

## Infection Control

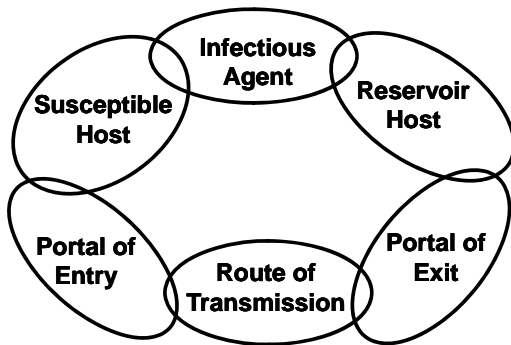
Satellite Conference and Live Webcast  
Wednesday, June 24, 2015  
1:00 – 3:00 p.m. Central Time

Produced by the Alabama Department of Public Health  
Video Communications and Distance Learning Division

## Faculty

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## Chain of Infection



## Chain of Infection

- Virulence is the ability to multiply and grow ;
- Invasiveness, the ability to enter tissue;
- Pathogenesis, the ability to cause disease

## Types of Microbes

- A microbe is a pathogenic microorganism
- Classification of plant and animal microbes:
  - Bacteria                      – Rickettsia
  - Viruses                        – Protozoa
  - Fungi

## Bacteria

- One cell plants
- Either pathogenic or non - pathogenic
- Many produce toxins that are poisonous
- Most bacteria are aerobic (need oxygen) and grow best in moderate temperatures
- A group of bacteria growing in one place is called a colony

### **Viruses**

- **Smallest of the microbes**
- **Need electron microscope to observe them**
- **Viruses are not whole cells, they depend on other living cells to provide food, nutrients and for reproduction**

### **Viruses**

- **300 of them identified**
- **Cause infections like influenza, pneumonia, chicken pox, croup, hepatitis B, AIDS, measles, polio, herpes and warts**
- **Transmitted through blood and body secretions**

### **Fungi**

- **Are a large group of simple plants**
- **Two forms of fungi:**
  - **Yeasts, which are one celled**
  - **Molds, which are multi - celled**

### **Fungi**

- **Cutaneous infections: superficial infections of the skin or mucus membranes such as: ringworm, athlete's foot, and candidiasis**
- **Systemic infections such as: histoplasmosis and Pneumocystis pneumonias**
- **Difficult or impossible to treat**

### **Rickettsia**

- **Smaller than bacteria, with rod or spherical shapes**
- **Called obligate intracellular parasites**
  - **Must live inside cell of another living organism**
- **Rickettsia transmitted through bites of fleas, lice, ticks and mites**

### **Rickettsia**

- **Diseases: Several types of typhus and Rocky Mountain Spotted Fever**
- **Typhus is the only rickettsia infection that can be transferred from human to human**

### Protozoa

- Only microorganism classified as an animal
- 45,000 different types of Protozoa
- Animal parasites reside in and out of the body
- Seek locations that provide nutrients, warmth and moisture

### Protozoa

- Found in decayed materials, bird and animal feces, water contaminated with sewage, waste, food washed in contaminated water or handled by unwashed hands, and insect bites
- Common disease caused by protozoa: dysentery, trichomoniasis, toxoplasmosis, malaria and giardiasis

### Hepatitis A Virus

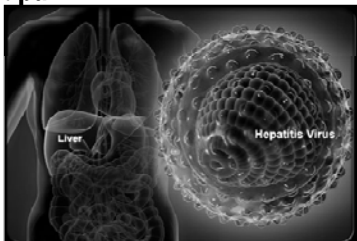
- Transmitted through feces, bile and blood from infected individuals
- Fecal oral route is the most common transmission
- Incubation period is 4 - 6 weeks until onset of symptoms

### Hepatitis A Virus

- Administration of Immunoglobulin before exposure or early in the incubation period can prevent Hep A
- Transmission is prevented through hand washing and glove usage

### Hepatitis B Virus

- Symptoms of HBV infection – jaundice, dark urine, fatigue, loss of appetite, N/V, joint pain



### Hepatitis B Virus

- OSHA requires employers to provide the HBV vaccine for free
- Series of 3 vaccines given over a 6 month period of time
- Provides a protective antibody levels in 85 - 97% of healthy adults
- Blood test can determine the antibody levels post series of the vaccine

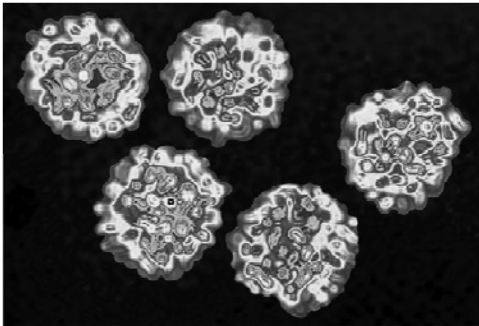
### Hepatitis B Virus

- Transmitted by percutaneous or mucosal exposure
- Remains viable at room temperatures for 7 days or longer
- Transmission is prevented by using universal precautions, Personal Protective Equipment (PPE) and vaccinations

### Hepatitis B Virus

- Vertical transmission of Hep B occurs during the 3rd trimester of pregnancy
- Major cause of chronic hepatitis, cirrhosis and hepatic carcinoma
- Number of HBV infections among HCP has decreased from 10,000 in 1983 to 400 in 2002

### Hepatitis C Virus



### Hepatitis C Virus

- Transmission is through occupational exposure, vertical transmission, sex with an infected partner, IV drug use is also a common risk factor
- HCV infection is the most common chronic bloodborne infection in the United States
- Affects 3.2 million persons in the US

### Hepatitis A, B and C Compared

Characteristic	Hepatitis A	Hepatitis B	Hepatitis C
Size of Virus	27 nanometer	47 nanometer	30 - 60 nanometer
Incubation of Virus	30 days	60 - 180 days	35 - 72 days
Route of Transmission	Fecal oral route	Parenteral and sexual	Parenteral
Prophylaxis	Hygiene, immune serum globulin, HAV vaccine	Hygiene, HBV vaccine	Hygiene

### Herpes Simplex I

- Viral infection
- Causes recurrent sores on lips, pharynx and conjunctivitis
- Incubation period of 2 to 14 days, lesions occur at the same site from reactivation of the virus
- Transmission through direct contact with lesions or with infectious saliva

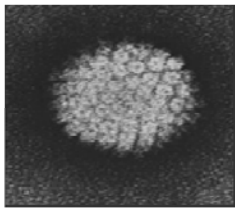
### **Herpes Simplex II**

- **Genital Herpes**
- **Most common cause of genital ulcerations in the United States, 80% of people that have do not know they are infected**
- **The wet lesions shed virus for about 10 - 14 days**

### **Herpes Simplex II**

- **Transmitted only during occurrences of the lesions and is more severe in women than men**
- **People with HSV are four times more likely to contract HIV**
- **There is no cure, just treatment management**

### **Human Papillomavirus**



### **Human Papillomavirus**

- **Most common viral STI in the United States with 5.5 millions cases diagnosed yearly**
- **HPV types 16 and 18 are responsible for 70 % of all cases of cancer**
- **Vaccine available for boys and girls in a 3 dose series to prevent HPV**

### **Herpes Zoster**



### **Herpes Zoster**

- **Reactivation of the chickpox virus**
- **Also known as shingles**
- **Diminished immune functions, medications and illness trigger the latent virus to reactivate**

### Herpes Zoster

- Symptoms are tingling pain and burning followed by vesicular eruptions that follow the affected spinal nerve
- One time vaccine that is recommended for persons 50 and over

### Ebola

- Most patients with fever and other symptoms coming to an ambulatory care facility don't have Ebola Virus Disease (EVD), but it is important that staff members know how to identify and manage patients who might have EVD

### Ebola

- Staff members should be ready to take 3 steps:
  - Identify, Isolate, and Inform
- Ask every patient if, in the last 21 days, they traveled to Guinea, or Sierra Leone or had contact with someone with confirmed EVD

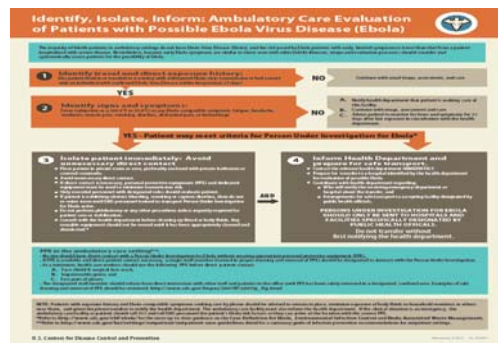
### Ebola

- If a patient appears to be at risk for EVD, isolate the patient immediately, avoid unnecessary direct contact, determine personal protective equipment needed, and notify the health department to arrange a transfer to a facility that can further assess the patient

### Ebola

- Do not transfer the patient without first notifying the health department; these patients should only be transferred to a facility approved by public health authorities

### Ebola Key Points



### **Breaking the Chain of Infection**

- For an infection to develop, each link in the chain must be connected, breaking any link of the chain can stop the transmission of infection

### **Breaking the Chain**

- Universal precautions is an approach to infection control to treat all blood and bodily fluids as if they were known to be infectious

### **Breaking the Chain of Infection**

- Barriers such as gloves, goggles, other Personal Protective equipment
- Hand washing
- Alcohol base hand rub
- Universal Precautions
- Contact Isolation
- Airborne Isolation

### **Breaking the Chain of Infection**

- Utilize proper disinfection of clinic rooms and surfaces by using
  - Super Sani Cloths
  - Calvi Wipes

### **Hand Washing with Soap and Water**

- Hands are the main way germs are transmitted during health care, either between patients or from the patient to the healthcare worker
- Correct hand hygiene reduces the number of germs on the hands and limits the opportunity for spread

### **Hand Washing with Soap and Water**

- Use soap and water when hands are visibly soiled with dirt, blood, or other body fluids and as an alternative to alcohol - based hand sanitizer

### **Hand Washing with Soap and Water**

- Although antimicrobial soaps are often used in some healthcare settings, it has not been proven to offer benefit over washing hands with plain soap (i.e., non-antimicrobial) and water

### **Alcohol Hand Sanitizer**

- Alcohol - based hand sanitizer is the preferred method of routine hand hygiene in healthcare settings when hands are not visibly soiled - this is because of its ability to kill germs like Ebola
- It is quick to apply to hands and to air dry, and it is gentler to the skin during frequent use than even soap and water

### **Alcohol Hand Sanitizer**

- CDC defines alcohol - based hand sanitizer as an alcohol - containing preparation designed for application to the hands for reducing the number of viable microorganisms on the hands
- Such solutions usually contain 60% to 95% ethanol or isopropanol

### **Alcohol Hand Sanitizer**

- Alcohol - based hand sanitizer should not be used when hands are visibly soiled with dirt, blood, or other body fluids

### **Airborne Precautions**

- Airborne droplets or dust particles containing infectious agents can remain suspended in the air for long periods of time
- Air currents can blow them long distances
- Can be emitted during talking, sneezing, coughing and whispering

### **Airborne Precautions**

- Examples:
  - Mycobacterium tuberculosis, Rubeola (measles) and Varicella (chicken pox)



### **Droplet Precautions**

- Propelled short distances through the air
- Deposited on host's conjunctiva, nasal mucosa or mouth
- Can be emitted during talking, sneezing, coughing and during procedures like suctioning and bronchoscopy

### **Droplet Precautions**

- Examples:
  - Streptococcal pharyngitis, mumps, influenza, rubella, some pneumonias, meningitis and sepsis

### **Contact Precautions**

- Most important and frequent mode of transmission for nosocomial infections
  - Nosocomial: originates / takes place in hospital or other health care facility
  - Nosocomial infection: the client gets it as a result of being in the health care facility

### **Contact Precautions**

- Examples:
  - Herpes (HSV), impetigo, scabies, some gastrointestinal, respiratory, skin and wound infections
- Direct - contact and Indirect - contact transmission

### **Disinfectants**

- Chemical disinfectants can be harmful to the skin, when using chemical disinfectants follow manufacturer's directions for dilution
- 10% household bleach in water meets OSHA requirements, kills HBV, HIV and TB

### **Disinfectants**

- Soaking for 20 - 30 minutes in 70% isopropyl alcohol acts as a disinfectant
  - Used for some instruments, glass thermometers
- Boiling instruments in water
  - Cover and boil for 20 minutes
  - Rarely used today

### **Disinfection of Clinic Room**

- After each patient, use disinfecting wipes
- Two choices:
  - Caviwipes
  - Super Sani Cloths
- Both of these products can be obtained from McKesson

### **Reporting Accidental Exposure**

- If you have an exposure, flush the area with running water
- Report any injury or accident involving exposure to blood or body fluids immediately to your clinic supervisor
- Complete a ARIA report

### **Contents of PPE Containers**

- Measuring cup for bleach
- Small bottle of bleach
- Spill kit
- PPE level I
- PPE level II

### **References**

- Association for Professionals in Infection Control (2014) Volumes One, Two and Three
- Epidemiology and Prevention of Vaccine - Preventable diseases (2011)
- Pathophysiology in Man (2014)