METHICILLIN-RESISTANT STAPHYLOCCUS AUREUS INFECTIONS

INTRODUCTION

Methicillin-resistant *Staphylococcus aureus* (a.k.a. MRSA) is a strain of bacterium that is resistant to many of the commonly used antibiotics such as penicillin and the cephalosporins. Methicillin-resistant *Staphylococcus aureus* has attracted a lot of attention in the media, and the popular press has named MRSA the “superbug” and the “flesh-eating bacteria,” identifying MRSA as a bacterium that can cause a frightening and dangerous condition called necrotizing fasciitis.

The term superbug is somewhat sensational and although MRSA *can* cause necrotizing fasciitis, this is a rare condition and it can be caused by many bacterium, not just MRSA. But MRSA is a dangerous microorganism. Methicillin-resistant *Staphylococcus aureus* is a pathogen that is carried by a big percentage of the population, it can cause infections essentially anywhere in the body, and MRSA infections can be very difficult to treat.

But MRSA is especially serious because MRSA is one of the most common sources of infections that occur in patients after they are admitted to a hospital. These infections are called hospital-acquired MRSA infections and many of these infections happen because of poor infection control. The MRSA bacterium is spread from patients to healthcare staff and then to other patients.

Some of these hospital-acquired MRSA infections are probably impossible to prevent, but the evidence is clear that many, if not most, MRSA infections that happen to inpatients can be prevented if medical professionals follow Standard Precautions such as hand washing, using protective gloves, gowns, etc., and the proper handling and disposal of body fluids. Because MRSA and MRSA infections are so common, Certified Nursing Assistants (CNAs) must understand what MRSA is, how it is transmitted, and how they can help prevent the spread of this dangerous pathogen.

**Learning Break:** The term bacterium refers to a single microorganism, and bacteria is the plural term. Most people use the term bacteria to refer to both single and multiple microorganisms, but that is not correct and bacterium and bacteria will be used in this module.

**OBJECTIVES**

After finishing this module the learner will be able to:

1. Identify the correct definition of normal flora.
2. Identify two reasons why *Staphylococcus aureus* is dangerous.
3. Identify the basic causes of hospital-acquired MRSA infections.
4. Name three common types of MRSA infection.
THE STAPHYLOCOCCUS AUREUS BACTERIUM AND MRSA

When people think of microorganisms such as bacteria and viruses they usually think of them as foreign “invaders” that cause illnesses. And to some extent that is certainly true: microorganisms such as bacteria, fungi, and viruses can and do cause diseases and make us sick. A microorganism that can cause disease is called a pathogen.

But many microorganisms and many pathogens are often not foreign. We all have microorganisms, millions and millions of them, living in our stomach, in our noses and mouths, in our bowels, and on our skin. These microorganisms are called the normal flora of the human body and Staphylococcus aureus is part of our normal flora.

Learning Break: The term flora is defined as the plant life that naturally occurs in a specified area - in this case, the human body.

Approximately 25-50% of the population has Staphylococcus aureus living inside the nose, in the armpits, in the perineal area, and in the oropharynx. People who have insulin-dependent diabetes, people who are infected with HIV, and people who need hemodialysis on a chronic basis are more likely to have Staphylococcus aureus in the nose and oropharynx or on the skin. Most of the time the Staphylococcus aureus bacterium does not cause illness or disease: many people have Staphylococcus aureus in/on their skin and in other areas of the body and they do not develop a Staphylococcus aureus infection and become sick. But Staphylococcus aureus is a dangerous pathogen for two reasons.

Number 1: Staphylococcus aureus can easily avoid the immune system and cause an infection, and it does so by several different mechanisms. First, the Staphylococcus aureus bacterium has strong enzymes that can break down tissues and allow the infection to spread. The baceteria also produces a protein that “disguises” Staphylococcus aureus from antibodies that would normally detect and destroy it. And finally, the Staphylococcus aureus bacterium can survive for weeks and months outside the body on medical equipment and other surfaces in the environment. When the environment is contaminated with MRSA it becomes very easy for MRSA to be picked up by one person and transmitted to another.

Number 2: Staphylococcus aureus has mutated to a bacterium that cannot be treated by many of the commonly used antibiotics, the MRSA bacterium. Bacteria that can be treated with pencillins, cephalosporins, and other commonly used antibiotics have a molecule on their cell walls called the penicillin-binding protein. This protein allows the antibiotic to attach the bacteria and destroy it, but MRSA does not have the penicillin-binding protein so many antibiotics - especially the penicillins - are ineffective for treating an infection with MRSA. The mutation of Staphylococcus aureus into MRSA happens for a variety of complex reasons such as the over prescribing of antibiotics and by the natural ability of pathogens like Staphylococcus aureus to mutate in order to evade the body’s immune system and survive.
An infection with MRSA cannot be treated with the following antibiotics. The generic names are listed first and the trade names are in parentheses.

- Aminoglycosides, e.g., gentamicin (Garamycin®), streptomycin
- Cephalosporins, e.g., cephalexin (Keflex®), cefoxitin (Mefoxin®)
- Fluoroquinolones, e.g., ciprofloxacin (Cipro®), levofloxacin (Levaquin®)
- Lincosamides, e.g., clindamycin (Cleocin®), lincomycin (Lincocin®)
- Macrolides, e.g., azithromycin (Zithromax®), clarithromycin (Biaxin®)
- Penicillins, e.g., penicillin G, ampicillin, amoxicillin, nafcillin

**Learning Break:** You may notice that methicillin is not included in the list. Methicillin is an old antibiotic that was developed in the ‘50s to treat penicillin-resistant infections. It is no longer manufactured because other antibiotics are more stable and more effective, but the term methicillin-resistant *Staphylococcus aureus* is still used.

Fortunately, the MRSA bacterium is not as common as *Staphylococcus aureus* and approximately 1-16% of the population has MRSA somewhere on the skin. However, although MRSA may not be as common as *Staphylococcus aureus*, infections with MRSA can be very serious. This is not because the MRSA bacterium is always more powerful than strains of *Staphylococcus aureus* although it can be. The biggest reason infections with MRSA are such a problem is that they cannot be easily treated with antibiotics.

**HOW IS MRSA SPREAD?**

Methicillin-resistant *Staphylococcus aureus* is primarily spread by skin contact and by the respiratory route. Methicillin-resistant *Staphylococcus aureus* can also be transmitted by infected blood.

Transmission of MRSA by skin contact occurs commonly in healthcare facilities and in the community. Transmission of MRSA by the respiratory route is relatively common in healthcare facilities, but not as common in the community. Infections with MRSA that happen in a healthcare facility are called hospital-acquired infections. Infections with MRSA that happen to people in the community are called community-acquired. For the most part - but not always - hospital-acquired and community acquired MRSA are different strains of the bacterium.

**Hospital-Acquired MRSA Infections**

Infections with MRSA that occur in the healthcare setting occur when the MRSA bacteria are spread from an infected patient to an uninfected patient by health care personnel. The MRSA bacteria can then gain access to tissues or the bloodstream of the
uninfected patient by a break in the skin. The MRSA bacterium can also be spread from patient to patient by infected respiratory droplets. These infections are common in the health care setting because:

- The patients are at risk: Many patients have chronic medical conditions that make them susceptible to developing infections. Also, as mentioned previously, many surgical incisions and in-dwelling IV catheters and other medical devices provide an entry point for the MRSA bacteria to enter the body. Remember: an intact skin is the body’s first line of defense against infection.

- Patient contact is a constant: Most CNAs have a lot of physical contact with the patients they are caring for: the amount of physical contact with patients will differ, depending on where you work, but it can be quite a lot. In an average eight hour shift you will take blood pressures, help people get dressed, perform catheter care - at the end of a typical day that all adds up to many, many instances of close physical contact with potentially infected patients.

- MRSA is easily transmitted: Methicillin-resistant *Staphylococcus aureus* is very easily transmitted from patients to healthcare personnel and then to other patients, and this can happen even in situations that may seem to be safe. Every time you make physical contact with a patient there is a risk that MRSA (and other pathogens) can contaminate the gloves you wear, your clothing, or your skin, and if that happens you can transmit MRSA to another patient. One study tested the disposable gloves nurses wore when performing patient care and found that 17% of the gloves were contaminated with MRSA.

- MRSA is everywhere: This is a bit of an exaggeration, but MRSA is very common in the healthcare environment. Methicillin-resistant *Staphylococcus aureus* has been found in significant amounts on mobile phones belonging to patients, visitors, and nurses, on stethoscopes, on computer keyboards, on x-ray cassettes, and on all kinds of surfaces such as countertops and cloth curtains. The MRSA bacterium can live on these objects and surfaces for weeks and months and can easily be picked up and transmitted. A study performed in three community hospitals found that 12% of the surfaces tested were contaminated with MRSA.

Because patient contact is so frequent, because MRSA is commonly found in health care facilities, and because MRSA is so easily transmitted, infections with MRSA are a significant risk for patients. Methicillin-resistant *Staphylococcus aureus* is the leading cause of surgical incision infections, it is the second-leading cause of bacteremia (infection of the bloodstream) in certain patient populations, and it is common cause of pneumonia in patients who are on ventilators. Patients who are elderly, patients who have a compromised immune system, patients who have received multiple antibiotics, patients who have in-dwelling catheters, and patients who have a long stay in the hospital are at risk for developing a hospital-acquired MRSA infection.
Community-Acquired MRSA Infections

Methicillin-resistant *Staphylococcus aureus* infections that are acquired in the community are transmitted by contact with an infected person or contact with a contaminated environment - just as hospital-acquired MRSA infections are - and there are factors that increase the risk of developing a community-acquired MRSA infection. These risk factors are called the five Cs:

1. **Crowding:** There are many reasons why crowding increases the risk of contracting a MRSA infection. The greater the number of people in close proximity to one another, the greater the chances that there will be someone who has a MRSA infection. Crowding also limits your ability to avoid MRSA infections. Examples of crowded environments that increase the risk of developing a MRSA infection are day-care centers, dormitories, locker rooms, and correctional facilities.

2. **Contact:** The more contact you have with people who have a MRSA infection or the more you are exposed to a MRSA-contaminated environment, the greater the chances are that you will contract a MRSA infection.

3. **Lack of Cleanliness:** Obviously if the environment is not hygienic or the people with whom you have contact with do not practice good hygiene, your chances of developing a MRSA infection will be increased.

4. **Compromised skin:** An intact skin surface is one of the most important defenses we have against infections. Pathogens such as MRSA can live on the skin and cause infections. But most pathogens, MRSA included, will thrive if they can gain access to internal organs and tissues and the bloodstream. The skin surface acts as a very effective physical barrier so that pathogens cannot gain access to the organs, tissues, and bloodstream. If there is a break in the surface of the skin, even a very, very tiny break, MRSA can gain access and spread.

5. **Environmental Contamination:** The more contaminated the environment is with MRSA, the greater the risk of developing an infection with MRSA. Remember, MRSA can be almost anywhere, and it can survive on surfaces in the environment for a long time.

Children, military personnel, people who are incarcerated, athletes who play team sports (especially contact sports like wrestling) people who have insulin-dependent diabetes mellitus, and people who use IV drugs are likely to have one or more of the five Cs present.
WHAT TYPES OF INFECTIONS ARE CAUSED BY MRSA? HOW ARE THESE INFECTIONS TREATED?

The MRSA bacterium can cause an infection anywhere in the body. The most common sites of MRSA infections are: 1) skin and soft tissue; 2) the bloodstream, and; 3) the respiratory tract, especially in hospitalized patients who are on ventilators. Other infections that can be caused by MRSA include bone and joint infections, infections of the heart muscle, brain infections, ocular infections, and urinary tract infections.

Community-acquired MRSA infections are primarily skin infections, and affect vulnerable groups such as children, military personnel, people who are immunocompromised, e.g., people who are HIV positive or have HIV/AIDS, people in correctional facilities, team sport athletes, IV drug users, and people who are sexually promiscuous.

Hospital-acquired MRSA can cause skin infections, but it can also cause bloodstream infections and respiratory infections, much more so than community acquired MRSA. Vulnerable hospital patients who are susceptible to contracting a MRSA infection include the elderly, ICU patients, ventilated patients, hemodialysis patients, people who are hospitalized for a long period of time, people who have a surgical incision, people with certain chronic medical conditions, and people have in-dwelling IV catheters or some other implanted medical device.

Skin Infections

The skin infections are the most common MRSA infections, and there are many different types of skin infections that can be caused by this pathogen. The most dangerous MRSA-related skin infection is necrotizing fasciitis, the infection that is some times called the “flesh-eating disease.” Necrotizing fasciitis has been the focus of many sensational stories, and it is a very dangerous condition for several reasons.

First, necrotizing fasciitis can be difficult to diagnose because it is the fat tissue that is affected, not the skin. Because the tissues that are being destroyed can’t be seen, the area that is infected will look normal but the patient will complain of intense pain. Second, once the infection begins to progress, it can rapidly cause fever, tachycardia, and significant swelling. If the infection is not quickly diagnosed and treated, the skin can be destroyed very, very quickly; the rate at which tissue is destroyed or “eaten” can be extremely fast. And third, even with early detection and the proper treatment, the mortality rate from necrotizing fasciitis has been reported to be between 30-40%, and the rate of amputations has been reported to be between 12-63%.

Most people who develop necrotizing fasciitis have chronic medical problems that affect their immune system or make them susceptible to infections, problems such as diabetes mellitus, HIV/AIDS, obesity peripheral vascular disease, or alcohol, IV drug, or tobacco use.

Fortunately, necrotizing fasciitis is quite rare; there are usually only 1000 cases reported in the United States each year. The great majority of skin infections caused by MRSA are conditions such as abscesses, boils, cellulitis, and surgical incision infections. These can be painful and quite disturbing for the patient but they are rarely as serious as necrotizing fasciitis. Most community-acquired MRSA infections are skin infections.
Bloodstream Infections

Bloodstream infections can cause a condition called sepsis. Sepsis occurs when a pathogen is present in large numbers in the bloodstream, allowing the harmful bacteria or virus to infect multiple organs. Sepsis that is caused by MRSA is a very dangerous condition. The mortality rate of MRSA-related sepsis is very high, and MRSA-related sepsis is very difficult to successfully treat. A MRSA-related sepsis usually happens to vulnerable people who are hospitalized.

Respiratory Infections

Community-acquired MRSA pneumonia is much less common than hospital-acquired MRSA pneumonia. People who are susceptible to developing community-acquired MRSA pneumonia are the elderly and people who have HIV/AIDS, cardiac disease, diabetes mellitus, or lung disease. Hospital-acquired MRSA pneumonia is one of the most common types of hospital-acquired pneumonia. It is common in patients who are in ICUs and ventilated patients, and as with the community-acquired type of MRSA pneumonia, hospital-acquired MRSA pneumonia tends to affect the elderly and people who have HIV/AIDS, cardiac disease, diabetes mellitus, or lung disease. A significant number of people with hospital-acquired MRSA pneumonia will also develop a MRSA-related bloodstream infection.

TREATMENTS FOR MRSA INFECTIONS

Treatment for Skin Infections

Skin infections caused by a MRSA infection that have formed an abscess are often treated by a procedure called incision and drainage, more commonly known as an I & D. The skin over the area of infection is opened with a scalpel (the incision) and the pus is drained. An I & D may be done in a physician’s office, a short-procedure unit, or an operating room. The choice of where and how to perform an I & D will depend on the size of the abscess, the location of the abscess, and the patient’s age and medical history. For example, if the patient is very young or very old, if the abscess is near a major blood vessel, or if the patient has significant medical problems the I & D may be performed using general anesthesia in an operating room. After the I & D is performed, the physician may or may not pack the wound and place a drain; the usefulness of these therapies is still being debated. Regardless of how and where an I & D is done, the patient will be prescribed antibiotics, usually both before and after the procedure. Less complicated MRSA skin infections are typically treated with antibiotics and warm compresses. Necrotizing fasciitis is treated with admission to the hospital and IV antibiotics.

The oral antibiotics that are used to treat simple MRSA skin infections include: trimethoprim-sulfamethoxazole (Bactrim®), doxycycline, clindamycin, linezolid, tetracycline, and minocycline. If the infection is more complicated, then these IV
antibiotics may be used: daptomycin (Cubicin®), linezolid (Zyvox®), and vancomycin (Vancocin®).

Treatment for Bloodstream Infections

Someone with a MRSA bloodstream infection will be admitted to the hospital if she/he is not already a patient. Bloodstream infections and sepsis caused by MRSA are usually treated with IV daptomycin, gentamycin, rifampin, or vancomycin.

Treatment for MRSA-Related Pneumonia

Clindamycin, linezolid, or vancomycin are usually the drugs of choice for treating MRSA-related pneumonia.

PREVENTING MRSA INFECTIONS

It is unlikely that all hospital-acquired MRSA infections can be prevented. The MRSA bacterium is very common in hospitals and healthcare facilities and some patients are very susceptible to MRSA infections.

But although MRSA infections probably cannot be eliminated, the incidence of MRSA infections can be reduced, especially in health care facilities. Decreasing the number of MRSA infections can be accomplished by using these three methods: 1) Identification of MRSA carriers and decolonization of the carriers; 2) Strict adherence to the principles and practices of Standard Precautions, and; 3) The judicious use of antibiotics. The proper use of antibiotics in order to prevent anti-biotic resistant strains of Staphylococcus aureus from developing is a very complex subject, and it does not have relevance for day-to-day patient care contact, and it will not be discussed in this module.

Identification and Decolonization of MRSA Carriers

Identification of MRSA carriers is a commonly employed strategy that is used to prevent MRSA infections in health care facilities. People who are admitted to health care facilities who are considered to be high risk for being MRSA carriers are screened by applying a swab to the areas where MRSA is typically found: the axillae (armpits), perineal area, the inside of the nose, and the throat.

Learning Break: Colonization with MRSA does not necessarily mean that a MRSA infection is present. Many of us can have pathogens growing on the skin, but there will not be enough of them to cause an actual infection, e.g., a clinical illness with signs and symptoms. Colonization simply indicates that the MRSA bacterium is present on the body. Remember, many people have MRSA growing on their skin for short periods of time.

If the patient is found to be a MRSA carrier, she/he will be isolated from vulnerable patients and from patients who are not MRSA carriers. The patient is then decolonized. Decolonization is a process by which the MRSA bacteria on the skin and in the nose is...
eliminated or greatly reduced. The decolonization procedure can be done in different ways in different health care facilities, but decolonization typically involves: 1) Application of a nasal antibiotic ointment, mupirocin (Bactroban®. This is done twice a day for five days; 2) Skin washing with a chlorhexidine-containing wash such as Hibiclens® for five days, and; 3) Five days of using an oral rinse that contains chlorhexidine, rinsing twice a day. Chlorhexidine is an antimicrobial that is effective in killing MRSA.

Screening and decolonization can be a very effective way of preventing MRSA infections. A 2013 study that was published in the New England Journal of Medicine showed that screening and decolonization of a targeted patient population was safe and reduced MRSA infections by 44%.

**Standard Precautions**

The incidence of hospital-acquired MRSA infections can be dramatically decreased with strict adherence to infection control measures and especially so if healthcare personnel conscientiously use Standard Precautions. Standard Precautions are infection control techniques and procedures that are used to prevent the transmission and spread of pathogens, and they are the most effective way of preventing the spread of MRSA and preventing hospital-acquired MRSA infections.

Standard Precautions are a combination of Universal Precautions (The original standards for the preventing the spread of pathogens), blood-borne pathogen precautions, respiratory and cough etiquette, safe injection practices, and the use of personal protective equipment (PPE). This module will not provide a comprehensive discussion of Standard Precautions, but the highlights will be covered.


The basics of Standard Precautions are as follows:

**Hand hygiene:** Hand washing is probably the most important way of preventing transmission of MRSA. It has long been proven that pathogens can be easily spread from patient to health care worker and then to other patients, and this spread can be caused by even minimal contact and in situations in which contamination of the hands would not be obvious. If health care personnel strictly adhere to proper hand washing protocols, transmission of MRSA from patient to patient can be reduced and the rate of MRSA infections can be reduced. The basic rules of hand washing are as follows.

Hand washing should always be performed before and after patient contact, even if the contact is minimal.

Hand washing can be done using an alcohol hand rub. When using an alcohol-based hand rub, apply the product to the palm of one hand and rub both hands together. Make sure you have covered all surfaces of your hands and fingers, and rub together until your
hands are dry. The amount of hand rub you should use will vary depending on the specifics of the product. Alcohol-based hand rubs are very effective method for cleaning hands. Using these products takes less time than washing the hands with soap and water, they remove more bacteria that soap and water, and they are less irritating to the skin than repeated hand washing with soap and water. The last point is very important for two reasons. First, people are less likely to wash their hands if their skin is chapped and irritated from constant washing with soap and water. Second, chapped and irritate skin places the health care professional at risk for infection: intact skin is the body’s first line of defense against infection. Alcohol-based hand rubs can also irritate the skin but to a lesser degree than hand washing. Alcohol-based hand rubs should not be used if your hands are visibly dirty or contaminated with blood or other body fluids.

If hand washing with soap and water is necessary, follow these rules. First remove all rings and bracelets. Wet the hands thoroughly, apply the soap and then rub your hands together vigorously for at least 15 seconds, making sure to cover all the surfaces. Dry them with a paper towel and use the paper towel to turn off the water; do not touch the faucet handle with your just washed hands. Healthcare personnel should avoid wearing artificial nails and keep natural nails less than one quarter of an inch long if they care for patients at high risk of acquiring infections.

**Gloves:** Gloves are an important part of infection control and preventing the spread of MRSA. Hand washing itself cannot remove all pathogens from the hands or prevent contamination of the hands, so gloves must be used when contamination is likely. The use of gloves does not eliminate the need for hand hygiene. Likewise, the use of hand hygiene does not eliminate the need for gloves. Gloves can reduce contamination of the hands by 70% to 80%, but the use of gloves does not mean that hand washing can be ignored.

Disposable gloves should be used whenever there is a chance that you may come in contact with blood or other body fluids or secretions.

In order to be effective, gloves must be used in the correct way. You must always wash your hands before putting on gloves and after taking them off: do not skip this step. Disposable gloves, either latex or non-latex, are not 100% impenetrable and it is also possible that small punctures to your gloves that you might not notice can occur during patient care, so do not forget to wash your hands after removing your gloves.

Putting gloves on and taking them off must be done properly. To remove gloves, grab the outside of one glove with your gloved hand and peel off the glove. For the other glove, slide your fingers underneath the glove and peel it back. Do not touch the outside of the gloves with bare hands when you are putting them on or when you are taking them off.

Always discard used gloves in a hazardous waste container, do not discard them into an ordinary trash receptacle. Disposable gloves are a one-time use article. They should not be washed and re-used, and you should never use the same pair of gloves to provide care for more than one patient.

**Personal protective equipment:** Personal protective equipment (PPE) includes gloves, gowns, shoe covers, face masks, goggles, and respirators. Personal protective
equipment is used to protect you from contamination with blood or other body fluids and secretions.

The specific PPE that should be used depends on two factors: 1) the patient care situation, and; 2) how likely it is you will be exposed to infectious material. For example, if you are going to doing urinary catheter care you would wear disposable gloves and possibly a gown but there would be no need for shoes covers, a face mask, or goggles. If you were asked to assist in a procedure that involved potential exposure to blood and the patient was agitated and confused, then more complete PPE would be appropriate. The facility in which you work should have protocols that outline what level of PPE should be used for any specific procedure.

Personal protective equipment must be used properly. Always wash your hands before putting on any article of PPE. Gloves should the last item that are put on. When you are removing any article of PPE, do not touch the outside of the mask, gown, glove, or shoe cover - the side that may be contaminated. Discard the PPE items in a hazardous waste container, not in an ordinary trash receptacle. Never re-use PPE items and never use the same PPE items to provide care for more than one patient.

**Blood-borne pathogen precautions:** A complete discussion of blood-borne pathogen precautions is beyond the scope of this module. Methicillin-resistant *Staphylococcus aureus* infections can be spread by contact with blood, so any contact with blood-especially contact on non-intact skin – would pose a risk. Always assume that blood may be potentially infectious and use gloves and other PPE whenever contact with blood is likely to happen.

**Respiratory and cough etiquette:** Respiratory and cough etiquette can help prevent the spread of airborne pathogens. The etiquette has three parts: 1) Cover your mouth and nose with a tissue when coughing or sneezing; 2) Make sure to wash your hands after coughing or sneezing, and; 3) Dispose of tissues in the nearest waste receptacle and wash you hands after using a tissue.

The most important basic principle behind Standard Precautions is that all body fluids and secretions must be considered potentially contaminated and infectious. You should also keep in mind that the transmission of MRSA can occur very easily, and it can occur in patient care situations that seem safe. Using Standard Precautions protects the patient and it protects you, as well. Using Standard Precautions can be time-consuming and inconvenient, but it provides invaluable protection against MRSA, both to you and to patients. Never assume patient contact is “safe.” Always use Standard Precautions.

**SUMMARY**

Methicillin-resistant *Staphylococcus aureus* is a dangerous pathogen, a mutation of the *Staphylococcus aureus* bacterium that has the ability to resist treatment by many of the commonly used antibiotics. Infections with MRSA usually affect the skin, the respiratory tract or the blood stream, but the heart, the brain, the urinary tract, and other areas of the body can develop MRSA infections.
The MRSA bacterium is very common, and many people have MRSA, for short periods of time, in their nasal passages and on the skin in the armpits, groin, and the oropharynx. Methicillin-resistant *Staphylococcus aureus* is also a commonly found environmental contaminant, especially in health care facilities. Although may of us have MRSA and MRSA often contaminates many objects and surfaces in the environment, infections with MRSA usually happen only in certain conditions and to people who are vulnerable.

Unfortunately, if a MRSA infection does occur it can be difficult to treat and for some patients who have MRSA infections of the blood stream or the respiratory tract, the mortality rate can be high. Skin infections with MRSA are less dangerous, but one particular type of MRSA skin infection, necrotizing fasciitis - commonly called the flesh eating disease - is difficult to diagnose and treat and is associated with high rates of mortality and amputation.

Infections with MRSA can be prevented by identifying and decolonizing MRSA carriers and by the conscientious use of Standard Precautions. Although these measures cannot completely eliminate MRSA infections, they have been shown to significantly decrease the number of people who develop MRSA infections.