Infectious Disease
February, 2015

South Cook County EMS

Introduction

- Bioterrorism
- Pandemic flu
- Respiratory Infections
- Blood born pathogens

Given the worldwide concern about infectious disease- as an EMS provider and a citizen-you are responsible to help recognize infectious disease, treat your patients properly, and keep yourself safe

Objectives

- Identify the types of PPE and if how and when they should be applied
- Identify the characteristics of infectious diseases that are a threat to EMS
- Identify appropriate measures for protecting yourself against infectious diseases
- Identify the appropriate actions to take for exposure
- Distinguish between the infectious diseases EMS providers can encounter

Terms

- Antibiotic – medicine or a drug that is effective in killing bacteria or inhibiting their growth
- Bacteria – a single-celled, microscopic organism that can cause damage to the body's cells. They multiply very quickly by dividing.
- Antibodies – proteins made by the immune system that have a memory for an invading virus and help recognize and destroy future invasions by that virus

Terms (cont'd)

- Epidemic – an outbreak of a contagiouis disease that spreads among many individuals in an area or a population at the same time
- Pandemic – an outbreak of a contagious disease that affects an entire population over a wide geographical area. A pandemic affects a far higher number of people and a much larger region than an epidemic

Terms (cont'd)

- Parasite- an organism that grows, feeds, and is sheltered on or in a different organism while contributing nothing to the survival of its host
- Pathogen- an agent that causes disease such as a bacterium, virus or fungus
- Vaccine- a preparation of a weakened or disabled virus that stimulates antibody production and provides immunity when injected into the body
- Virus- a very small agent made of genetic material (RNA/DNA) surrounded by a protein coat. It cannot reproduce on its own but must take over a living cell to multiply

Personal Protective Equipment

- Treat every scene that has a potentially infectious patient as a biological haz mat
- Avoid infection from fluids and airborne particles
- Decontaminate equipment and surfaces after use and wash your hands frequently
- Universal precautions should be universal – they should be observed on every incident

MRSA
Methicillin-resistant Staphylococcus Aureus

MRSA is on the rise and MRSA exposure for EMS is greater than for the general public

- Type of staph bacteria resistant to common antibiotics
- Traditionally associated with hospitals but now is epidemic in community-acquired MRSA
- Multiplies rapidly causing many types of infection ranging from skin infections to septicemia and toxic shock syndrome

MRSA (cont'd)

Transmission

1. Found commonly on human skin, in nose and throat and, less common, in colon and urine
2. Can infect other tissues when skin or mucosal lining have been breached

Occupational Exposure

Can be spread through contact with pus from infected wound, skin – to – skin contact with infected person and contact with objects such as towels, sheets, or clothing used by infected persons

MRSA (cont'd)

Prehospital

- Staph infections, including MRSA, generally start as small red bumps that resemble pimples, boils, or some spider bites
- Can quickly turn into deep, painful abscesses
- Can also burrow deep into body, causing potentially life-threatening infections in bones, joints, surgical wounds, the bloodstream, heart valves and lungs

MRSA (cont'd)

Prevention

- Best defense against MRSA-wash hands often, especially after contact with other people

  (thorough washing with soap/water or alcohol hand disinfecting gels is effective against MRSA)
- Wear a gown when caring for patients with a known or highly suspected MRSA infection of the skin
- In some cases MRSA is a respiratory infection

  (*If the patient has a cough, and a known or highly suspected case of MRSA, wear a fitted mask and put a surgical or procedural mask (oxygen mask) on the patient if they can tolerate it.)*

Hepatitis B

Caused by hepatitis B virus (HBV), which damages liver

- Vaccination against HBV has been available since 1982
- Spread by contact with blood of person infected with the disease, or by sexual transmission

Hepatitis B (cont'd)

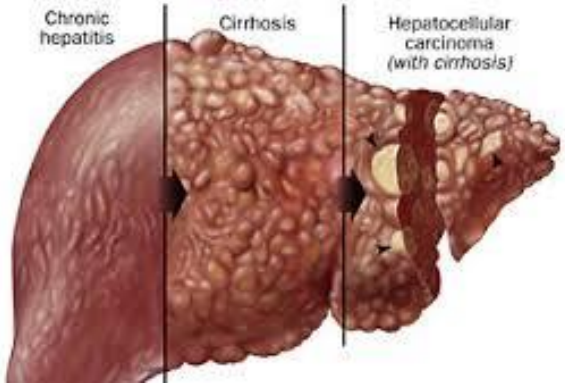
Transmission

- Sex with infected person
- Blood and other bodily fluids
- Sharing needles with infected person
- Cross transmission from mother to baby during birth

Hepatitis B (cont'd)

Prehospital

- Most signs and symptoms of Hep B mild
- Unlikely you will be called to respond to acute illness caused by this virus
- However, you may on occasion see a patient with end stage liver cancer of other complications from the disease



Hepatitis B (cont'd)

Occupational Risk

Occupational risk for acquiring HBV for an unvaccinated person is significant. The risk for a vaccinated person is very low.

Prevention

Best way to prevent occupational exposure to HBV, in addition to taking care to protect yourself from blood exposure, is to be vaccinated against the disease

Hepatitis C

Caused by hepatitis C virus (HCV) found in blood of persons who have the disease

- 4 million persons infected with Hep C in the US
- Spread by contact with blood of infected person
- Most common chronic blood borne viral infection in the US
- Can cause cirrhosis of liver and liver cancer

Hepatitis C (cont'd)

Transmission

- Blood and other bodily fluids
- Sharing needles with infected persons
- Cross transmission from mother to baby during birth

Prehospital

Most Hep B and C infections generally produce no signs and symptoms, during early stages; and may produce none for years.

If encountered: the symptoms may include

Fatigue, nausea/vomiting, poor appetite, muscle and joint pain, and low grade fever

Hepatitis C (cont'd)

Occupational Risk

- After needlestick or sharps exposure to HCV positive blood, about 2 healthcare workers out of 100 will become infected with HCV
- Approximately 20% of patients with Hep C recover completely following treatment with interferon and ribavirin

Prevention

- No effective vaccine for Hep C
- Only way to protect yourself-avoid exposure to infected blood

HIV - AIDS

AIDS – *acquired immunodeficiency syndrome* is caused by HIV *human immunodeficiency virus*

- HIV attacks cells of immune system
- Immune system fails and patient becomes susceptible to “opportunistic” diseases and infections

HIV, (cont')

Transmission

- Unprotected sex with an infected partner
- Infected blood given during a transfusion (early years before transfusions were tested for HIV)
- Sharing of needles by IV drug users
- Infected mother to her baby
- Occupational transmission usually by a needlestick of infected blood

HIV (cont')

Prehospital

- Dehydration and hypotension secondary to diarrheal diseases
- Seizures or altered mental status secondary to nervous system infection
- Dyspnea secondary to respiratory infection (pneumonia, tuberculosis, etc.)
- Medication reactions
- Sores in the mouth, thick white plaque on the oral mucosa

HIV (cont')

Occupational Risk

The occupational risk of acquiring AIDS is low

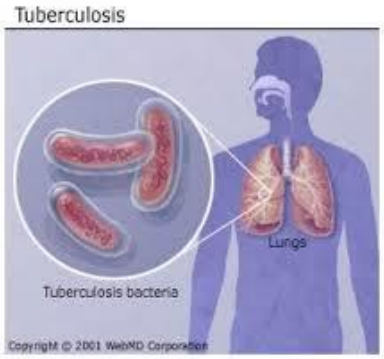
Prevention

- Prevention should focus on preventing significant blood exposures (needlesticks)
- Post-exposure prophylaxis (PEP) if exposed

Tuberculosis (TB)

Caused by small bacteria that travels from small airways to cells of the lungs

- Less than 10% of people infected with TB develop active disease
- In the others, bacteria hides, causing no disease until host (patient) becomes immuno-compromised or otherwise debilitated.



Tuberculosis (TB) cont'd

Transmission

- Via small airborne particles expelled by cough, sneezing, or speaking
- Particles are inhaled into the airways
- Prolonged exposure in confined space confers highest risk

Prehospital

Signs/Symptoms – cough (often productive of blood-tinged sputum), fatigue, weakness, night sweats, low grade fever, loss of appetite and weight loss

Tuberculosis (TB) cont'd

Occupational Risk

Occupational risk is low but difficult to quantify

Prevention

- Maintain high index of suspicion among patients who are at risk of having TB
- Take precautions if patients present with suspicious signs and symptoms
- Yearly TB skin test

Influenza (flu)

Caused by the influenza virus which attacks the respiratory system

- Occurs seasonally from November to April in the northern hemisphere
- The structure of the virus changes slightly, but frequently over time; this accounts for the appearance of different strains each year.

Influenza, (cont'd)

Transmission

- Coughed droplets
- Touching contaminated surfaces (less common)

Prehospital

Sudden onset of: high fever, malaise, headache, dry cough, body aches.

Influenza, (cont'd)

Occupational Risk

Varies depending on the strain

Prevention

- Hand washing, clean surfaces
- Place mask on patient or ask patient to cover mouth when coughing
- Best prevention is the flu vaccine, which must be taken yearly.

Pandemic Flu

- Outbreak of contagious disease that affects entire population over a wide geographical area
- Caused by influenza virus to which humans have little or no natural resistance
- Such an outbreak has potential to cause many deaths and illnesses
- Past pandemic flu viruses known for virulence causing rapid death, especially in young people
- It is difficult to accurately predict which strain of flu may give rise to the next pandemic

Pandemic vs. Seasonal flu

- Seasonal outbreaks are caused by subtypes of flu viruses that already circulate among humans
- Pandemic outbreaks are caused by new subtypes

  (these are subtypes that have never been circulated or have been dormant for a very long time)

Viral Hemorrhagic Fevers (VHF)

A group of illnesses caused by several distinct families of viruses that include: arenaviruses, filoviruses, bunyaviruses, and flaviviruses

- Most VHF's have limited geographical ranges and most are found in Africa, South America and the Pacific islands.
- Naturally reside in animals or arthropods (ticks or mosquitos)
- The viruses are fully dependent on a living host for reproduction and survival

Viral Hemorrhagic Fevers (VHF) (cont'd)

Transmission

- Usually transmitted to humans during contact with urine, fecal matter, saliva, or other body excretions from an infected rodent or by a bite from an infected mosquito or tick
- Some VHF's (Ebola and Marburg) also can spread from person-to-person following an initial infection (close contact with body tissues/fluids)

Viral Hemorrhagic Fevers (VHF) (cont'd)

Prehospital

Signs and symptoms – fever, fatigues, dizziness, muscle aches, loss of strength, exhaustion

Severe cases may also have bleeding from mucous membranes, internal organs, or from the mouth, eyes, ears.

Viral Hemorrhagic Fevers (VHF) (cont'd)

Occupational Risk

- Low risk, must have close contact with infected persons tissues and/or body fluids
- Low risk due to low to no incidents in the US
- Low due to high awareness and recent education

Treatment and prevention

- No known vaccines
- Therapy is basically supportive with IV fluids. The goal of therapy is to maintain vital functions

Norovirus

Highly contagious virus responsible for outbreaks of gastrointestinal disease on cruise ships

- Norovirus is the general name given to viruses of this type
- Responsible for many cases of severe but short-lived illnesses causing vomiting, diarrhea, and stomach cramps
- “stomach flu” and “food poisoning” are typical infections of a Norovirus

Norovirus (cont'd)

Transmission

Occurs via fecal – oral route

- For example, food handler does not wash his hands after using bathroom, you then ingest food that has been contaminated with small amounts of fecal matter

A person with a Norovirus is considered contagious from the time he or she starts feeling ill to as long as two weeks after recovery

Norovirus (cont'd)

Prehospital

Signs and symptoms – nausea, vomiting, diarrhea, stomach cramps, low-grade transient fever, general feeling of malaise, headache, body aches

Symptoms begin suddenly, may last 1-3 days and usually resolve on their own. Because the disease is caused by a virus, antibiotics are useless

Norovirus (cont'd)

Occupational Risk

- Community-acquired, usually situations where large numbers share same food or living space (cruise ships, college dorms)
- Several outbreaks of noroviruses among staff at hospitals and nursing homes

Prevention

- Gloves, wash hands thoroughly
- Consider use of protective eyewear and mask
- Surfaces contacted by the patient must be thoroughly disinfected

West Nile Virus

First identified in Africa. The virus causing the disease, West Nile Virus (WNV), infects certain types of birds (ravens, crows, and jays), mosquitoes, horses, and other animals

Humans are an incidental, rather than primary host.

West Nile Virus (cont'd)

Transmission

- WNV is transmitted through the bite of an infected mosquito.
- WNV is NOT transmitted person-to-person except in the rare case of a blood transfusion from an infected person

Prehospital

Signs and symptoms – fever, headache, fatigue, rash and swollen lymph nodes (rare)

Less than 1% of the people infected with WNV will develop severe illness. These people may present with high fever, headache, or altered LOC

West Nile Virus (cont'd)

Occupational Risk

No occupational risk involved in caring for a person with WNV disease

Prevention

Not transmitted person-to-person and no specific disease prevention precautions are necessary at work

Types of PPE

- Fit-tested masks (such as N95)
- Eye protection (glasses, face shields, and goggles)
- Gowns (or suits)
- Gloves

You must wear full PPE for any patient that is confirmed with an infectious disease

Donning PPE

Put on PPE before entering the patient area. The sequence for donning PPE is MEGG:

- Mask
- Eye protection
- Gown
- Gloves

Doffing PPE

Remove PPE once call is complete or crew has left patient area

Be careful not to contaminate yourself taking it off

To remove PPE, reverse the order that you put it on:

- Gloves
- Gown (hand washing minimum 20 sec or *alcohol hand disinfecting gels*)
- Eye protection
- Mask - (hand washing minimum 20 sec or *alcohol hand disinfecting gels*)

Hand Washing is Vital

- Single most effective way to prevent spread of disease
- Soap and water for at least 20 seconds or with waterless alcohol
- After all patient contacts, even if you wore gloves

Equipment Decontamination

After completing a response to an infectious patient, you must decontaminate everything touched including, but not limited to:

- All equipment that was exposed or cross-contaminated
- Outside of kits
- Stethoscopes
- Radios
- AED, etc

Wear new gloves while decontaminating equipment. Wear clean eye protection and mask if there is splash risk or vapors

Follow CDC requirements for disinfecting product or utilize a 10% bleach solution.

Exposures

Needlestick

- Wash area well with soap and water
- Do NOT use bleach or other harsh chemicals, these may damage the skin, making it more likely for the virus to enter the body
- Report exposure immediately to your officer for testing and possible post-exposure prophylaxis

Skin/Mucus

- Wash with soap and water
- Report exposure immediately to your officer for testing and possible post-exposure prophylaxis
- Flush liberally with water

Blood on intact skin is not considered a significant exposure. Non-intact skin includes abrasions and cuts.

Exposure (cont'd)

Airborne

- Report possible exposure to your company officer
- The hospital may notify exposed responders if the patient is diagnosed with airborne disease (i.e. TB, bacterial meningitis)
- Some diseases may require automatic and immediate post-exposure prophylaxis
- Others may require post-exposure testing and then treatment only if you become positive

References

Information for this presentation was taken primarily from the Mosby, 4th Edition, *Paramedic Textbook*