Methicillin-resistant Staphylococcus Aureus

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What is MRSA?

★ Staphylococcus aureus or “staph” bacteria commonly live on the skin and in noses of healthy people.

★ MRSA is a flesh eating strain of S. aureus

★ MRSA is spread by coming in contact with an infected person or by exposure to a MRSA-contaminated object or surface that an infected person touches.
MRSA bacteria 3D model

www.youtube.com/watch?v=VF7aulH_f7g
Don't pick your NOSE!!!

Background on MRSA

★ MRSA carries genes that make it resistant to most antibiotics, including Methicillin.

★ Some 40 other strands of “Staph” harmlessly inhabit our skin and mucous membranes.

★ S. aureus lives naturally on the skin of about 32% of Americans, and nearly 1% carry the MRSA strand without knowing it.
Biology/Morphology Of MRSA

- Gram Positive coccus
- Catalase positive and oxidase negative
- Non-motile
- Spherical in shape
- The bacteria grow in chains
- Resemble grape-like clusters under the microscope due to the activity of the coagulase enzyme
When a person becomes infected with MRSA the bacteria begin to multiply within the affected area. A person will not have any signs or symptoms during this time. After 1 to 10 days, on average, signs and/or symptoms of MRSA may appear.
Signs and symptoms of MRSA

★ Signs of MRSA can include:
  ○ The area of the skin can be red and/or inflamed
  ○ The area can be very painful
  ○ Warm to the touch
  ○ Full of pus or other liquid
  ○ Accompanied by a fever
Symptoms that MRSA bacteria has caused a serious infection by penetrating the bloodstream or deep inside the body include:

- Fever - 100.4 degrees F or above
- Chills
- Malaise
- Dizziness
- Confusion
- Aches and pains of the muscles
- Swelling and tenderness to the affected body part
- Chest pains
- Cough
- Breathlessness
- Headache
- Rash
- Wounds that do not heal
What does a MRSA infection look like?

★ Large red, painful lumps under skin
★ A cut that is swollen, hot and filled with pus
★ Spider bite
How is MRSA spread?

★ MRSA spreads through direct contact with
  ○ The skin of someone who has MRSA
  ○ Personal items such as towels, washcloths, clothing, razors, etc.
  ○ Objects that are contaminated such as work desks, door knobs, phones, etc.
Who is at risk for MRSA?

Anyone can get MRSA!

- When sharing sports equipment
- Anyone that shares personal hygiene products
- Anyone that spends a lot of time in crowded places such as hospitals, schools, clinics, etc.
- Overuse or misuse of antibiotics
Remember the 5 “C’s”:

The 5 Cs can be used to remember what factors make it easier for MRSA to be transmitted:
1. Crowding
2. Contact (skin-skin)
3. Compromised skin (open wounds)
4. Contaminated (items and surfaces)
5. Cleanliness (lack of).
How is a MRSA infection diagnosed?

★ A skin sample, sample of pus from a wound, or blood, urine, or biopsy material (tissue sample) is sent to a microbiology lab and cultured for *S. aureus*. If *S. aureus* is isolated (grown on a Petri plate), the bacteria are then exposed to different antibiotics, including methicillin. *S. aureus* bacteria that grow well when methicillin is in the culture are termed MRSA, and the patient is diagnosed as MRSA infected.
How is MRSA treated?

★ Treatment options for MRSA skin and soft tissue infections may include:
  ○ Vancomycin
  ○ Daptomycin
  ○ Rifampin
  ○ Linezolid
How can we prevent the spread of MRSA?

- Wash your hands thoroughly. Use soap and water or an alcohol-based hand sanitizer. Experts suggest that you wash your hands for as long as it takes you to recite the alphabet.
- Cover cuts and scrapes with a clean bandage. This will help the wound heal. It will also prevent you from spreading bacteria to other people.
- Do not touch other people's wounds or bandages.
- Do not share personal items like towels or razors.
- If you use shared gym equipment, wipe it down before and after you use it.
- Dry clothes, sheets, and towels in a dryer rather than letting them air dry.
In the 1940s, medical treatment for *S. aureus* infections became routine and successful with the discovery and introduction of antibiotic medicine, such as penicillin.

From that point on, however, use of antibiotics—including misuse and overuse—has aided natural bacterial evolution by helping the microbes become resistant to drugs designed to help fight these infections.

In the late 1940s and throughout the 1950s, *S. aureus* developed resistance to penicillin. Methicillin, a form of penicillin, was introduced to counter the increasing problem of penicillin-resistant *S. aureus*. Methicillin was one of most common types of antibiotics used to treat *S. aureus* infections; but, in 1961, British scientists identified the first strains of *S. aureus* bacteria that resisted methicillin. This was the so-called birth of MRSA.

The first reported human case of MRSA in the United States came in 1968. Subsequently, new strains of bacteria have developed that can now resist previously effective drugs, such as methicillin and most related antibiotics.
MRSA resistance history

*S. aureus* Resistance: The Numbers

1941 – Introduction of penicillin into treatment of infectious disease
1944 – *S. aureus* penicillin resistant
1960 – New penicillinase-resistant drugs are used to fight staph infections (i.e. methicillin)
1975 – Methicillin-resistant strains of *S. aureus* emerge
1988 – 2.4% *S. aureus* are methicillin-resistant
1989 – 3% enterococci vancomycin-resistant
1991 – 29% *S. aureus* methicillin-resistant
1993 – 7.9% enterococci vancomycin-resistant
1996 – *S. aureus* strain with intermediate vancomycin resistance reported in Japan
1998 – Man in New York dies from a staph infection
Works Cited


