MRSA
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MRSA; Etiological agent- Methicillin-resistant *staphylococcus aureus* (2).

Transmission:

There are two types of MRSA:

1. Hospital-Acquired (HA)-MRSA: This type of MRSA affects people in a healthcare setting. People who have surgery or medical device that is surgically implanted (catheters, prosthetics, or undergoing kidney dialysis) (1).

2. Community-Associated (CA)-MRSA: This type of MRSA affects people who are in public health professions. This is known to spread through touching, skin-to-skin contact. When items such as towels, razors, and sporting equipment is shared, this is known to spread as well (1).

It can also happen through indirect transmission via contaminated environmental surfaces (4).

Reservoirs:

Three main reservoirs for MRSA in hospitals or institutions: staff, patients, and inanimate objects such as beds, linens, and utensils. The most important reservoir is patients who may have MRSA but show no signs of infection (3).

General Characteristics and Key tests for identification:

MRSA is a gram-positive coccus, with an appearance under the microscope to look like a bunch of grapes because of the activity from the coagulase enzyme. MRSA is catalase positive and oxidase negative. MRSA is *Staphylococcus aureus* that has a meticillin resistance gene (4).

Since MRSA in hospitals are usually resistant to multiple antibiotics including meticillin and other B-lactam antibiotics (4). They use broth microdultion testing, cefoxitin disk screen test, latex agglutination test for PBP2a, or a plate containing 6 ug/ml of oxacillin in Mueller-Hinton agar supplemented with 4% NaCl as alternative methods of testing for MRSA (5). Doctors also take a tissue sample of nasal secretions for signs of drug resistant bacteria. Procedures involve sending a sample to a lab where it is placed in a dish of nutrients that encourage bacterial growth. In about 48hrs the bacteria will grow (1).
Signs and Symptoms of MRSA:

(HA)-MRSA infections may include surgical wound infections, urinary tract infections, bloodstream infections, and pneumonia. The skin infection will appear red, swollen, painful area on the skin. It may also show a abscess, boil, or pus-filled lesion. It also may cause a fever and may be warm around the infected area. For more serious (HA)-MRSA infections it may include chest pain, chills, fatigue, headache, muscle aches, and rash (6).

(CA)-MRSA are skin infections that may appear as pustules or boils. These are often red, swollen, painful, and may have pus or other drainage. They start off looking like pimples, spider bites or bumps that are red, swollen, and painful. These often happen at sites of visible skin trauma, such as cuts and scrapes, and areas of the body covered by hair (2).

Photo from: http://drbcshah.com/mrsa-infection/

Historical Information:

In 1960, the first MRSA isolates identified in a British study (7).

From 1960-1967, infrequent hospital outbreaks of MRSA happened in Western Europe and Australia (7).

In 1968, the first hospital outbreak of MRSA happens in the United States at the Boston City Hospital, Massachusetts (7).

From 1968- mid 1990’s, MRSA gradually recognized as an endemic pathogen in hospitals. The percentage of people infected with Staphylococcus aureus in hospitals increases slowly but steadily (7).

From 1998-2008, rates of HA-MRSA remain stable, but CA-MRSA increase (7).
In 2012, MRSA infections cause people to go to hospitals; hospital stays less commonly cause MRSA infections. CA-MRSA infections are now common in majority of U.S. cities (7).

**Virulence factors:**

MRSA has many virulence factors. Panton Valentine Leukocidin (PVL) is a toxin which forms pores in leukocyte membranes, this causes them to burst. This is associated with abscess that form and pneumonia. Most CA-MRSA strains have PVL genes. PVL does not influence the severity in HA-MRSA infections. Another virulence factor is alpha-toxin, these also target leukocytes and platelets. Biofilm formation is another major virulence factor for MRSA (8). In CA-MRSA, the phenol-soluble modulin (PSM) protein family is severe. These proteins are able to destroy majority of immune cells, mainly white blood cells that help fight off infection. These are not the only virulence factors produced by CA-MRSA but these are the major factors (1). Alongside these proteins, this organism also expresses a number of membrane-damaging toxins and super-antigen toxins that can cause tissue damage and the symptoms of septic shock. This organism also has multiple mechanisms for evading both B and T cells (9).

**Control/Treatment:**

Treating MRSA according to the CDC, have a healthcare professional drain the infection, and in some cases, prescribe an antibiotic (10).

**Prevention/Vaccine info, new trials:**

To prevent MRSA, clean hands with an antimicrobial soap or alcohol-based hand rub before and after each patient, even if gloves have been worn. Wear gloves when examining infected areas and appropriately dispose of gloves, properly dispose of all dressings contaminated with drainage from the infected site, clean surfaces and equipment in the exam or hospital room that may have been contaminated by the patient, and wash all linens that come into contact with drainage or secretions from the infected site in hot water and dry with a high dryer setting as heat will help kill the bacteria (11). Also, always tell your healthcare provider, that you have had MRSA (2).
Local causes/global causes or outbreaks:

According to JAMA, an estimated 94,360 cases of MRSA infection are reported in the U.S. Also, MRSA is responsible for an estimated 18,650 deaths in the U.S (12).

Works Cited:


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