OCTE SAFETY

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TEACHER/PEEL DISTRICT SCHOOL BOARD

**Infection Control**

Infection control refers to policies and procedures used to prevent the spread of infection within the health care settings.

We will be learning the vocabulary through a variety of hands on activities.

The following are the explanations of infection control:

**Microorganisms:**

A microorganism (microbe) is a form of life (organism) that is so small (micro) it can be seen ony with a microscope. Microbes live and grow everywhere in water, air food, soil, plants, and animals. They are on inanimate objects like clothing, furniture, medical equipment, and personal care items. Microbes also live and grow in and on people. They are in the mouth, nose, respiratory tract, stomach, intestines and on the skin. Most microbes do not cause infection.

**Nonpathogen:** microbes that do not cause infection.

Pathogens: Harmful microbes and they do cause infection, also commonly known as "germs" and "bugs".

**Types of Microorganisms.**

Within the health care settings, the three types of microbes that cause the greatest risk for infection are bacteria, virus, and fungi.

**Bacteria:** a single celled microbes that naturally occur on living, dead or inanimate objects. They multiply rapidly. They can be nonpathogenic or they can cause serious infections in any body system. Infections caused by bacteria are usually treated with antibiotics. (See immunology lesson plan).

**Viruses:** microbes that grow only inside living cells. They take over the cells ability to produces new virus particles. AIDS, hepatitis, influenza, and the common cold are examples of infections caused by viruses. Antibiotics are not effective caused by a virus. Some viral diseases (measles, chickenpox, polio, pertussis and influenza) can be prevented by vaccination.

**Fungi:** microbes that live only on organic matter, such as plants and animals. Certain types of yeasts and molds are common fungi that can be pathogens. In humans, fungi can infect the

mouth, skin, feet, vagina and other body areas. Many fungal infections are mild, such as athlete's foot. However, fungi can also cause life-threatening infections.

Microorganisms require certain conditions to live and grow. The reservoir (host) is the environment where the microbe lives and grows. Microbes grow in reservoirs that are warm and dark. They need water and nourishment. Most microbes also need oxygen, although some microbes thrive without it. Many microbes grow best ay body temperature. They are destroyed by heat and light.

**Normal Flora**

Normal flora is microbes that naturally live and grow in a certain location. They are non-pathogens when they are in or on this natural location. Certain microbes, for example, are found in the respiratory tract, intestines and the skin. They are harmless and sometimes beneficial to the body. When a nonpathogen is transmitted from its natural site to another site or host, it becomes a pathogen. An example is Escherichia coli is a bacteria normally found in the colon. It helps with food digestion. If E.coli enters a different body system (or for an example if it ingested through contaminated food or water) it can cause a serious infection.

**Multi-Resistant Organisms (MROs)**

Bacteria reproduce very quickly and in large numbers. Therefore, they can change to protect themselves from antibiotics. Certain strains of bacteria are now very difficult to teat with common antibiotics. These bacteria are known as multi-resistant organisms. (MROs).

Multi-resistant organisms are becoming increasing common. They are a serious threat to patients and residents in health care facilities. Infections caused by MROs sometimes can be fatal. They are easily spread among people at risk for infection. The two most common multi-resistant organisms are MRSA (methicillin resistant Staphylococcus aureus) and VRE (vancomycinresistant Enterococci.

Any Health Care professional will be trained to follow special precautions when in contact with clients infected or suspected.

**The Spread of Pathogens**

An infection is a disease state resulting from the invasion and growth of microbes in the body. A local infection is infection in one part of the body. A systemic infection involves the whole body. The person has signs and symptoms of infection. Some or all symptoms may be present. (See a symptom chart for identification)

Many common illnesses are infections. The common cold, influenza and chicken pox, hepatitis, pneumonia, tuberculosis, and AIDS are examples. They are communicable diseases. A communicable disease (contagious disease) is a disease caused by microbes that spread easily. An example would be pneumonia spreading to the lungs)

Being exposed to pathogens does not always result in an infection. There are three possible outcomes when exposed to a pathogen:

The immune system destroys the pathogen. The pathogen does not live and grow within the body. An infection does not occur. (*refer* to the lessons on the immune system).

The immune system does not destroy the pathogen, but an infection does not develop. Even though the person remains healthy, the pathogen is still present within the body and can be transmitted to others. In this case, the person is colonized with the pathogen. Colonization occurs when a pathogen lives on or within the body but does not carry an active infection. The person is now the carrier. The person is now able to transfer the pathogen to others.

An infection develops sometime after exposure to the pathogen. The period of time between exposure and the onset of illness is called the incubation period. The incubation period may be relatively short or may last for years. During the incubation period, the person can transfer the pathogen to others.

**The Chain of Infection**

Many factors work together for an infection to develop. The spread of infection involves a process known as the chain of infection. The links in the chain of infection are as follows:

**PATHOGEN**: a microbe capable of causing disease.

**RESERVOIR**: the environment where the pathogen lives before it infects. Note: a pathogen can live on or in a person or animal (a host), food, water, soil or inanimate objects.

**PORTAL OF EXIT:** the path by which the pathogen leaves the reservoir. Exits in the human body are the body opening (mouth, nose, rectal, vaginal and urethral openings), breaks in the skin (scrape, cut or other wound), breaks in the mucous membranes (the skin in the mouth, eyes, nose, vagina and rectum). Pathogens are carried through the portals of exit by blood, body fluids, excretions, or secretions. These include urine, stool, vomitus, saliva, mucus, pus, vaginal discharge, semen, wound drainage, and sputum (respiratory secretions).

**MODE OF TRANSMISSION**: how the pathogens travels from the portal of exit to the next reservoir or host. Microbes can be transmitted by physical contact (direct and indirect), droplets in the air, air currents, or by an infected vehicle or vector. The mode of transmission depends on the type of microbe. Some microbes are transmitted in more than one manner.

**PORTAL OF ENTRY**: where the pathogen enters the new hosts' body. Portals of entry are the same as the exits: body openings and breaks in the skin or mucous membranes.

**SUSCEPTIBLE HOST:** a person at risk for infection. Whether or not the pathogen grows and multiplies in the new host depends on the state of the person's immune system. The immune system protects the body from infection. A person whose immune system is weakened is immunocompromised. The person is likely to acquire infection. Note: view list on factors that increase the risk of infection.

**INFECTIONS IN HEALTH CARE SETTINGS:**

A ***nosocomial infection*** is an infection acquired after admission to a health care facility. Infections can also be acquired in home care and other community settings. People in health care settings are usually at high risk for infection. They might have some or all of the risk factors for

infection. Microbes can enter the body through equipment used in treatments, therapies, and tests. Therefore, equipment must be free of pathogens. Workers can transfer from client to client and from themselves to the clients.

The most common infections within the health care settings include respiratory tract infections (cold, pneumonia, bronchitis and influenza), urinary tract infections, gastrointestinal tract infections (resulting in nausea or diarrhea), skin infections such as from a wound or IV site infections). Sick, frail and older clients have a difficult time fighting infections. Therefore the *health care team must prevent the spread of infection*.

The following aid in prevention of infections in the health care settings:

**MEDIAL ASEPSIS**
**ISOLATION PRECAUTIONS**
**SURGICAL ASEPSIS**

***ASEPSIS is the state of being free of pathogens.***

Note: Microbes are everywhere. Therefore measures are required to achieve asepsis.

**MEDICAL ASEPSIS** (clean technique or aseptic technique) refers to the practices that:

***Reduce the number of microbes***

***Prevent the spread of microbes from one person of place to another person or place***

**Aseptic practices break the chain of infection.**

In Healthcare, an aseptic object or area is considered clean. There are no pathogens present. The object of area is contaminated (unclean) if pathogens are present or if it has been exposed to pathogens.

**Contamination** is the process of being exposed to pathogens.

An aseptic (clean) environment is different from a sterile environment. Sterile means free from all microbes: *pathogens and non-pathogens*. Example: operating rooms and instruments inserted into the body need to be sterile. Microbes cannot be present during surgery or invasive procedures. Infection is a risk. **Surgical asepsis (sterile technique)** refers to the practices that keep equipment and supplies free of all microbes. **Sterilization** is the process of destroying all microbes. Both pathogens and non-pathogens are destroyed.

There are many **ASEPTIC PRACTICES** that help prevent the spread of microbe.

The following lessons will describe some of the most important aseptic practices that are required to be adhered to and followed with the ultimate of care.

**HAND WASHING, CLEANING, DISINFECTION and STERILIZATION** are a few important aseptic measures. We will be preparing our brains to learn even more!

## HAND WASHING

Hand washing with soap and water is the easiest and most important way to prevent the spread of infection. We touch everything, and the hands are used in every task. The hands easily pick up microbes from one person, place or thing. They also transmit the microbes to people, places and things. If you touch your mouth, eyes, nose, and body with your contaminated hands then you also transfer microbes to your own body. Hand washing may seem like a simple procedure, yet many people do it incorrectly.

## WHEN DO YOU NEED TO WASH YOUR HANDS?

- Whenever your hands are visibly soiled.
- After contact with your own or another person's blood, bodily fluids, secretions, or excretions.
- Immediately before and after giving care. This means you wash your hands before caring for a client, after caring for a client, and then again immediately before you care for the next client.
- After touching objects that are contaminated, such a soiled linens, tissues, toilet paper, garbage bags, bed pans, diapers and other sanitary products.
- Before and after preparing, handling or eating food.
- Before feeding a client.
- Before putting on disposable gloves and after removing them.
- After personal body functions, such as urinating or having a bowel movement, changing tampons, or sanitary pads, sneezing, coughing, or blowing your nose.

## PROCEDURE FOR HANDWASHING

1. Make sure you have soap, paper towels, wastebasket, and an orange stick, nail file, or soft nail brush.
2. Push your watch and sleeves up well over your wrists. Remove rings.
3. Stand away from the sink so your clothes do not touch it. Stand so the soap and the faucet are easy to reach.
4. Turn on and adjust water until it feels warm.
5. Wet your wrists and hands thoroughly under running water. Keep your hands lower than your elbows.
6. Apply about 1tsp. or 5ml of liquid soap to your hands. If using a bar soap, do not touch the soap dish as you pick up the soap. Rinse the bar soap before you use it. DO not touch the soap dish as you put the soap back.
7. Rub your palms together and interlace your fingers to work up a good lather. This step should last at least 15 seconds.
8. Wash each hand and wrist thoroughly. Clean well between the fingers.
9. Clean under the fingernails by rubbing your fingertips against your palm.
10. Clean under the fingernails with a nail file, orange stick, or soft nail brush. This step is necessary for the first hand washing of the day and when your hands are highly soiled.
11. Rinse your wrists and hands well, keeping your hands and forearms down. Water flows from the arms to the hands.
12. *Repeat steps 6 through 11 as needed.*
13. Dry your hands and wrists with paper towels. Pat dry starting at your fingertips.
14. Discard the paper towels.
15. Turn off faucets with clean paper towels. Use a clean paper towel with each faucet.
16. *Apply a small amount of lotion to your hands.*

Please see the following link to the YouTube video demonstrating proper hand washing:

http://www.youtube.com/watch?v=Oke9rjp8eFY

Please see the following link to the YouTube video demonstrating sterile scrubbing:

http://www.youtube.com/watch?v=O1sS0ahb4MA&feature=related

Please see the following link to the You Tube video demonstrating the open glove technique:

http://www.youtube.com/watch?v=OLx6ega1Jsk&feature=related

Please see the following link to the You Tube video demonstrating with scrubbing, gloving and gowning technique:

http://www.youtube.com/watch?v=FGcLXOIxFfI&feature=related

## Disinfection

Disinfection is the process of destroying all pathogens except spores. Spores are bacteria protected by a hard shell. Spores can be destroyed only by the sterilization process. An item must be thoroughly cleaned before it is disinfected.

Reusable items are disinfected with chemicals such as alcohols or chlorines (chemical disinfectants.

Such items include: metal bedpans, glass thermometers, commodes, countertops, tubs and room furniture.

Chemical disinfectants can burn and irritate the skin. Wear utility gloves or rubber household gloves to prevent skin irritation. These gloves are waterproof.

Do not wear disposable gloves when using disinfectants. Some chemicals disinfectants have special measures for use or storage. Check the material safety data sheet before handling a disinfectant. Always follow your employer's policies.

**Note:** Detergent and hot water are common disinfectants. They are used for utensils, linens and clothes. Many commercial products are available for house hold surfaces. Such surfaces include sinks, countertops, floors, toilets, tubs and showers. Use the products preferred by the clients' family or as instructed by your employer. Vinegar is also an effective and cheap disinfectant. You can use it to clean bedpans, urinals, commodes, and toilets. To make a vinegar solution, mix 250ml (1cup) of white vinegar and 750ml (3 cups) of water. Make sure you label the container as "vinegar solution". Also put the date on the container and your name.

*Creating a safe cleaning solution is a "mini-lab" in the classroom, incorporating literacy and numeracy, in addition to cleaning their working surfaces.* ☺

## Sterilization

Sterilization destroys all nonpathogen and pathogens, including spores**.** Very high temperatures are used because microbes are destroyed by heat.

Boiling water, radiation, liquid or gas chemicals, dry heat, and steam under pressure are sterilization methods. Items that enter the body or are used during surgery are sterilized. These include IV catheters, urinary catheters, and needles. In facilities, specially trained workers are responsible for the sterilization process. Therefore support workers are not responsible for sterilizing equipment. However, you may be required to clean the item in preparation for sterilization.

Students may require using an autoclave for sterilizing equipment, or a mini bead sterilizing unit for fine tools.

**Other Aseptic Measures:**

Hand washing, cleaning, disinfection, and sterilization are important aseptic measures. However there are other aseptic measures also prevent the spread of infection and microbes.

***Mini classroom activity*:** have the students identify the additional aseptic measures and design/create a poster for alerting others and spread the word.

Heading would be: Controlling Reservoirs, Controlling Portals of Exits, Controlling Transmission, Controlling Portals of Entry, Protecting the Susceptible Host and Vaccinations.

Mini classroom activity: have the students identify STANDARD PRECAUTIONS for HANDWASHING, PUTTING ON GLOVES, USING A MASK and/or EYE PROTECTION, WEARING GOWNS, CARING FOR EQUIPMENT, DISPOSAL OF WASTE, DISINFECTION of FREQUENTLY TOUCHED SURFACES, CLEANING/WASHING/LAUNDERING SOILED LINENS and CLOTHING, PREVENTATIVE MEASURES/CAUTIONS for not transferring microbes to other people, while handling the care of linens and clothing.

Have the students create a bookmark/checklist to remind them of the standard precautions and how to handle the above list.