Multi-Drug Resistant Organisms: What You Need to Know 2017
The Problem of Antibiotic Resistance

- When antibiotics are given, bacteria in the body have an opportunity to adapt. Some are killed by the drugs, but hardier bacteria survive by acquiring a resistant gene that allows them to overcome the antibiotic.

- These mutant bacteria pass on resistant genes to their offspring, multiplying a million-fold in a single day.
Three major organisms of concern in the battle against antibiotic resistance are Methicillin-Resistant Staphylococcus aureus (MRSA), Vancomycin-Resistant Enterococci (VRE), and Clostridium difficile (C Diff).
CRE or Carbapenem-resistant Enterobacteriaceae

- Healthy people usually do not get CRE infections—they usually happen to patients in hospitals, nursing homes and other healthcare settings. Patients whose care requires devices like ventilators, urinary catheters, IV catheters and patients who are taking long courses of certain antibiotics are most at risk for CRE infections.
Some CRE bacteria have become resistant to most available antibiotics. Infections with these germs are very difficult to treat and can be deadly- one report from the CDC sites they can contribute to death in up to 50% of patients who become infected.
What is a Staph Infection?

- *Staphylococcus aureus*, often referred to simply as “staph”, are bacteria commonly carried on the skin or in the nose of healthy people.
Symptoms of Staph infections

Symptoms of staph infection depend upon where the infection is located

- Boil: an abscess, bump, or swelling within the skin. Also called a furuncle.
Cellulitis: a “flat” skin infection which can make the skin red, painful and warm but does not have pustules

Folliculitis: an infection of the hair follicles
Impetigo: pustules (bulbous impetigo) or honey colored crusted lesions on the skin (may be caused by staph or other bacteria)
Other sites of Staph infection:

- Bacteremia: a blood infection
- Deep abscess: an abscess that occurs below the skin surface
- Endocarditis: infection on the valves of the heart
- Food Poisoning: vomiting or diarrhea caused by a staph toxin
- Lymphadenitis: an infection of a lymph gland, which causes it to be red, swollen, and painful
- Lymphangitis: an infection of the lymph channels that drain to the lymph glands, causing red streaks in the skin
- Osteomyelitis: a bone infection
- Paronychia: an infection of the skin folds of the nails
- Scalded Skin syndrome
- Septic arthritis: an infection of a joint, like a hip or knee
- Styes: infection of the glands on the eyelid
- Toxic Shock Syndrome
Staphylococcus aureus can also cause less common infections such as pneumonia, ear infections, tonsillitis, and sinusitis.
How is Staph. aureus infection treated?

- In the past, most serious staph bacterial infections were treated with a type of penicillin class agent such as oxacillin, penicillin, amoxicillin, or a cephalosporin.

- Over the past 50 years, treatment of these infections has become more difficult because staph bacteria have become resistant to various antimicrobial agents, including the commonly used penicillin class agents.

- One of those antibiotic resistant staph bacteria is **MRSA**.
What is MRSA?

- MRSA are *Staph. aureus* bacteria that have become resistant to this antibiotic, as well as most penicillins and cephalosporins.
- On a sensitivity panel, MRSA will be a *Staph. aureus* resistant to Oxacillin.
- Methicillin is no longer used clinically as it has been replaced by more stable penicillins like Oxacillin, but the term MRSA is still used.
Colonized vs. Infected

- **Colonization** means that the staph bacteria is present in or on the body but is not causing illness.
- **Infection** means that the staph is present and is causing illness.
Risk factors for MRSA Infection

- Recurrent skin diseases or open wounds (sores, boils, “spider-bites”)
- Long-term illness or long-term dialysis patients
- IV drug abuse
- Surgery or other invasive procedures
- Being a patient in a hospital or other healthcare facility
- Contact with other persons with MRSA infection
- Recent antibiotic use
- Crowded living conditions (home, jail, institution)
“It seems everyone has MRSA – so what’s the big deal??”

- Newer strains of **community-acquired** MRSA produce toxins that make the infection even more difficult to treat.
- Certain toxins increase the virulence and infectivity of MRSA, meaning the infection spreads and worsens at a rapid rate.
- Other toxins attack neutrophils (body’s weapon against invading bacteria) at the site of infection, creating more opportunity for the bacteria to thrive and endure.
Top Locations for mrsa for Guadalupe Regional Medical Center, TX 1/1/2016 to 12/20/2016

- ER: 58 patients
- MEDFLOOR: 28 patients
- WINDCARE: 20 patients
- LAB: 16 patients
- OPLAB: 9 patients
- REMARKALTH: 9 patients
- WINDSOR: 7 patients
- ICUFLOOR: 0 patients
- SDC: 5 patients
- ERHOLD: 5 patients
- O/WNC: 5 patients
- NESBT: 5 patients
- RAD: 3 patients
- SURGFLOOR: 3 patients
- UNI: 3 patients

CareFusion

Guadalupe Regional Medical Center
Community-Acquired MRSA is on the rise in communities affecting otherwise healthy people. Not only is it better at outwitting the immune response than more common *Staph. aureus* strains, but combines resistance with virulence.

This combination can be detrimental or even fatal in an immunocompromised patient.
How does VRE fit in this picture?

- CA-MRSA and MRSA cause physicians to treat patients with a more potent antibiotic, usually vancomycin. As a result, strains of bacteria – called Vancomycin Resistant Enterococci (VRE) – become resistant to vancomycin and many other antibiotics.

- In some cases, they resist all standard therapies.

- The potential also exists for VRE to transfer genetic vancomycin resistance to other gram-positive organisms, including Staphylococcus aureus. (VRSA)
VRE

- VRE is the leading cause of healthcare-associated bacteremia, as well as surgical wound and urinary tract infections.
- Transmission is by direct contact with stool, urine or blood containing VRE.
Other Modes of VRE Transmission

- Indirectly from healthcare providers’ hands
- Directly from contaminated environmental surfaces such as bed rails, wheelchairs, thermometers and the like
- VRE can survive on surfaces for $\geq 58$ days and can extensively contaminate a patient environment
Risk factors for VRE

- Patients with weakened immune systems
- Those previously treated with vancomycin and combinations of other antibiotics
- Hospitalized patients – particularly those on long-term antibiotic therapy and who have recently undergone surgical procedures
- Patients with in-dwelling medical devices, such as urinary catheters or central intravenous catheters
Preventing Transmission of MRSA and VRE

- Place patients on contact precautions if MRSA or VRE is suspected/known or if patient has a history of MRSA or VRE.
- Wear appropriate personal protective equipment for patients on contact precautions (caregivers and visitors).
- Hand hygiene – most important of all!!
Preventing Transmission of MRSA and VRE

- Remember patient equipment and environmental surfaces – such as countertops, bed rails, and charts – can be contaminated with MRSA or VRE and the organisms may survive for weeks to several months on various surfaces.

- Always:
  - Handle equipment and linens as if contaminated
  - Clean/Disinfect/Sterilize equipment between patients, as appropriate
  - Discard single-use items properly
  - Remember environmental surfaces can harbor microorganisms
CONTACT PRECAUTIONS

Visitor must go to nursing station before entering room.
Visitante debe ir a la estación de enfermería antes de entrar en la habitación.

WASH YOUR HANDS/LAVARSE LAS MANOS
BEFORE ENTERING AND BEFORE LEAVING ROOM
ANTES DE ENTRAR Y SALIR DE HABITACIÓN

Visitors Wear

Staff Wear
Another Problem from Antibiotic Resistance: C Diff

- Because more patients are presenting with MRDO infections and receiving multiple and potent antibiotics, there is also a rise in the number of patients with Clostridium difficile-associated disease.
A little humor...

- C Diff
- C Diff Run
- C Diff Spread
- No, C Diff, No!
What is *Clostridium difficile* (C. *diff*)?

- *C. diff* is a bacteria that lives in the intestinal tract of about 5% of healthy adults.
- *C. diff*-associated disease (CDAD) occurs when the normal intestinal flora is altered which allows the bacteria to grow and produce disease causing toxin. CDAD is sometimes called antibiotic associated diarrhea.
What are the main clinical symptoms of CDAD?

- Common symptoms include watery diarrhea (sometimes with blood or pus), fever, loss of appetite, nausea, and abdominal pain.
- Complications can include pseudomembranous colitis, toxic megacolon, perforations of the colon, sepsis, and sometimes death.
How is *C. diff* transmitted?

- *C. diff* is shed in feces and can contaminate high contact surfaces such as commodes, thermometers, bedside tables, etc.
- *C. diff* is often spread to patients on the hands of health care workers or other people who touch a contaminated surface.
Who gets CDAD?

- Anyone taking antibiotics – very few people who are not on antibiotics get CDAD
- Persons with inflammatory bowel diseases
- Persons who have had gastrointestinal surgery
- Persons on chemotherapy
Why all the recent attention?

- Reports of CDAD disease have increased, noting more severe disease and an associated increase in mortality.
- The increased rates and/or severity of disease may be caused by changes in antibiotic use, changes in infection control practices, or the emergence of a new strain of *C. difficile*-associated disease with increased virulence and/or antimicrobial resistance.
CONTACT PRECAUTIONS
ENHANCED
Visitor must go to nursing station before entering room.
Visitante debe ir a la estación de enfermería antes de entrar en la habitación

WASH YOUR HANDS/LAVARSE LAS MANOS
BEFORE ENTERING AND LEAVING ROOM/ ANTES DE ENTRAR Y SALIR DE HABITACIÓN

Only Soap and Water*
Se debe utilizar agua y jabón

Visitors Wear

Staff Wear
Why the special sign?

- The Enhanced Contact Precautions sign alerts healthcare providers, environmental service personnel, and visitors that special precautions are needed:
  - SOAP and WATER must be used for handwashing
  - Gown and Gloves are required upon entry to room
  - Room and equipment in room must be cleaned with a hypochlorite solution (not Virex)
How can CDAD be prevented in our facility?

- Use Contact Precautions for patients with CDAD:
  - If possible, place these patients in private rooms or place in rooms (cohorted) with other patients with C. difficile-associated disease.
  - Use gown and gloves when entering patients’ rooms and during patient care.
  - Dedicate equipment whenever possible. If not possible, disinfect equipment between patients.
  - Precautions should be continued until diarrhea has ceased.
  - Wash hands with **SOAP and WATER** before and after caring for patients.
What Else Can You Do?

- Educate patients on contact precautions and the importance of hand hygiene (for healthcare workers and for themselves)
- Educate patients on the importance of completing antibiotics as prescribed
- WASH YOUR HANDS...
- WASH YOUR HANDS...
- WASH YOUR HANDS!!!
MDROs are a serious threat to patients, both in the community and in healthcare facilities.

By practicing good contact precautions in addition to standard precautions, we can help prevent healthcare-acquired MDROs like MRSA, VRE, and C diff.
Questions?

- Please contact me if you have any infection control-related questions:
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