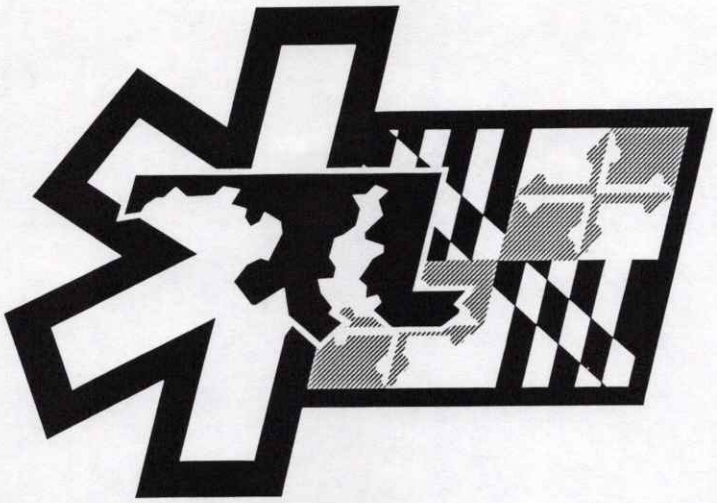

Jim—
style changes on pp 4-5 + continuing to end. Beginning (pp 1-3) has # between Gs. Starts with part 1 p4, there is no # between paragraphs. Change or leave as is?

INFECTIOUS DISEASE PREVENTION: Saving The Lives Of Our Providers

Maryland Institute for
Emergency Medical Services Systems

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Bloodborne Pathogens

Bloodborne pathogens are microorganisms found in human blood that can cause disease in humans. It is important for prehospital care providers to know the three ways in which these microorganisms are spread from one person to another. Percutaneous (through the skin) transmissions occur when being stuck with an infected needle or other sharp object. Having infected blood or other body fluids splashed onto cut or scratched skin or sores are other examples of percutaneous exposures. Mucocutaneous (through a mucous membrane) transmissions involve having infected blood or body fluids splashed into the eye, nose, or mouth. Sexual transmission (caused by unprotected sexual activity) is the third method.

All links in the chain of infection must be present to have the infection transmitted. The chain of infection begins with the infectious agent that is responsible for causing the disease. The next link is the reservoir, where the organisms survive and multiply. Unclean equipment, contaminated surfaces, and the human body are all reservoirs. There needs to be a means for the organisms to exit the reservoir. The mode of transmission is the way that the disease spreads. It can be percutaneous, mucocutaneous, or sexually transmitted. There must be a means for the organisms to enter the body. This could be through an open wound in the skin or through a mucous membrane. The final link in the chain is the susceptible host. This "host" is the prehospital care provider who is at risk of acquiring the infection.

Two bloodborne pathogens are of special concern to prehospital and hospital providers: Hepatitis B virus (HBV) and Human Immunodeficiency Virus (HIV).

Hepatitis B is a viral disease that affects the liver. It is preventable by immunization. There are about 1 million infectious carriers in the United States, with 300,000 new cases annually. Hepatitis B symptoms usually include nausea, vomiting, abdominal pain, jaundice, and skin rashes. Some infected people get mild, flu-like sickness, while others may never feel sick. The disease is usually diagnosed by clinical symptoms and laboratory testing. It is spread mostly in blood, semen, vaginal fluids, and saliva from a bite. The survival of the virus outside the body can be seven days or longer. The chance of infection following a needle stick from an infected patient is 6 to 30%, if you are unvaccinated.

Human Immunodeficiency Virus is a retrovirus that causes AIDS. There are more than 1 million people in the United States today that are HIV positive. The signs of clinical illness are anorexia, weight loss, chronic diarrhea, and fever. Within several weeks to months after infection, many develop an acute illness lasting one to two weeks. Others may be symptom free for months to years. The incubation time is vari-

able. One to three months is generally the timeframe from infection to the development of detectable antibodies. HIV/AIDS is diagnosed by lab testing, most commonly by the ELISA (enzyme-linked immunosorbent assay). If this test is positive, a more specific test such as the Western Blot Test is used. The time from HIV infection to the diagnosis of AIDS ranges from two months to ten years, or longer. This disease is spread mostly from contact with blood, semen, or vaginal secretions of an infected person. This virus dies soon after it is exposed to air. The chance of infection after being stuck with a needle from an HIV infected patient is less than 1%. There is no vaccine available for this virus.

Bloodborne Pathogens

OSHA/MOSH Update

The Federal Register and Maryland Register both address the bloodborne pathogen standard. This standard applies to all occupational exposures to blood or any other potential infectious material and any employee working in a job where these exposures could occur. Prehospital providers could be exposed to infectious material while doing patient assessment, airway management, bleeding control, and other patient care activities; coming into contact with a patient's body fluids; or cleaning equipment. The general method of compliance to OSHA/MOSH regulations is to use universal precautions to prevent contact with blood or other potentially infectious materials. All body fluids should be considered potentially infectious materials. Engineering controls (such as devices to prevent possible contact use of isolation and containment supplies; proper handwashing facilities; containers for sharps; and medical waste containers) can help prevent contact with infectious materials.

Contaminated sharps should be placed in a container that can be closed and is puncture resistant, leak-proof, and labeled or color coded. It should be easily accessible, kept upright, and replaced routinely. Other regulated waste liquids or potential infectious materials must be placed in containers that can be closed, will not leak, and are labeled and closed prior to removal. A container filled with contaminated material should be placed inside another approved container.

Employees must be informed of possible communicable hazards with labels and/or signs. Warning labels must be placed on containers of regulated waste and labeled BIOHAZARD with the symbol. These labels should be fluorescent orange or orange-red. Labels are not needed if red bags or red containers are used. All areas used for cleaning and decontaminating should be posted with a sign noting BIOHAZARD.

Hepatitis B vaccination, post-exposure evaluation, and follow-up are also addressed by the OSHA/MOSH standards. The employer must make the Hepatitis B vaccine available to all employees who have a

chance for occupational exposures within ten (10) working days of their initial assignment. Antibody testing should be provided for previously vaccinated employees. If an employee declines the Hepatitis B vaccine, he/she may take it at a later date, but a waiver must be signed. Confidential post-exposure evaluation and follow-up must be provided for any employee who has had an exposure. This evaluation should include documentation of the route of exposure and, with the employee's consent, HBV and HIV tests should be done.

Work practice controls that aid in preventing the spread of disease include: hand washing; prohibiting eating, drinking, and smoking in emergency vehicles; and being careful not to cause splashes or splatters. Make sure work spaces and cabinets are well ventilated.

It is important to maintain clean and sanitary conditions in the work site. By implementing a schedule for cleaning, this can be accomplished. Inspect bins, pails, and cans regularly. Laundering of contaminated material should be done by an approved laundry facility per local protocol or using CDC recommendations. Handle potential infectious material as little as possible using universal precautions. Bag materials in an approved container.

Personal protective equipment (PPE) should be utilized on all calls. This equipment should be easily accessible at the work site or issued to all employees. Gloves, gowns, faceshields or other eye protection, masks, and ventilation devices are all available to protect the prehospital care provider.

TUBERCULOSIS

Tuberculosis killed thousands of people each year in the United States in the late 1800s. Throughout the 1900s, medical advancements reduced the number of cases to a point that, in the 1970s, it was believed that TB was being eliminated. But this downward trend began to reverse in the mid-1980s. By 1990, there were 25,000 new cases of TB reported. Tuberculosis has again become an infectious disease of great concern, especially to the prehospital care provider.

Tuberculosis is a bacterial disease caused by the infectious agent Mycobacterium tuberculosis. An infectious agent is an organism capable of causing an infection. Illness can result from the invasion of a host by a disease-producing organism. The bacteria that cause TB are transmitted by infected airborne particles, called droplet nuclei. These minute infectious particles can be produced whenever a person with tuberculosis disease talks, coughs, or sneezes. These actions cause the droplets to be projected and then suspended in the air.

Certain procedures performed by prehospital care providers increase the risk of exposure to TB-infected particles. These procedures include endotracheal intubation, suctioning, and the use of bag valve masks and demand valves. Administering aerosolized medications such as albuterol also enhances the risk of exposure. Additionally, just being in the enclosed space of a transport vehicle with a person who has active TB heightens the chance of disease transmission.

Tuberculosis can occur in the forms of latent infection and active disease. Not everyone who is infected develops the disease. Approximately 10% of the people with latent infections make the transition to active disease. Active TB has the following signs and symptoms: persistent cough, fever, chills, weight loss, and bloody sputum. A physician confirms the diagnosis by a positive tuberculin skin test, an abnormal chest x-ray, and a positive sputum smear or culture. Patients are usually treated with the drugs Isoniazid (INH) and Rifampin.

Prehospital care providers should use universal precautions when treating any patient. Additional respiratory precautions are required for patients with active TB. The current minimal acceptable standard is the high efficiency particulate air (HEPA) respirator.

All providers should be screened for tuberculosis at least annually. The test consists of two parts: 1) intradermal injection of purified protein derivative (PPD) and 2) interpretation of the skin reaction by trained personnel. Anyone who has a positive PPD test should be evaluated for active TB. Always follow your agency's infection control plan. Occupational exposures to tuberculosis must be documented. An active TB case must be reported to the local health department.

MEASLES

Measles (also known as rubeola, hard measles, or red measles) is a highly communicable viral disease. The infective agent (morbillivirus) is passed from person to person by the spread of airborne droplets, direct contact with nasal or throat secretions, or, less commonly, the handling of articles freshly soiled with nasal or throat secretions. Anyone who has not had the disease or who has not been successfully immunized against it is susceptible to infection.

The spread of measles (once a common childhood illness) has been relatively controlled as a result of parent education and immunization programs. The vaccine against measles is usually given in combination with vaccines against mumps and rubella (and thus called MMR). Exposure to measles does not prevent recurrent development of the illness. Immunization during childhood is encouraged: the first dose should be given at 15 months of age, and the second dose either at 4 to 6 years of age (when the child begins school) or at 11 to 13 years of age (at entry to middle school). Immunization may be required to develop adequate antibodies. However, anyone who was not immunized early in life can obtain the measles vaccine.

The incubation period for measles varies from 7 to 18 days, averaging 10 days. Before the typical red rash appears, the infected person can have any of the following prodromal ("warning") symptoms: fever, red eyes (conjunctivitis), runny nose, cough, and, on the inside of the mouth, red spots with a white speck in the center of each (Koplik's spots). Measles' characteristic red blotchy rash appears on the third to seventh day and lasts 4 to 7 days. An infected person can pass the virus to a susceptible host from the time the prodromal period begins until about 4 days after the emergence of the rash.

A person suspected of having measles should be seen by a physician. Diagnosis is based not only on the patient's clinical symptoms and history of exposure but also, more definitively, on the detection of measles-specific antibodies through laboratory testing. Clinical assessment and monitoring are important, because potentially serious complications can be associated with this disease. Complications that may result: otitis media (ear infection), pneumonia, diarrhea, encephalitis, and rarely, death.

MUMPS

Mumps is an acute viral disease characterized by fever as well as swelling and tenderness of one or more salivary glands (usually the parotid glands) located near the angle of the jaw. The infectious agent for this disease is paramyxovirus. The virus is transmitted through droplets and by direct contact with saliva from an infected person.

Mumps occurs less frequently than the other communicable diseases of childhood; however, about 85% of adults who have not been immunized against paramyxovirus have serologic evidence of having had mumps infection. About one-third of the individuals who are exposed to the virus, and who are susceptible to it, such as those not immunized, develop infections that are not identified clinically.

In general, anyone who has not had mumps and has not been immunized against the virus is susceptible to infection. After infection (clinically apparent or not), people usually have lifelong resistance to the virus.

A vaccine against mumps can be taken as a preventive measure. The vaccine is usually given as broader immunization against measles, mumps, and rubella (MMR). It is commonly administered to 15-month-old infants and again at 4 to 6 years of age or at 11 or 12 years of age.

Exposure to mumps does not prevent recurrent development of the illness. Immunization during childhood is encouraged: the first dose should be given at 15 months of age, and the second dose either at 4 to 6 years of age (when the child begins school) or at 11 to 12 years of age (at entry to middle school). Immunization may be required to develop adequate antibodies. Similarly, administration of immune globulin after exposure does not offer effective protection.

The incubation period for mumps is about 12 to 25 days, with an average of 18 days. The virus can be transmitted 6 to 7 days before the appearance of swollen salivary glands (parotitis) and up to 9 days thereafter.

Complications related to mumps occur in 20% to 30% of males and 5% of females infected after puberty. Central nervous system complications have been reported, usually aseptic meningitis. Death is also possible, but rare.

RUBELLA

Rubella, or German measles, is a mild viral disease caused by a virus (Rubivirus). Children with rubella have the characteristic diffuse rash and, usually, few or no other symptoms. Adults, however, may experience prodromal symptoms (early signs) with a low-grade fever, headache, malaise, runny nose (coryza), red eyes (conjunctivitis), and swollen glands for 1 to 5 days before the appearance of the rash.

The primary danger of rubella is its ability to cause birth defects in the developing fetus. The congenital rubella syndrome occurs in about 25% of infants born to women who contract rubella during the first three months (the first trimester) of pregnancy.

The rubella virus is present worldwide and is most prevalent during winter and spring. It is transmitted by contact with nasopharyngeal secretions or droplets from infected people and from mother to fetus (congenitally).

Rubella's incubation period averages 16 to 18 days, ranging from 14 to 23 days. As a highly communicable disease, it can be transmitted about 1 week before and at least 4 days after the onset of the rash. Since the clinical diagnosis of this disease can be inaccurate, diagnosis based on laboratory tests is important. Such tests will detect a rubella-specific antibody, indicating recent infection.

Most people who have not had rubella or who have not been vaccinated against the virus are susceptible to it. After natural infection or immunization, active immunity is present.

As a preventive measure, the vaccine against rubella is often given with vaccines against measles and mumps (MMR). Immunization during childhood is encouraged: the first dose should be given at 15 months of age, and the second dose either at 4 to 6 years of age (when the child begins school) or at 11 to 12 years of age (at entry to middle school). Immunization may be required to develop adequate antibodies. Such post-exposure immunization is contraindicated for pregnant women. Immunization with immune globulin (passive [temporary] immunizing agent) is not indicated for any group.

CHICKENPOX

Chickenpox is an acute generalized disease caused by herpesvirus. Infection with that virus manifests as

- the sudden onset of a slight fever,
- mild constitutional (generalized) symptoms, and
- a skin eruption, which progresses from a maculopapular rash that lasts a few hours to a vesicular rash (often very itchy) that lasts 3 to 4 days, leaving scabs thereafter.

Chickenpox is also known as varicella. The condition called herpes zoster, or shingles, is a local manifestation of recurrent or reactivated infection with the virus that causes chickenpox.

The virus is readily communicable. It can be transmitted from person to person by direct contact (mutual touching), by droplet or airborne spread of secretions from the respiratory tract of people with chickenpox, or by contact with vesicular fluid from people with herpes zoster. Indirect spread is also possible, for example, by contact with freshly soiled articles.

Herpesvirus is found worldwide. In metropolitan communities, about 75% of the population has had chickenpox by age 15 and at least 90% have had the disease by young adulthood.

The incubation period for chickenpox can be 2 to 3 weeks, but is commonly shorter (13 to 17 days). The virus is communicable 1 to 2 days before the onset of the rash, maybe as long as 5 days before. The period of communicability does not extend more than 6 days after the appearance of the first crop of vesicles.

Anyone who has not been previously infected with herpesvirus is susceptible to it. Infection confers long immunity; second attacks are rare. No immunization is available as a preventive measure. However, after exposure to someone with the virus, susceptible individuals can receive immunization with a specific immune globulin, which, if administered within 96 hours after exposure, may prevent or modify the disease.

Complications related to chickenpox are viral pneumonia in adults and encephalitis, frequently associated with Reye's syndrome, in children.

PEDICULOSIS

Pediculosis is infestation of the head, the hairy parts of the body, or the clothing with adult lice, larvae, or nits (young insects). Symptoms of this infestation include severe itching and irritation of the scalp or body.

There are three infesting agents, all of them are present worldwide. The three types of lice are the head louse (Pediculus capitis), the body louse (Pediculus humanus), and the crab louse (Phthirus pubis).

Outbreaks of head lice are common among children in schools and institutions. Head and body lice are transmitted by direct contact with an infested person. Indirect contact can occur when clothing or headgear are shared.

Anyone can become infested with lice if contact is suitable for transmission. The "period of communicability" lasts as long as the lice or eggs remain alive on the infested person or clothing. Lice eggs (nits) hatch in about one week. The insects reach sexual maturity approximately 8 to 10 days after hatching.

To limit the transmission of lice, several methods of control are possible: The best is to avoid physical contact with infested people and their belongings, especially clothing and bedding. If an exposure does

occur, clothing and bedding should be washed in hot water (131 degrees F) for 20 minutes. Dry cleaning is also effective in destroying nits and lice. Concurrent disinfection with a chemical insecticide and ovicide may be necessary: local health authorities can provide information about agents and techniques.

For specific treatment of pediculosis, medical treatment should be obtained. Typical treatment includes the use of lindane (Kwell) lotion or shampoo, with retreatment after 7 to 10 days to ensure that no eggs have survived.

METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA)

Methicillin-resistant Staphylococcus aureus (MRSA) is a bacterium that is resistant to penicillin and semi-synthetic penicillins, such as methicillin. Infection with this bacterial strain is commonly acquired in hospitals (nosocomial), but the organism is also present in the community. It is carried by 30% to 40% of the general population.

About one-third of cases are the result of auto (self) infection. Any of a variety of body locations can be involved: lesions from simple furuncles or suture line abscesses, extensively infected bedsores, or surgical wounds.

The most important "instrument" for transmitting infection is the hands. Contact with the purulent discharge from draining lesions can transfer the organism to a susceptible host. MRSA infection may be asymptomatic, and the disease-causing (pathogenic) organism can be transmitted via seemingly innocuous discharges (usually nasal). Also, the handling of contaminated objects (indirect exposure) may transmit the bacterium, but direct contact is a more significant vector. Airborne spread is rare but has been demonstrated in infants with associated viral respiratory disease.

Most people are susceptible to MRSA infection. Susceptibility is increased in chronically ill or debilitated patients; in patients receiving steroid therapy; and among inpatients undergoing major, prolonged surgery and then during convalescence.

The incubation period associated with MRSA infection is variable and indefinite, but commonly lasts 4 to 10 days. The period of communicability exists as long as purulent lesions continue to drain or as long as the carrier state persists.

To control the spread of MRSA infection, aseptic techniques and universal precautions are essential. There is no vaccine that protects against MRSA infection. Patient isolation may be appropriate under limited conditions, and occlusive dressings may be indicated. In general, prevent discharges from the patient from contaminating the environment and nearby objects. Medical equipment used in the care of MRSA-infected individuals should be cleaned with an EPA-approved germicidal disinfectant.

MENINGOCOCCAL MENINGITIS

Meningococcal meningitis, an acute bacterial disease, may cause the following signs and symptoms: ·sudden onset of illness with fever, intense headache, nausea and vomiting, stiff neck, and/or a petechial rash. However, those indications of infection may be absent; the infected person's symptoms can be limited to the nasopharynx or the upper respiratory tract.

The infectious agent is Neisseria meningitides, a bacterium frequently found in the nasopharynx of asymptomatic carriers. Its reservoir is humans. Meningococcal meningitis is primarily a disease of small children and young adults, affecting more males than females. Meningococcal infections are not highly communicable; therefore, under routine conditions, the EMS provider's susceptibility to infection with the clinical disease is low. Certain conditions (such as overcrowding) or high hazard procedures (such as mouth-to-mouth resuscitation) increase one's susceptibility.

The mode of transmission is direct contact with, for example, respiratory droplets from the nose and throat of infected people. Infected individuals can transmit the disease as long as the infective organisms (meningococci) are present in discharges from the nose and mouth. The incubation period varies from 2 to 10 days, but commonly lasts 3 to 4 days.

Diagnosis of meningococcal meningitis is confirmed by the presence of the causative organism in a Gram-stained smear of cerebrospinal fluid (CSF) and by the recovery of meningococci from the CSF or blood.

Routine immunization against N meningitides is not indicated. The spread of the bacterium can be controlled by disinfection of surfaces and articles that have been contaminated with nasal and oral discharges from infected individuals.

Anyone who comes into contact with a person known to have meningococcal meningitis should be monitored closely for early signs of illness. If such signs develop, appropriate treatment should be given immediately. Medical consultation should be sought following exposure to someone with meningococcal meningitis. After "intimate" contact with someone who has this bacterium (for example, after administering mouth-to-mouth resuscitation), the person exposed to the disease should be given an effective preventative agent.

HEPATITIS C

Hepatitis C results from infection with a flavi-like virus, one of a number of viruses that cause inflammation of the liver. More than one type of agent may be responsible for this infection. Hepatitis C was once included in the non-A, non-B hepatitis category but now is classified separately.

In 1990, a screening test (ELISA) for the hepatitis C virus (HCV) in blood supplies became available. Before such monitoring, hepatitis C was the most common type of hepatitis resulting from transfusions.

Indications of HCV infection include anorexia, vague abdominal discomfort, nausea and vomiting, fatigue, and jaundice. The onset is usually gradual, or insidious, so the presence of infection may not be obvious to the affected person. Many people with HCV infection have had no known or documented exposures to the virus.

HCV is a bloodborne virus. It can be transmitted by exposure to infected blood or other body fluids, by injectable drug use, by sexual contact (an "inefficient" mode of transmission), from mother to fetus, and through transfusions of contaminated blood products.

The incubation period for this virus is 2 weeks to 6 months, commonly between 6 and 9 weeks. The period of communicability extends from one or more weeks before symptoms start and lasts through the clinical course. In chronic carriers, the communicable period is indefinite.

HCV has a worldwide occurrence, and most people are susceptible to infection with it. The degree of immunity after infection is not known. Since a vaccine against this virus has not yet been developed, transmission is best controlled by universal precautions, as for all bloodborne diseases.