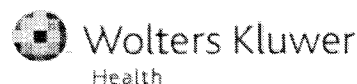




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Patient information: Methicillin-resistant Staphylococcus aureus (MRSA) (Beyond the Basics)

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Disclosures

All topics are updated as new evidence becomes available and our [peer review process](#) is complete.

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ANTIBIOTIC-RESISTANT STAPH INFECTIONS — Staphylococcus aureus (Staph aureus or "Staph") is a bacterium that is carried on the skin or nasal lining of up to 30 percent of healthy individuals. In this setting, the bacteria usually cause no symptoms.

However, when the skin is damaged, even with a minor injury such as a scratch or a small cut from shaving, Staph can cause a wide range of problems. These problems can range from a mild pimple to severe illness, especially in young children, older adults, and people with a weakened immune system.

This topic review discusses the signs and symptoms, diagnostic tests, treatment, and prevention of a particularly dangerous form of Staph aureus called methicillin-resistant Staphylococcus aureus (MRSA, pronounced "Mursa").

WHERE DID MRSA COME FROM? — Initially most Staph infections were sensitive to penicillin. In the 1950s many infections became resistant to penicillin and methicillin (a related drug developed to treat these germs). Thus the term methicillin-resistant Staphylococcus aureus (MRSA) was derived. Staph that can be treated with these drugs is called methicillin-susceptible Staphylococcus aureus, or MSSA.

Unfortunately some strains of Staph have become resistant to methicillin and other similar antibiotics. These strains are known as MRSA, which cannot be cured with traditional penicillin-related drugs. Instead, MRSA must be treated with alternate antibiotics.

Initially, after problems with MRSA were recognized, most cases of MRSA infection occurred in people who were hospitalized or lived in nursing homes. However, in the 1990s MRSA infections were recognized in people who were not hospitalized or in contact with people in nursing homes. Since then the frequency of cases of MRSA in people who live in the community has greatly increased; in 2006 more than one-half of all cases of skin infections due to MRSA occurred in otherwise healthy people living in the community [1].

Today we now realize that infections with MRSA occur in three specific groups of people: 1) persons currently in the hospital (hospital-associated MRSA), 2) persons with recent hospitalization or ongoing contact with medical clinics, dialysis units, or those undergoing complex outpatient treatments, such as chemotherapy (healthcare-associated MRSA), and 3) persons in the community (community-associated MRSA).

HOW IS MRSA SPREAD? — You can be "colonized" with MRSA, meaning that you carry the bacteria on your skin or in your nose but you have no signs or symptoms of the illness. You can become colonized with MRSA in a variety of ways:

- By touching the skin of another person who is colonized with MRSA.
- Through the tiny droplets that travel when people carrying MRSA breathe, cough, or sneeze.
- By touching a contaminated surface (such as a counter top, door handle, or phone).

You can develop an infection from MRSA if your skin is colonized and the bacteria enter an opening (eg, a cut, scrape, or wound) in the skin.

MRSA RISK FACTORS — Anyone can become colonized and then infected with MRSA, although certain people are at a higher risk.

Hospital care — Risk factors for becoming infected with hospital associated MRSA include the following:

- Having a surgical wound and/or intravenous (IV) line
- Being hospitalized for a prolonged period of time
- Recent use of antibiotics
- Having a weakened immune system due to a medical condition or its treatment
- Being in close proximity to other patients or healthcare workers who are colonized with MRSA

In hospitals and other long-term healthcare facilities, MRSA can be spread from one patient to another on the hands of healthcare workers. Hands or gloves may become contaminated with MRSA when healthcare workers touch a patient's skin, wounds, wound dressings, or devices such as IV tubing.

Healthcare providers should wash their hands before and after touching any patient and change gloves between patients to decrease the risk of spreading MRSA. (See '[Prevention in the hospital](#)' below.)

Hemodialysis — People who need hemodialysis for kidney failure have a substantially higher risk of becoming infected with MRSA compared with other patients. In one study, 4 percent of hemodialysis patients became infected with MRSA; only about 0.04 percent of people in the general population become infected with MRSA [2]. (See "[Patient information: Hemodialysis \(Beyond the Basics\)](#)".)

Community associated MRSA — You can pick up MRSA outside the hospital, especially if you:

- Have skin trauma (eg, "turf burns," cuts or sores)
- Are an athlete
- Shave or wax to remove body hair, particularly of the armpits and groin
- Have tattoos or body piercing
- Have physical contact with a person who has a draining cut or sore or is a carrier of MRSA
- Share personal items or equipment that is not cleaned or laundered between users (such as towels or protective sport pads)

Community-associated MRSA infections may occur more commonly in certain populations, such as daycare centers, prisons, in the military, or in athletes who play on a team. Spread of MRSA within households is common.

MRSA SYMPTOMS — Most people infected with community-associated MRSA (CA-MRSA) have signs of a skin infection. Such skin infections may appear spontaneously and, in some cases, may be mistaken for a spider bite. The skin may have a single raised red lump that is tender, a cluster of "pimples", or a large tender lump that drains pus (called a carbuncle). The area may enlarge and become progressively more tender, red, and swollen. The center of the raised area may ooze pus.

It is also possible to develop an infection in areas other than the skin if the bacteria enter the bloodstream through an opening in the skin. Infection can then develop on a heart valve, in a bone, joint, or the lungs, or around devices (such as an IV line, pacemaker, or replacement joint). In these situations, symptoms may include fever and fatigue, as well as pain or swelling in the infected area.

MRSA DIAGNOSIS — People with skin infections can be tested for MRSA with a culture. Results of the test are usually available in 48 to 72 hours.

People with infections of the lung, bone, joint, or other internal areas usually require blood tests as well as imaging studies (eg, x-ray, CT scan, echocardiogram).

MRSA TREATMENT — If MRSA is diagnosed, you will be given an antibiotic. The antibiotic dose or type may be changed when the results of the laboratory culture are available.

At home — Treatment of MRSA at home usually includes a seven to 10 day course of an antibiotic (by mouth) such as trimethoprim-sulfamethoxazole (brand name: Bactrim), clindamycin, minocycline, or doxycycline. It is very important to carefully follow the instructions for taking the antibiotic; this means taking it on time and finishing the entire course of treatment, even if you feel better after a few days. If the oral antibiotic is not effective or if the infection is making you ill, you may need to be treated in the hospital (see 'In the hospital' below).

In addition to antibiotics, your healthcare provider may drain the infected area by inserting a needle or making a small cut in the skin. This is done to reduce the amount of infected material (pus), which will help the tissue to heal. You should **NEVER** try to drain a boil or pimple on your own because this could worsen the infection.

In some cases additional strategies may be used for management of household spread and/or recurrent infection. These may include use of mupirocin ointment, chlorhexidine soap, and other techniques. These strategies are not always fully effective.

In the hospital — Hospitalized people with MRSA infections are usually treated with an intravenous medication. The intravenous antibiotic is usually continued until the person is improving.

In many cases, the person will be given antibiotics after discharge from the hospital, either by mouth or by IV. This may be needed for a short period of time or for as long as six to eight weeks. Intravenous antibiotics can be given at home, by a visiting nurse, or in a rehabilitation facility.

MRSA infections can be very serious and even fatal. One study estimated that in 2005, approximately 20 percent of patients with serious MRSA infections died; about 86 percent of these infections were acquired in the hospital [3].

MRSA PREVENTION — A number of prevention strategies are recommended to avoid becoming infected with MRSA.

Prevention in the hospital — In the hospital, MRSA is commonly spread to patients from the hands of healthcare workers. To minimize this risk, patients and family members can help to ensure that anyone who comes in contact with the patient washes their hands or uses an alcohol-based hand sanitizer before and after touching the patient. Patients with active infection should also wash their hands frequently.

Hospitalized patients who are colonized or infected with MRSA should have "contact precautions". This means that anyone who enters the patient's room, even family and friends, must wash their hands and wear gloves and a clean cover gown to prevent contamination of their clothing.

Prevention in the community — The best way to prevent and control MRSA in the community is not clear. The Center for Disease Control and Prevention has made the following recommendations [4]:

- Keep hands clean by washing thoroughly with soap and water. Hands should be wet with water and plain soap, and rubbed together for 15 to 30 seconds. Special attention should be paid to the fingernails, between the fingers, and the wrists. Hands should be rinsed thoroughly, and dried with a single use towel (eg, paper towels).
- Alcohol-based hand sanitizers are a good alternative for disinfecting hands if a sink is not available. Hand sanitizers should be rubbed over the entire surface of hands, fingers, and wrists until dry, and may be used several times. Hand sanitizers are available as a liquid or wipe in small, portable sizes that are easy to carry in a pocket or handbag. When a sink is available, visibly soiled hands should be washed with soap and water.
- Keep cuts and scrapes clean, dry, and covered with a bandage until healed.
- Avoid touching other people's wounds or bandages.
- Avoid sharing personal items such as towels, washcloths, razors, clothing, or uniforms. Other items that should not be shared include brushes, combs, and makeup.
- Students who participate in team sports should shower after every athletic activity using soap and clean towels. Athletes with skin infections should receive prompt treatment and should not compete when they have draining or active skin infections.
- People who use exercise machines at sports clubs or schools should be sure to wipe down the equipment, including the hand grips, with an alcohol-based solution after using it.

Care for family members of infected person — Current guidelines do not recommend that family members of a person with CA-MRSA infection be treated with antibiotics [5]. Careful preventive measures, including washing hands, keeping wounds covered, washing bed sheets and towels, and avoiding shared personal items is recommended in these situations.

Basic infection prevention measures — There are a number of other measures that may help to prevent the spread of infections, including infection with MRSA.

- Use a tissue to cover the mouth when sneezing or coughing. Used tissues should be disposed of promptly. Sneezing/coughing into the sleeve of one's clothing (at the inner elbow) is another means of containing sprays of saliva and secretions and has the advantage of not contaminating the hands.
- Use of disinfectant (antimicrobial cleaning agent) on surfaces (eg, counters, door knobs, phones, computer keyboards) can help to reduce or eliminate bacteria.

Should I be tested for MRSA? — It is frightening to think about becoming ill with a serious infection such as MRSA. Many people wonder if they should be tested for MRSA, even if they have no signs, symptoms, or risk factors.

Experts do not recommend widespread testing for MRSA because of the small risk of becoming infected; currently only about four out of 10,000 people living in the community develop the infection per year.

WHERE TO GET MORE INFORMATION — Your healthcare provider is the best source of information for questions and concerns related to your medical problem.

This article will be updated as needed on our web site (www.uptodate.com/patients). Related topics for patients, as well as selected articles written for healthcare professionals, are also available. Some of the most relevant are listed below.

Patient level information — UpToDate offers two types of patient education materials.

The Basics — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.

[Patient information: Methicillin-resistant Staphylococcus aureus \(MRSA\) \(The Basics\)](#)

[Patient information: Cellulitis and erysipelas \(skin infections\) \(The Basics\)](#)

[Patient information: What you should know about antibiotics \(The Basics\)](#)

[Patient information: Hospital-acquired pneumonia \(The Basics\)](#)

Beyond the Basics — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.

[Patient information: Hemodialysis \(Beyond the Basics\)](#)

Professional level information — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

[Epidemiology and clinical spectrum of methicillin-resistant Staphylococcus aureus infections in children](#)

[Epidemiology of methicillin-resistant Staphylococcus aureus infection in adults](#)

[Evaluation and management of suspected methicillin-resistant Staphylococcus aureus skin and soft tissue infections in children](#)

[Folliculitis](#)

[Prevention and control of methicillin-resistant Staphylococcus aureus in children](#)

[Skin abscesses, furuncles, and carbuncles](#)

[Treatment of invasive methicillin-resistant Staphylococcus aureus infection in children](#)

[Treatment of invasive methicillin-resistant Staphylococcus aureus infections in adults](#)

[Treatment of skin and soft tissue infections due to methicillin-resistant Staphylococcus aureus in adults](#)

[Vancomycin-intermediate and vancomycin-resistant Staphylococcus aureus infections](#)

The following organizations also provide reliable health information.

- National Library of Medicine

www.nlm.nih.gov/medlineplus/healthtopics.html

- National Institute of Allergy and Infectious Diseases

www.niaid.nih.gov/

- Centers for Disease Control and Prevention (CDC)

Phone: (404) 639-3534
Toll-free: (800) 311-3435
(<http://www.cdc.gov/mrsa/index.html>)

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