
- Importance of notifying the facility
- Information about medical evaluation for symptoms of active tuberculosis

OSHA Tuberculosis Exposure Enforcement Guidelines

- These guidelines address patient and healthcare staff testing, source control methods, decontamination techniques, and prevention of tuberculosis-contaminated air.
- This enforcement policy refers to CDC guidelines and the OSHA general duty clause. OSHA conducts inspections in response to complaints and during routine compliance visits in the following workplaces:

    - Healthcare settings
    - Correctional institutions
    - Homeless shelters
    - Long-term care facilities
    - Drug treatment centers

OSHA Citations For Tb Exposures

- OSHA can issue citations to employers as a result of exposure or potential exposure to the exhaled air of a suspected or confirmed case of tuberculosis.
- Exposure can occur during a high-hazard procedure performed on an individual with suspected or confirmed tuberculosis.
- OSHA can issue citations under the respirator standard (29 CFR 1910.134) when employers fail to provide respirators and fit testing to potentially exposed employees.

OSHA Abatement Methods

- Strive to identify persons with active tuberculosis. Provide medical surveillance at no cost to the employee, including preplacement evaluation, tuberculosis skin tests, annual

evaluations, and twice- yearly exams for those exposed. Evaluate and manage individuals with a positive skin test.

- Use acid- fast bacilli isolation rooms for those with active or suspected TB infection. Maintain such rooms under negative pressure and use outside exhaust or high-efficiency particulate air (HEPA)-filtered ventilation.
- Develop an employee information and training plan.

OSHA Tuberculosis Respirator Requirements

- OSHA requires healthcare organizations to meet the provisions of 29 CFR 1910.134, which covers respiratory protection for general industry.
- OSHA enforces all provisions, including annual fit testing with regard to TB exposures.
- When using disposable respirators, never permit reuse unless maintaining the functional and structural integrity of the respirator.
- Maintaining functionality depends on adherence to the manufacturer's instructions. Facilities should address the conditions under which a disposable respirator is considered contaminated.
- Whenever using reusable or disposable respirators, employers must implement a respiratory protection plan to meet the requirements of 29 CFR 1910.134.
- This entails creating a written respiratory protection plan for managing respirator selection and use, employee instruction and training, surveillance of work area conditions, and res- pirator fit testing. 29 CFR 1910.134 provides specific guidance on appropriate fit.

Tb Exposure Control Plan

- Every healthcare setting should implement a TB infection control plan as a part of their overall infection control and prevention efforts.
- The specific details of the TB infection control plan can differ depending on patients encountered. Administrators making this distinction should obtain medical and epidemiologic consultation from state and local health departments.
- The TB infection-control plan should consist of administrative controls, environmental controls, and a respiratory protection plan.
- Every setting providing services to persons with suspected or con- firmed infectious TB disease, including laboratories and nontraditional facility-based settings, should develop a TB infection control plan.
- Take the following steps to establish a TB exposure- control plan: (1) assign supervisory responsibility for the TB infection-control plan to a qualified person or group; (2) delegate authority to conduct a TB risk assessment, implement, and enforce TB infection-control policies; (3) ensure the completion of education and training; (4) develop a written TB exposure control plan that outlines control procedures; and (5) update the plan annually.
- Employers must develop procedures for evaluating suspected or confirmed TB disease when not promptly recognized or appropriate precautions or controls fail.
- Collaborate with the local or state health department to develop administrative controls consisting of the risk assessment, the written TB infection-control plan, management of patients with suspected or confirmed TB disease, training and education. wents with suspected or confirmed TB disease when transferred from another setting.

Administrative Controls

- The first and most important level of TB controls is the use of administrative measures to reduce the risk for exposure to persons with TB disease.
- Administrative controls consist of the following activities: (1) assigning responsibility for TB exposure control in the setting, (2) conducting a TB risk assessment of the setting, (3) developing and instituting a written TB exposure control plan to ensure prompt detection, (4) use of airborne precautions, (5) treatment of persons with suspected or confirmed TB disease, and (6) ensuring the timely availability of recommended laboratory processing, testing, and reporting of results to the ordering physician and infection-control team.
- Other administration controls include implementing effective work practices for the management of patients with suspected or confirmed TB disease and ensuring proper cleaning and sterilization or disinfection of potentially contaminated equipment such as endoscopes.
- Provide training and education with specific focus on prevention, transmission, and symptoms. Conducting screening and evaluation of at risk for TB disease remains a key administrative action.

Environmental Controls

- Environmental controls provide the second line of defense in the TB infection-control plan, after administrative controls. Environmental controls include technologies for the removal or inactivation of airborne TB.
- These technologies include local exhaust ventilation, general ventilation, HEPA filtration, and ultraviolet germicidal irradiation (UVGI).
- These controls help to prevent the spread and reduce the concentration of infectious droplet nuclei in the air. CDC provides a summary of environmental controls and their use in the prevention in the 2005 CDC TB Guidelines.
- Primary environmental controls consist of controlling the source of infection by using local exhaust ventilation (hoods, tents, or booths) and diluting and removing contaminated air by using general ventilation.
- Secondary environmental controls consist of controlling the airflow to prevent contamination of air in areas adjacent to the source (AII rooms) and cleaning the air by using HEPA, filtration, or UVGI.

Respiratory Protection Controls

- The first two control levels minimize the number of areas in which exposure to M. tuberculosis might occur and, therefore, minimize the number of persons exposed. These control levels also reduce, but do not eliminate, the risk for exposure in the limited areas in which exposure can still occur.
- Because persons entering these areas might be exposed to M. tuberculosis, the third level of the hierarchy is the use of respiratory protective equipment in situations that pose a high risk for exposure.
- Use of respiratory protection can further reduce the risk for exposure from droplet nuclei expelled into the air from a patient with infectious TB disease.
- Take the following measures to reduce the risk of exposure: (1) implement a respiratory protection plan, (2) train employees on respi- ratory protection, and (3) educate patients about respiratory hygiene and cough etiquette procedures.

Engineering Controls

- Engineering controls prove critical in preventing the spread of tuberculosis within a facility. The CDC guidelines recommend exhausting air from possibly infected areas to the outside. Healthcare facilities can develop isolation rooms with negative pressure. Recommend a rate of six air changes per hour. New construction requires 12 air changes per hour. Some facilities use germicidal ultra- violet lights to supplement ventilation and isolation efforts.

5.5 HEALTHCARE OPPORTUNISTIC INFECTIONS P7

BACTERIA

- Once classified as a member of the plant kingdom, we classify bacteria as a totally separate kingdom. Bacteria adapt remarkably and survive in diverse environmental conditions.
- They exist in the bodies of all living organisms and in all parts of the world even in hot springs and the stratosphere. Bacteria normally exhibit one of three typical shapes: (1) rod shaped (bacillus), (2) round (cocci), and (3) spiral (spirillum). An additional group (vibrios) appears as incomplete spirals.
- We can characterize bacteria by growth patterns such as the chains formed by strep-tococci. Bacillus and Spirillum exhibit motile or swimming motions similar to the whip-like movements of flagella.
- Other bacteria possess rod-like appearances (called pili) that serve as tethers. Aerobic forms of bacteria function only in the presence of free or atmospheric oxygen. Anaerobic bacteria cannot grow in the presence of free oxygen but obtain oxygen from other compounds.
- Bacteria do not make their own food and must live in the presence of other plant or life. Bacteria grow when they find food and favorable conditions. A cough or sneeze releases millions of bacteria from the body.

Methicillin-Resistant Staphylococcus Aureus

- Staphylococcus aureus can live on the skin or in the nose of healthy people. During the past 50 years, these infections became resistant to various antibiotics, including penicillin-related antibiotics.
- Infection control personnel refer to these resistant bacteria as methicillin-resistant S. aureus (MRSA).
- Colonization can occur when the staph bacteria survive on or in the body without causing illness. Staph bacteria causes a variety of illnesses, including skin infections, bone infections, pneumonia, and severe BSIs.
- MRSA occurs more commonly among persons in hospitals and healthcare facilities. The infection usually develops in elderly hospitalized patients with serious illnesses or in an open wound such as a bedsore.
- Factors that place some patients at risk include long hospital stays, receiving broad-spectrum antibiotics, and being kept in an intensive care or burn unit.
- Keep cuts and abrasions clean and covered with a proper dressing or bandages and to avoid contact with wounds or material contaminated by wounds.

- Implement con- tact precautions when identifying MRSA, and infection control believes that it indicates special clinical or epidemiologic significance.

Viruses

- Smaller than bacteria, viruses contain a chemical compound with protein. They must infect a host to survive for long periods.
- Viruses depend on the host cells to reproduce. Outside of a host cell, a virus exists as a protein coat or capsid that can enclose within a membrane.
- While outside the cell, a virus remains metabolically inert. A virus can insert genetic material to take over the functions of the host.
- An infected cell begins to produce more viral protein and genetic material instead of its usual products.
- Some viruses may remain dormant inside host cells for long periods and cause no obvious change in the host cells.
- When stimulated, a dormant virus enters a phase that results in new viruses bursting and infecting other cells.
- Viruses cause a number of diseases, including smallpox, colds, chickenpox, influenza, shingles, hepatitis, polio, rabies, and AIDS. Disinfectants destroy viruses very easily.

Aspergillus

- The mold spore produced by Aspergillus can create pathogenic infection opportunities. Aspergillus exists worldwide and can thrive at elevated temperatures.
- Ideal growth conditions include damp areas with decaying vegetation. Aspergillus appears initially as a flat thread-like white growth that soon becomes a powdery blue–green mold spore.
- Most infections result from inhaling these spores. Most people possess natural immunity and do not develop any disease.
- Patients with serious ailments tend to experience a greater risk of infection. The severity of Aspergillus depends on the individual's immune system.
- Aspergillus infection can range from sinusitis conditions to pulmonary infections, including pneumonia.
- Ventilation plays a key role in maintaining an Aspergillus-free environment in healthcare settings. Establish procedures to control dust during renovations that occur near patient areas.

Anthrax

- Exposure to the spore-forming bacterium results in black coal-like skin lesions.
- In the naturally occurring forms, anthrax passes on by contact with anthrax-infected or anthrax-contaminated animals and animal products.
- Anthrax does not spread from one person to another person.
- Humans can host three forms of anthrax: inhalation, cutaneous, and gastrointestinal. Inhalation anthrax occurs when the anthrax spore is inhaled.
- Cutaneous anthrax, the most common naturally occurring form, is contracted by handling contaminated hair, wool, hides, flesh, blood, or excreta of infected animals and from manufactured products such as bonemeal.

- It is introduced through scratches or abrasions of the skin.
- Gastrointestinal anthrax occurs as a result of ingesting insufficiently cooked infected meat or from flies.
- The spores enter the lungs, migrate to the lymph nodes, change to the bacterial form, multiply, and produce toxins.

Severe Acute Respiratory Syndrome

- Severe acute respiratory syndrome (SARS) is an emerging, sometimes fatal, respiratory illness. The first identified cases occurred in China during 2002. Some experts believe that a virus causes SARS;
- however, the specific agent remains unidentified. No laboratory or other test can definitively identify cases.
- Most suspected SARS cases occurring in the United States involved individuals returning from travel to Asia and healthcare staff members in contact with patients.
- Casual contact does not appear to cause SARS. Transmission appears to occur primarily through close contact with a symptomatic patient.
- Signs of illness include a decreased white blood cell count in most patients as well as below-normal blood platelet counts, increased liver enzymes, and electrolyte disturbances in a number of patients.

Pseudomonas

- Pseudomonas, a motile rod-shaped organism, uses glucose in an oxidative manner. These bacteria pose a clinically important risk because of their resistance to most antibiotics.
- They can survive conditions that few other organisms can tolerate, aided by their production of a protective slime layer.
- The key targets include immune-suppressed individuals, burn victims, and individuals on respirators or with indwelling catheters.
- Additionally, these pathogens colonize the lungs of cystic fibrosis patients, increasing the mortality rate of individuals with the disease.
- Infections can occur at many sites and can lead to urinary tract infections, sepsis, pneumonia, and pharyngitis.
- Rarely does Pseudomonas cause infection in healthy individuals. Its noninvasive nature limits its pathogenic capabilities. Pseudomonas prefers to inhabit moist environments, but it can survive in a medium as deficient as distilled water.

Legionella

- Studies link a majority of outbreaks to cooling towers and domestic water systems. Other sources include evaporative condensers, respiratory equipment, showers, faucets, whirlpool baths, humidi- fiers, and decorative fountains.
- Hot water systems provide a perfect breeding habitat as Legionella grows best in temperatures ranging from 95°F to 115°F.
- Uncontrollable incidents that can cause Legionella problems include surges in water pressure that may disburse dirt into the water system or dislodge Legionella-laden scale and sediment from the walls of water pipes.

- Legionella can enter cooling towers, air intakes, or water pipes. In addition, new or renovated water lines not properly flushed prior to opening may contain Legionella. Idle plumbing can hold heavy contamination due to stagnant water.
- Current human treatment includes the antibiotics erythromycin and rifampin for severe cases.

Infection Control Risk Assessment

- ICRA functions best as a multidisciplinary process that focuses on reducing risk from infection throughout facility planning, design, construction, and renovation activities. A multidisciplinary team considers environment, infectious agents, human factors, and impact of a proposed project on controlling infections.
- The team includes, at a minimum, experts in infectious disease, infec- tion control, patient care, epidemiology, facility design, engineering, construction, and safety, as circumstances dictate.
- Educate both the construction team and healthcare staff about high-risk patient areas with regard to the airborne infection risks associated with construction projects, dispersal of fungal spores during such activities, and methods to control the dissemination of fungal spores.
- Incorporate mandatory adherence agreements for infection control into construction contracts, with penalties for noncompliance and mechanisms to ensure timely correction of problems.
- Establish and maintain surveillance for airborne environmental disease such as Aspergillus during construction, renovation, repair, and demolition activities to ensure health and safety of high-risk patients.

5.6 HEALTHCARE-ASSOCIATED INFECTIONS P8

- According to the CDC, almost 1.7 million hospital-acquired infections occur yearly, contributing to approximately 99,000 deaths.
- Such infections were long accepted by clinicians as an inevitable hazard.
- Recent efforts demonstrate that simple measures can prevent the majority of common infections Hospitals and providers must work to reduce the burden of these infections.
- Four specific infections account for more than 80% of all hospital-related infections. Their list includes surgical site infec- tions (SSIs), catheter-associated urinary tract infection (CAUTIs), central venous catheter (CVC)– related bloodstream infections (CRBSIs), and ventilator-associated pneumonia (VAP).
- Preventing the transmission of antibiotic-resistant bacteria such as MRSA has become increasingly important.
- Effective measures exist to prevent the most common healthcare-associated infections (HAIs).

Central Venous Catheter–Related Bloodstream Infections

- Employ maximal sterile barrier precautions. Use aseptic technique including the use of a cap, mask, sterile gown, sterile gloves, and a large sterile sheet for the insertion of all CVCs.

- Use 2% chlorhexidine gluconate solution for skin sterilization at the CVC insertion site. Avoid femoral site for nonemergency CVC insertion and ensure prompt removal of unnecessary catheters.

Surgical Site Infection

- Ensure administration of appropriate prophylactic antibiotic, generally begun within 1 h before skin incision and discontinued within 24 h.
- Avoid shaving of the operative site and use clippers or other methods for hair removal in the area of skin incision(s).
- Ensure maintenance of blood glucose less than 150 mg/dL during postoperative period. Use tighter controls needed in specific patient populations.

Ventilator-Associated Pneumonia

- Ensure elevation of the head of the bed to more than 30° for all mechanically ventilated patients. Minimize the duration of mechanical ventilation by minimizing sedative administration (including daily sedation holidays) and/or using protocol-based weaning.

Catheter-Associated Urinary Tract Infection

- Ensure the use of skin antisepsis at insertion and proper aseptic technique for the maintenance of catheter and drainage bag, and the use of closed urinary drainage system.
- Ensure removal of urinary catheter when no longer essential for care.

5.7 MEDICATION SAFETY P9

- Medications include prescriptions, samples, herbal remedies, vitamins, over-the-counter drugs, vaccines, diagnostic drugs, and contrast agents used on/administered to persons to diagnose, treat, or prevent disease.
- The list includes radioactive medications, respiratory therapy treatments, blood derivatives, intravenous solutions, and any product designated by the FDA as a drug.
- The definition of medication does not include enteral nutrition solutions, oxygen, and other medical gases.
- Consider medication management as an important component in the palliative, symptomatic, and curative treatment of many diseases or conditions.

Medication Errors

- Clinicians must deal with more than 10,000 prescription medications. One-third of adults in the United States take five or more medications.
- Patients admitted to a hospital commonly receive new medications or incur changes to their existing medications.
- Hospital-based clinicians also may not access a patient's complete medication list or remain unaware of recent medication changes.
- As a result, the new medication regimen prescribed at the time of discharge may inadvertently omit needed medications, unnecessarily duplicate existing therapies, or contain incorrect dosages.
- Such unintended inconsistencies in medication regimens may occur at any point of transition in care such as transfer from an intensive care unit to a general nursing unit.

- Studies show that unintended medication discrepancies occur in nearly one-third of patients at admission, a similar proportion at the time of transfer from one site of care within a hospital, and in 14% of patients at hospital discharge.
- Medication reconciliation refers to the process of avoiding such inadvertent inconsistencies across transitions in care by reviewing the patient's complete medication regimen at the time of admission, transfer, and discharge and comparing it with the regimen being considered for the new setting of care.
- Though most often discussed in the hospital context, medication reconciliation can prove equally important in ambulatory care, as many patients receive prescriptions from more than one outpatient provider.
- Advances in clinical therapeutics can result in major improvements in the health of patients.
- These benefits can become overshadowed by increased risks. An ADE is defined as harm experienced by a patient as a result of exposure to a medication, and ADEs account for nearly 700,000 emergency department visits and 100,000 hospitalizations each year.
- ADEs affect nearly 5% of hospitalized patients, making them one of the most common types of inpatient errors; ambulatory patients may experience ADEs at even higher rates.
- As with the more general term adverse event, the occurrence of an ADE does not necessarily indicate an error or poor quality care.
- A medication error refers to an error (of commission or omission) at any step along the pathway that begins when a clinician prescribes a medication and ends when the patient actually receives the medication.
- Preventable ADEs result from a medication error that reaches the patient and causes any degree of harm.
- We can characterize medication errors that do not cause any harm because of interception before reaching the patient or by simple luck as potential ADEs. A certain percentage of patients can still experience ADEs from medications correctly prescribed and administered appropriately.
- Consider these events as adverse drug reactions or nonpreventable events. For example, the safe use of heparin requires weight-based dosing and frequent monitoring of tests of the blood's clotting ability.
- Taking these actions can help avoid either bleeding complications for high doses and or clotting risks for low doses.
- Prescribing an incorrect dose of a medication would result in an error even if a pharmacist detected the mistake before the patient received the dose.
- If the incorrect dose gets dispensed and administered, but no clinical consequences occurred, that would still classify as a potential ADE.

Risk Factors For Adverse Drug Events

- There exist patient-specific and drug-specific risk factors for adverse events. Older patients take more medications and can prove more vulnerable to specific medication adverse effects.
- Pediatric patients experience a more elevated risk, particularly when hospitalized due to poor weight dosing.

- Other well- documented patient-specific risk factors include limited health literacy and math ability.
- Ambulatory patient factors remain overlooked as an important source of ADEs. Studies show that both caregivers and patient can commit medication administration errors at surprisingly high rates.
- The Institute for Safe Medication Practices (ISMP) maintains a list of high-alert medications—medications that can cause significant patient harm if used in error.
- These include not only medications with dangerous adverse effects, but also look-alike, sound alike medications, with similar names and physical appearance but containing completely different pharmaceutical properties.

Prevention Of Adverse Drug Events

- The pathway between a clinician's decision to prescribe a medication and the patient actually receiving the medication consists of several steps:

- Ordering: The clinician should select the appropriate medication and determine the dose and frequency of administration.
- Transcribing: In a paper-based system, an intermediary (a clerk in the hospital setting, or a pharmacist or pharmacy technician in the outpatient setting) should read and interpret the prescription correctly.
- Dispensing: The pharmacist should check for drug–drug interactions and allergies, then release the appropriate quantity of the medication in the correct form.
- Administration: Supply the correct medication for administration to the correct patient at the correct time.

- While the majority of errors likely occur at the prescribing and transcribing stages, medication administration errors do occur frequently in both inpatient and outpatient settings.

- Analysis of serious medication errors invariably reveals other underlying system flaws, such as human factors engineering issues and impaired safety culture, that allowed individual prescribing or administration errors to reach the patient and cause serious harm. Integration of information technology solutions, computerized provider order entry (CPOE), and barcode medication administration into closed-loop medication systems holds great promise for improving medication safety in hospitals.

- Preventing ADEs remains a key priority for accrediting and regulatory agencies. The Partnership for Patients now includes ADE prevention as a patient safety improvement goal. The Partnership for Patients set a goal of reducing preventable ADEs in hospitalized patients by 50%.

Accomplishing Medication Reconciliation

- A 2012 systematic review of inpatient medication reconciliation studies did find some evidence supporting pharmacist-led medication reconciliation processes.

- However, the study did not reach any firm conclusions regarding the most effective strategies.
- The Joint Commission suspended scoring of medication reconciliation during on-site accreditation surveys between 2009 and 2011.
- As of July 2011, medication reconciliation became incorporated into National Patient Safety Goal 3, Improving the safety of using medications.
- This National Patient Safety Goal requires that organizations "maintain and communicate accurate medication information" and "compare the medication information the patient brought to the hospital with the medications ordered for the patient by the hospital in order to identify and resolve discrepancies."
- Medication reconciliation processes can help avoid inadvertent inconsistencies across transitions in care.
- Accomplish this by reviewing the patient's complete medication regimen at the time of admission, at transfer, and upon discharge to compare it with the regimen being considered for any new setting of care.
- Researchers continue to study a variety of methods to include (1) pharmacists performing the entire process, (2) linking medication reconciliation to existing CPOE systems, and (3) integrating medication reconciliation within the EMR system.
- In 2009, the Joint Commission announced that they would no longer formally score medication reconciliation during on-site accreditation surveys. This policy change was made in recognition of the lack of proven strategies for accomplishing medication reconciliation

Key Medication Reconciliation Suggestions

- Facility personnel should identify all medications of patients being admitted.
- Require the patient or a family member validate the list if possible.
- Compare admission orders with the preadmission medication list.
- Make the list readily available to prescribing professionals.
- Provide reconciliation info to the next unit or patient care setting.
- Give the complete list of medications to the patient at discharge.

Medication Administration

- Develop guidelines for staff members administering medications with or without supervision, consistent with law and regulation and organization policy. Address an individual's qualification to administer by medication, medication class, or route of administration.
- Provide guidelines for prescribing professional notification in the event of an adverse drug reaction or medication error. Identify the patient by using at least two individual identifiers excluding patient location.
- Verify the correct medication by reviewing the medication order and product label. Verify stability by conducting a visual examination for particulate matter or discoloration and check the medication expiration date.
- Verify that no contraindication exists before administering the medication. Validate the medication administration time, prescribed dose, and correct administration route.

- Advise the patient or the patient's family about any potential adverse reactions. Discuss any significant concerns about the medication with the patient's physician or prescriber. Provide guidance and training to patients doing self-administration of drugs. Training topics should include how to administer, frequency, route of administration, and dosage. Educate caregivers about any possible side effects of the medications administered

Reducing Medication Errors

- Many medication errors occur while communicating or transcribing medication orders. Take steps to reduce the potential for error or misinterpretation of written or verbal orders.
- The written policy should address the required elements of a complete medication order.
- Develop and publish as a list of unacceptable abbreviations, symbols, acronyms, and dose information.
- Provide guidance on the use and acceptability of generic versus brand name drugs.
- Implement detailed policies for ordering drugs with look-alike or soundalike names.
- Post procedures for dealing with incomplete, illegible, or unclear orders.

Medication Administration Safety Suggestions

- Ensure guidelines consistency with laws, regulations, and policies.
- Address qualifications to administer by medication, class, or route.
- Develop guidance for professional notification for an adverse drug event.
- Identify patients using at least two individual identifiers excluding room.
- Review orders and product labels and conduct a visual exam of medications.
- Check the medication expiration date.
- Ensure that no contraindication exists before administering.
- Verify medication administration time, dose, and route.
- Advise patient or the patient's family about any potential adverse reactions.

High-Alert Medications Safety Suggestions

- Identify all high-alert drugs available at the facility.
- Implement processes to identify new medications for placement on the list.
- Develop guidelines, dosing scales, and checklists for all high-alert drugs.
- Implement a process to audit compliance with the protocols and guidelines

Medication Error Categories

- Failure to administer medication when required or as prescribed
- Administration of the medication at the wrong time or using an incorrect route
- Administration of the wrong dosage or concentration of a drug
- Administration of the wrong medication
- Misunderstanding verbal/written medication orders including transcription
- Administering medication to the wrong patient
- Failure to read container labels and using improper injection techniques

Reporting Medication Errors

- Each organization should comply with internal and external reporting requirements. This may include notifying US Pharmacopeia (USP), FDA, or ISMP. Error and adverse events may relate to professional practice, healthcare products, procedures, and systems.
- This can include prescribing, order communication, product labeling, packaging, nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and usage.
- The FDA receives medication error reports on marketed human drugs including prescription drugs, generic drugs, and over-the-counter drugs, and nonvaccine biological products/devices. In 1992, the FDA began monitoring medica- tion error reports forwarded to FDA from the USP and ISMP.
- The Agency also reviews MedWatch reports for possible medication errors.

Investigating Medication Errors

- The organization should designate a qualified person or department to conduct a thorough investigation to document all the facts. Investigations should seek to determine or document all facts sur- rounding the incident.
- Document all facts such as unit, time, date, and shift. Evaluate and determine staffing levels at the time of occurrence.
- Determine what other factors contributed to the event. Assess the legibility and accuracy of physician orders.
- Gather information on failure to follow safety precautions or other procedures. Ensure evaluation of facts by senior leaders, nurses, and pharmacy personnel. Document trends or patterns and implement corrective actions.

Computerized Provider Order Entry

- The basic steps of a CPOE system include (1) ordering appropriate medication, dose, and frequency of administration; (2) transcribing the order correctly and communicating accurately to the pharmacist; (3) dispensing, which requires the pharmacist to check for drug–drug interactions and allergies before releasing the appropriate quantity of the medication in the correct form; and (4) administration, which requires that the nurse should receive the medication and check for accuracy before giving it to the correct patient.
- CPOE refers to any system in which clinicians directly enter medication orders into a computer system. The system transmits the order directly to the phar- macy. A CPOE system does ensure standardized, legible, and complete orders that can reduce errors at the ordering and transcribing stages. Other advantages include averting problems with similar drug names, drug interactions, and specification errors. Some unanticipated consequences of using CPOE systems includes (1) workflow issues, (2) system demands, (3) changes in communication patterns and practices, (4) negative feelings toward the new technology, (5) unexpected changes to organizational power structure or culture, and (6) an overdependence on the technology. AHRQ and the NQF both recommend CPOE system usage as 1 of the 30 Safe Practices for Better Healthcare. The Leapfrog Group also recommends CPOE implementation as one of its first three recommended leaps for improving patient safety. A 2009 study found that only 17% of US hospitals used a CPOE system.

PART-A

1. **Write the factors considered for the employee health function medical history?**
   - Infection Control Plan Development Considerations
   - Device-related, intravascular devices, ventilators, and tube feeding infections
   - Surgical site infections and healthcare-acquired infection in special care units
   - Infections caused by organisms that are antibiotic resistant
   - Tuberculosis and other communicable diseases

2. **What are the impacts of ventilation and water systems?**
   - Controlling tuberculosis risks in operating rooms when infectious patients require surgery
   - Culturing water as part of a control plan for Legionella if appropriate
   - Recovering from water system disruptions, leaks, and natural disasters
   - Disinfecting surfaces to control antibiotic-resistant microorganisms
   - Developing specific infection-control procedures for laundries
   - Establishing control procedures for using animals in activities and therapy

3. **List out the few lines about infection control?**
   - Guideline for the Prevention and Control of Norovirus Gastroenteritis Outbreaks in
   - Healthcare Settings (2011)
   - Guideline for Disinfection and Sterilization in Healthcare Facilities (2008)
   - Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in
   - Healthcare Settings (2007)
   - Guideline-Management of Multidrug-Resistant Organisms in Healthcare Settings (2006)
   - Public Reporting of Healthcare-Associated Infections (2005)

4. **Illustrate the routes of infection transmission?**
   - Contact—Contamination due to close proximity with persons with a contagious disease
   - Indirect contact—Contamination by contacting an object contaminated by an infected person
   - Droplet—Contamination caused by a person sneezing, coughing, or talking
   - Common vehicle—Disease spread by food, water, drugs, devices, or equipment
   - Airborne—Air-suspended infectious nuclei or dust that could be inhaled or digested.

5. **What is droplet precaution?**
   - Droplet precautions reduce the risk of droplet transmission of infectious agents. Droplet transmission involves contact of the conjunctive or mucous membranes of the nose or mouth of a susceptible person with large-particle droplets (larger than 5 μm).
   - The droplets contain microorganisms generated from a person with a clinical disease or who serves as a carrier of the microorganism. Droplets generated from the source

person during coughing, sneezing, or talking and during performance of certain procedures such as suctioning and bronchoscopy can result in exposure risks.

6. Write the down the steps CDC wants hospitals and other healthcare facilities to take ?

- Enforce infection-control precautions.
- Group together patients with CRE.
- Segregate staff, rooms, and equipment with CRE patients.
- Inform facilities about the transfer of patients with CRE.
- Use antibiotics carefully.

7. What are the effectiveness of germicides?

- Shape and texture of surface
- Amount of contamination on the surface
- Resistance of contaminants to the germicide
- Amount of soil buildup, including blood, mucus, or tissue
- Chemical composition of the germicide
- Time of exposure to the germicide
- Temperature of the germicide

8. List out disinfecting levels of CDC?

- High-level disinfection processes can expect to destroy all microorganisms with the exception of high numbers of bacterial spores.
- Intermediate-level disinfection, which inactivates M. tuberculosis, vegetative bacteria, most viruses, and most fungi but does not necessarily kill bacterial spores.

9. Mention the requirements of log information?

- Type and brand of device involved in the incident
- Location of the incident
- Description of the incident

10. What are the needs of engineering control ppe?

- Syringes with a sliding sheath that shields the attached needle after use
- Needles that retract into a syringe after use
- Shielded or retracting catheters
- IV delivery systems that use a catheter port with a needle housed in a protective covering

11. List out the control measures in engineering control?

- Employers should take appropriate preventative measures against occupational exposure. These include engineering controls and work practice controls.
- Examples of engineering controls include biohazard hoods, puncture-resistant sharps containers, mechanical pipette devices, and other devices that permanently remove the hazard or isolate individuals from exposure.

12. What is the direct relationship between the employee and the organisations?

- OSHA will check for compliance with this provision during inspections by questioning a representative number of employees to determine if and how their input was requested. Employers must document in the exposure control plan how they received input from employees.

13. write about hepatitis virus b?

- HBV infection can cause severe fatigue and weakness, brown urine, and pale stools. The virus that causes HBV is found in blood and other body fluids, including semen, vaginal secretions, urine, and even saliva.
- Most people recover, but up to 10% become chronic carriers. These chronic carriers can spread the disease to others for an indefinite period of time and create a high risk for other diseases including cirrhosis of the liver and primary liver cancer.

14. List out reasons why hepatitis virus is not required as that of hepatitis virus c?

- Hepatitis B Vaccination Is Not Required
    - Employees previously completing the hepatitis B vaccination series
    - Immunity confirmed through antibody testing
    - Vaccine contraindicated for medical reasons
    - Following participation in a prescreening plan

15. How the workplace transmission of HIV?

- Saliva and blood contacted during dental procedures
- Unfixed tissue or organs other than intact skin from living or dead humans
- Organ cultures, culture media, or similar solutions
- Blood, organs, and tissues from experimental animals infected with HIV or HBV

PART-B

1. List at least seven infection control plan development considerations.
2. List the three healthcare vaccine categories.
3. Healthcare employees should meet the ACIP guidelines for immunization of which four diseases?
4. The Guidelines for Environmental Infection Control in Healthcare Facilities would not apply to which three broad categories of biological risks?
5. List the six types of disease and infection transmission routes.
6. What three diseases or pathogens can be transmitted by airborne routes in healthcare facilities?
7. List three HACs that could qualify for potential reduced payments.
8. List the three types of chemical germicides.
9. What type of pathogen exhibits the most resistance to chemical germicides?
10. Which federal agency regulates liquid chemical sterilants and high-level disinfectants?
11. Describe in your own words the three CDC-defined disinfecting levels.
12. What actions does OSHA require employers to take to help reduce risks associated with needle usage?
13. What three types of information does OSHA require on sharps injury logs?
14. List at least seven HBV vaccination requirements mandated by the OSHA Bloodborne Pathogen Standard.
15. Describe the CDC recommended TB screening procedures for settings classified as low risk.
16. List five types of workplaces, with potential TB exposures, that can be inspected by OSHA.
17. Describe the process known as an ICRA.