

## **OSHA Update: Infection Control Practices for Clinicians and Outreach Educators**

**Satellite Conference and Live Webcast  
Wednesday, December 6, 2006  
10:00 a.m. - 12:00 Noon (Central Time)**

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

## **Faculty**

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## **Program Objectives**

- Name at least four of the components of OSHA's Bloodborne Pathogen Standard including one which impacted healthcare's Smallpox Vaccination Program.
- List three examples of sharps with engineered sharps injury protections (SESIPS) devices which are detailed in the Needlestick Safety and Prevention Act.

## **Program Objectives**

- Discuss the importance of the CDC Guidelines for hand hygiene in reducing transmission of pathogenic microorganisms to patients and personnel in healthcare settings.
- Identify recommended strategies for reducing antibiotic resistance within the general population.
- List public health strategies for effective control of outbreaks associated with new pathogens.

## **Staphylococcus aureus**

- Staphylococcus aureus as a community pathogen is best known for its ability to produce furuncles and infect soft tissues.

## **Staphylococcus aureus**

- There are several biblical descriptions of staphylococcal infection.
  - Of the ten plagues brought on the Egyptian Pharaoh, the sixth cast boils or sores upon man and beast. (Exodus 9:8-12)
  - Job is stricken by Satan with boils that made his body black. (Job 2:7)

### **Clinical Manifestations**

- **Furuncle (boil):** a painful superficial skin infection that develops in a hair follicle or gland. These lesions found commonly on the neck or buttock and are the most common infection caused by *Staphylococcus aureus*.
- **Carbuncle:** spread of infection from furuncle to the deeper subcutaneous tissues resulting in abscess formation.

### **Clinical Manifestations**

- **Impetigo:** highly contagious superficial skin infection characterized by large blisters and large numbers of organisms. Seen most often in infants and children under conditions where direct spread can occur. (e.g. sharing contaminated towels)

### **Clinical Manifestations**

- **Secondary Cutaneous Infections:** occurs in people with eczema.
- **Scalded Skin Syndrome:** shedding of epithelial layer of skin caused by staphylococcal toxins - most commonly found in children less than eight.

### **Clinical Manifestations**

- **Toxic Shock Syndrome:** seen most commonly in young women - symptoms include high fever, vomiting, diarrhea, sore throat, and can lead to severe shock.
- **Food Poisoning:** results from the production of *Staphylococcal enterotoxin* in food before ingestion - acute vomiting and diarrhea occurs 1-5 hours after ingestion of food.

### **Clinical Manifestations**

- **Bacterial Pneumonia:** most always secondary to a respiratory viral infection such as Influenza.
- **Bacteremia:** many times associated with intravenous catheters.

### **Clinical Manifestations**

- **Endocarditis:** causes damage to the heart valves, seen commonly in IV drug users, patients with prosthetic valves, and the elderly.
- **Post-Op Wounds:** the most common organism causing post-operative surgical site infections.

### History of Organism

- In the 1880's due to the work of Louis Pasteur the species was named.
- In the pre-antibiotic era of the early 20th century mortality due to Staph sepsis was as high as 82%.
- Penicillin became available in 1942 but there was a rapid resistance to it.

### History of Organism

- New drugs were developed to use on penicillin resistant strains but within 2 years there were naturally occurring strains resistant to these as well.
- Reports of infections due to MRSA came from British and Australian hospitals in the 1960s, in Irish hospitals in the 1970s.

### History of Organism

- In the US only 2 outbreaks were reported prior to 1976 but have spread to all parts of the country since then.
- Numbers of strains resistant to Methicillin (MRSA) are increasing - from 1987 to 1997 Staphylococcus aureus infections due to MRSA in intensive care units in NNIS hospitals increased from 22.8% to 56.2%.

### Why Is MRSA So Important?

- Twice as likely to die of a MRSA BSI as you are from a MSSA BSI.
- Annual treatment of MRSA infections in US hospitals \$3.2-\$4.4 million.
- 16 fold increased risk of transmission for colonized patients not isolated.

### Why Is MRSA So Important?

- MRSA vs. MSSA bacteremia.
  - 30 day mortality 53.2% vs 18.4%.
  - Attributable Mortality 23.4% vs 1.3%.
  - Attributable total cost \$27,083.

### Why Is MRSA So Important?

- MRSA SSI.
  - Death risk 21% vs 2% for no infection.
  - 21% vs 7% for MSSA.
  - Excess cost per case \$41,274 and \$13,901(from Increased LOS).

### **Risk Factors for Acquiring Traditional or Classic MRSA in Healthcare Settings**

- Hospital or nursing home stay.
- Advanced age.
- Underlying disease-diabetes, renal failure, cancer.
- ICU or burn unit stay.

### **Risk Factors for Acquiring Traditional or Classic MRSA in Healthcare Settings**

- Surgical wound or burn.
- Indwelling intravascular catheter.
- Proximity to another patient colonized/infected with MRSA.

### **Traditional of Classic Hospital - Acquired MRSA**

- Reservoir.
  - Colonized or infected patients in hospitals and nursing homes.
  - Occasionally colonized or infected HCWs.
  - Rarely, the environment (e.g., burn unit).
- Transmission.
  - Via transient carriage on the hands of HCWs.

### **Four Pediatric Deaths from Community Acquired MRSA Minnesota and North Dakota, 1997 - 1999**

- MRSA is an emerging community pathogen among patients without established risk factors for MRSA infection (e.g., recent hospitalization, recent surgery, residence in a long term care facility, or injecting-drug use).

### **CA-MRSA Definition**

- CA-MRSA
  - An infection with MRSA in a person who does not have any recent healthcare exposure such as:
    - Recent hospitalization.
    - Surgery.
    - Permanent intravenous lines.
    - Residence in a chronic care facility.

### **CA-MRSA Causes Outbreaks**

- First detected as clusters of abscesses or spider bites.
- Various settings.
  - Sports participants: football, wrestlers, fencers.
  - Inmates of correctional facilities.
  - Military recruits.
  - Men who have sex with men.
  - Daycare centers.

### Factors in Transmission “The Five Cs”

- Crowding.
- Frequent skin to skin contact.
- Compromised skin.
- Contaminated surfaces and shared items.
- Cleanliness (lack of).

### MRSA New Developments Dr. Jarvis

- Reports of community onset are increasing.
- 60% of all SST infections treated in hospital EDs test positive for MRSA. NEJM 8.2006.

### MRSA New Developments Dr. Jarvis

- Recognition by public health infrastructure and clinicians as an emerging hospital and community problem.
- Decreased susceptibility of health care-associated strains to vancomycin.

### Comparison of Classic HA vs Community Onset MRSA

Characteristic	HA	CO
Susceptible to antibiotic classes other than beta lactam	NO	YES
Genotypes	A	B
Staphylococcal Cassette Chromosome (SCC)-mec	I, II, III	IV
Panton-Valentine-Leukocidin (PVL) or Toxic Shock Syndrome Toxin (TSST-1)	NO	YES
Typical MRSA risk factors	YES	NO

### APIC National Inpatient MRSA Prevalence Survey

- Needed to provide a better estimate of the true incidence/prevalence rate of MRSA in healthcare facilities.
  - Data collected on one day in October included the number of inpatients on that day culture positive for MRSA.
    - Detected by clinical, active surveillance cultures or both.

### APIC National Inpatient MRSA Prevalence Survey

- A line listing of each of the MRSA-positive patients, including gender, age, service, duration from admission to positive culture, colonization/infection status, site, underlying conditions, and antibiotic susceptibilities.

## HICPAC / SHEA Debate

### MRSA Colonization Leads To Infection

- Nares cultures obtained on all patients admitted to five units.
- 30/758 (3.96%) patients MRSA-colonized on admission.

### MRSA Colonization Leads To Infection

- 19% of those colonized on admission and 25% of those acquiring MRSA in the hospital developed MRSA infections compared to 1.5% of those MSSA-colonized or 2 % of those not colonized.
- MRSA colonization increased infection risk compared to MSSA colonization (RR=9.5) or uncolonized (RR=12).

### HICPAC Guidelines on Management of MDROs in Healthcare Settings Published October 2006

- First Tier: General recommendations.
  - Proceed to Second Tier (Intensified Interventions) if endemic rates are not decreasing or if the first case of an important organism.

### First Tier

- Administrative engagement.
  - Including feedback on facility and patient-unit trends in MDRO infections.
- Education and training of personnel.
- Judicious use of antimicrobial agents.

### First Tier

- Monitoring of prevalence trends over time to determine whether additional interventions are needed.
- Standard precautions for all patients.
- Contact precautions for patients known to be infected or colonized (masks not routinely recommended).

### **Second Tier Intensified Interventions for Acute Care Settings**

- Active surveillance cultures from patient in populations at risk at the time of admission to high risk area and at periodic intervals as needed to assess transmission.
  - Contact precautions until surveillance culture known to be negative.

### **Second Tier Intensified Interventions for Acute Care Settings**

- Additional recommendations for intensifying:
  - Administrative engagement / correction of systems failures.
  - Education and training of personnel/ adherence monitoring.
  - Judicious use of antimicrobial agents.
  - Monitoring of trends.

### **Second Tier Intensified Interventions for Acute Care Settings**

- Cohorting of staff to the care of MDRO patients only.
- Enhanced environmental measures.
- Consult with experts on case by case basis regarding the use of decolonized therapy for patients or staff.
- If transmission continues despite full implementation of above, stop new admissions to the unit.

### **SHEA Guideline for Preventing Nosocomial Transmission of MRSA and VRE**

- Active surveillance cultures to identify the reservoir for spread.
  - Surveillance cultures are indicated at the time of hospital admission for patients at high risk for carriage of MRSA, VRE, or both.

### **SHEA Guideline for Preventing Nosocomial Transmission of MRSA and VRE**

- Periodic (weekly) surveillance cultures are indicated for patients remaining in the hospital at high risk for carriage of MRSA due to location, antibiotic use, underlying disease, duration of stay.

### **SHEA Guideline**

- In facilities with high prevalence on initial sampling, facility-wide culture survey is indicated to identify all colonized patients and allow implementation of contact precautions.
- Frequency of active surveillance cultures based on prevalence of pathogen and risk factors for colonization.

## Bloodborne Pathogens

- Infectious materials in the blood that can cause disease in humans, including:
  - Hepatitis B
  - Hepatitis C
  - HIV

## Hepatitis Transmission

- Blood and body fluids.
  - Sex with an infected person.
  - Sharing needles.
  - Occupational needlesticks or sharps exposures.
  - From infected mother to baby during birth.

## Symptoms

- Jaundice
- Fatigue
- Abdominal pain
- Loss of appetite
- Nausea and vomiting
- Joint pain
- Dark urine

## Symptoms

- Hepatitis B:
  - About 30% of people have no signs or symptoms.
- Hepatitis C:
  - 80% of people have no signs or symptoms. Often called the silent epidemic.

## Hepatitis B

- Long term effects.
  - Chronic infection occurs to:
    - 90% of infants infected at birth.
    - 30% of children age 1-5 years.
    - 6% of those after 5 years of age.

## Hepatitis B Vaccine

- Vaccine is a yeast product, not blood.
- 96% effective.
- 3 – dose series given IM in the deltoid (arm): (0, 3 and 6 months intervals)

### **Hepatitis C**

- Long term effects:
  - Chronic infection:
    - 75 – 85% of all persons who become infected.

### **Hepatitis C**

- A major healthcare problem worldwide.
  - 50 million people infected worldwide; of these 4 million are in the U.S.
- Contributes to over 12,000 deaths annually.
- Many people who are infected have no symptoms for many years, but their blood and body fluids could be infectious.

### **Hepatitis C Treatment**

- There is no vaccine for hepatitis C.
- There are some anti-viral medications available for treatment of some hepatitis C patients, but treatment is usually only effective in 10 – 40% of those treated.

### **Hepatitis E**

- The major cause of fecal/oral transmitted non-A, non-B hepatitis worldwide.
- Rarely seen in the U.S.
- Case fatality rate for pregnant females is 15 – 25%.
- No vaccine is available.

### **Hepatitis A**

- Transmission:
  - Close personal contact – fecal/oral route (household, sexual, daycare).
  - Contaminated food or water (infected food handler, raw seafood).
  - Blood exposure (very rare).

### **Hepatitis A**

- Present vaccine is 99% effective.
- Two dose schedule (given 6 months apart).
- Recommended for children two years or older, homosexual and bisexual men, IV drug users, and travelers to endemic countries.

## HIV/AIDS

- Routes of transmission are very similar to hepatitis B.
- AIDS is the last stage of an infection caused by the HIV virus.
- HIV weakens the immune system, the body's natural defense against illness.

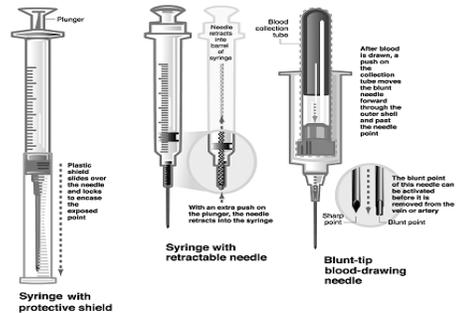
## HIV/AIDS

- Infection with HIV can last for years.
- By the AIDS stage, the immune system is very weak and cannot protect against illness.
- There are antiviral medications, which can prolong life and boost the immune system.

## Sharps

- CDC estimates that HCW's sustain nearly 600,000 percutaneous injuries annually involving contaminated sharps.

## Safety Needle Devices



## Hand Hygiene

The most important measure you can use to prevent the spread of infection.

## Self Reported Reasons for Poor Adherence

- Handwashing agents cause skin irritation and dryness.
- Sinks are inconveniently located/lack of sinks.
- Lack of soap and paper towels.
- Too busy/insufficient time.
- Understaffing.
- Patient needs take priority.
- Low risk of getting an infection from a patient.



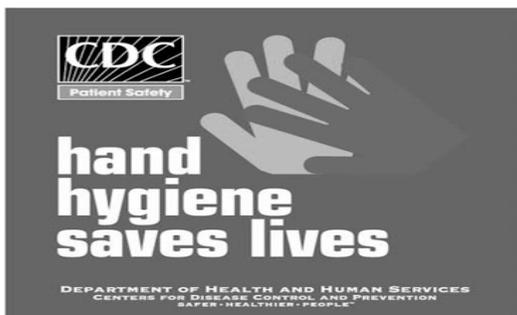
## Nails

- Artificial nail
  - Polish
  - Length

## Lotion The True Story

- Some lotions make antibacterial soaps less effective.
- Some lotions can breakdown latex gloves.
- Lotions can become contaminated.

[www.cdc.gov/ncidod/hip/hhguide.htm](http://www.cdc.gov/ncidod/hip/hhguide.htm)



## Upcoming Programs

**Are You Ready? Be Prepared for a  
Pandemic Influenza Outbreak  
Wednesday, December 6, 2006  
2:00 - 4:00 p.m. (Central Time)**

**For complete list of upcoming  
programs visit: [www.adph.org/alphtn](http://www.adph.org/alphtn)**