

Speaker Notes: Infection Prevention and Control in Schools

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Many infection prevention challenges can be met with a basic understanding of how infection is transmitted. Let's quickly review what is needed for an infection to occur.

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For an infection to occur, six elements are needed. First, a causative agent, commonly known as a germ, is needed. Germs need a place to live and grow. This environment is often referred to as a reservoir. Next, the germ needs a way out of the reservoir and a method of travel to the host. The germ enters the host through entry points. We will discuss each of these "links" of an infection further.

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Susceptibility to infection is dependent upon many factors. Our bodies are made to fight infection. Our skin, mucous membranes, gastrointestinal fluids and cilia provide natural barriers and mechanisms to prevent infection. We become more susceptible to infection when these natural protection actors are compromised through injury or other disease processes.

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Factors that increase our susceptibility to infection include a depressed immune response, other comorbidities, malnutrition, antibiotic usage, invasive devices, and stress.

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What helps us be more immune to infection? Immunity can be actively or passively acquired. Let's explore these methods briefly.

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Our bodies often build antibodies after we are infected with an initial infection protecting us from subsequent infection when exposed again. For example, most persons who became sick with measles do not become sick with measles again.

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Vaccination usually provides active acquired immunity as our bodies build antibodies to live or inactivated viruses contained in the vaccination. This child is receiving polio vaccine.

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Administration of immune globulin or antitoxin can decrease susceptibility to some infections. For instance, immune globulin is often given to persons exposed to hepatitis A, measles, rabies and other infectious diseases.

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Infants are often protected from some infections by maternal transfer of antibodies. For example, infants are often protected from measles infection for the first couple months of life from antibodies passed on to them from their mothers.

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Many infections are caused from organisms that naturally live on us, such as acne from *Staphylococcus* species.

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Infections caused from bacteria are often treated with antibiotics. Common bacteria include staphylococcal or streptococcal infections.

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Viruses, on the other hand, are not treated with antibiotics. Occasionally, viral infections might be treated with anti-viral agents, such as with influenza. Many respiratory infections are caused from viruses. Another common viral infection is cytomegalovirus (CMV).

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Common infections due to fungi, yeast or molds include athletes' foot, ringworm and thrush. These infections are not usually treated with antibiotics, but treated with other agents or therapies.

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Protozoa and metazoa often can be parasites and cause vector-borne infections in humans, such as malaria that is carried by affected mosquitoes as they transmit *Plasmodium* protozoa to humans through their bite. Hookworm is another common infection caused by these organisms.

Slide 30: Ectoparasites, such as fleas and ticks, can cause infection as they live on the surface of the host.

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Organisms, especially bacteria and viruses can develop resistance, that makes infections from these resistant organisms more difficult to treat. Yet, these organisms are usually not more infective than organisms that have not developed multi-drug resistance. Persons are more at risk for infection and subsequent colonization from a multi-drug resistant organism after receiving antibiotics and those persons with invasive devices, or those with wounds or other major skin disruptions.

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A lot of infections are transmitted through large droplets that are expelled by infected persons when they cough, sneeze, or any other occurrence that might expel droplets. Common infections transmitted by droplets include influenza, respiratory syncytial virus (RSV), and pertussis.

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Very few infections are transmitted simply through the air. These infections are usually caused by very small organisms that can stay suspended in the air for long periods of time before dropping to surfaces. Common airborne transmitted infections include measles, varicella and tuberculosis. Persons can become infected by being in the same room that an infective person with these infections is in, without being in close proximity to the infected person.

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Infection can occur after contact with infective body fluids, or surfaces with infective body fluids, such as with stool incontinence, draining wounds and/or skin lesions that cannot be covered, or uncontrolled secretions. Common infections due to contact transmission include MRSA infections and pink eye.

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Reservoirs of the agents are the normal habitat, or home, in which the organism usually lives, multiplies and grows. Habitats include man, animals and the environment. We will explore human reservoirs further, as the focus of the discussion is preventing infections in school settings, especially preventing infections spread from other persons.

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Attention must be given to persons with signs and symptoms of infection. When persons with infectious symptoms are identified, e.g. fever, uncontrollable secretions, or open draining wounds, these persons should be temporarily excluded from school attendance according to the school districts' exclusion criteria and with consultation with the local health department, as needed.

Individuals may have multidrug resistant bacteria living in their nose, on their skin, in their gut, etc., but may not be infected. These individuals are "colonized" or "carriers" of the organism. The colonized individual does not have symptoms of infection. These persons may remain colonized with the organism for prolonged periods of time. Shedding of these organisms may be intermittent, and surveillance cultures used to determine colonization may fail to detect these organisms' presence. Being colonized with, or being a carrier of a multidrug resistant organism should not be a reason for exclusion from school settings unless other school district exclusion criteria are met. Standard Precautions must be used in order to prevent organism transmission from one person to another, regardless of colonization status.

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Persons can inhale infective organisms when infected persons exhale organisms.

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Infective organisms can enter and exit persons through the alimentary tract. Many food-borne infections occur when persons have not washed their hands prior to eating or preparing food. Other common alimentary tract associated infections include hepatitis A, and infections from cryptosporidium or *Clostridium difficile*.

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Breaks in skin can be both portals of exit and entry for infective organisms.

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Once we understand the “chain of infection,” we can easily recognize infection prevention opportunities in school settings. Two links in the “chain of infection” that can be interrupted are the “mode of transmission” and “susceptible host” links. Infections can be effectively prevented in clean environments where organism load has been reduced. If infection occurs in the school setting, further infections can be prevented through containment measures, such as cleaning, disinfection and separating persons with signs and symptoms of infection away from healthy persons. Ultimately, effective cooperation from all persons in the school setting will help reduce infection transmission. We will discuss these strategies further.

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Hands should be washed or sanitized frequently. Hands should be cleaned prior to and after providing care to other persons. Hands should be cleaned upon entering the classroom, before contact with an immune suppressed person, and especially before and after touching any medical devices, such as tracheostomies or urinary catheters. Hands should also be cleaned before eating, and before, during and after preparing food. Hands should also be cleaned after contact with secretions, wounds, or any person’s body fluids.

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Frequent cleaning and disinfection of frequently touched surfaces and equipment helps effectively reduce organism load and prevent potential infections. Responsibility for cleaning and disinfection should be assigned to appropriately trained personnel. Manufacturer recommendations regarding amount, dilution and contact time for use of cleaners and EPA approved disinfectants must be followed to effectively reduce organism load and prevent potential infections.

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Visible contamination or soil needs to be effectively removed by cleaning procedures prior to disinfection to effectively prevent transmission of infective organisms. Clean items with soap and water or other methods prior to applying disinfection agents.

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If disinfectant wipes are used, remember to use a separate wipe between areas so that cross-transmission is prevented. “One wipe, one application per surface.”

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Slide 51: Personal protective equipment that can be used in school settings to prevent exposure to infectious organisms includes gloves, gowns, face masks, face shields, goggles, aprons and disposable absorbent pads. Gloves should be worn for any potential contact with another person’s blood, body fluids, mucous membranes, non-intact skin or contaminated equipment. Gloves should be removed, discarded and hand hygiene performed before care is provided for another student. Gloves should not be washed for re-use. Gowns, aprons or absorbent pads can be used to protect exposure to skin and

clothing during procedures or activities where contact with blood or other body fluids is anticipated. The same gown or barrier should not be used for the care of more than one student. Mouth, nose and eye protection should be used during procedures that are likely to generate splashes or spray of blood or other body fluids.

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Students with an active infection and inability to control infective secretions should be temporarily excluded from school attendance according to the school district's criteria.

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Maximize cooperation by students, parents, teachers and all involved to prevent infection transmission in school settings through effective communication, education and compliance monitoring. Provide messages about infection prevention in daily announcements, newsletters, online postings, and other resources.

Provide job or task specific infection prevention education and training to all school staff, including those employed by outside agencies and available by contract on a volunteer basis in the school.

Trainings should focus on school worker and student safety, and should be provided upon orientation and repeated regularly. Competencies should be documented after initial trainings and repeatedly. For example, safe cleaning and disinfection competencies should be documented for appropriate school staff after initial training and repeated regularly. Compliance to infection prevention strategies should be monitored and guide future communications and education offerings.

Local health departments should be contacted for guidance, information and resources.

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Slide 55: References

Slide 56: Helpful Resources