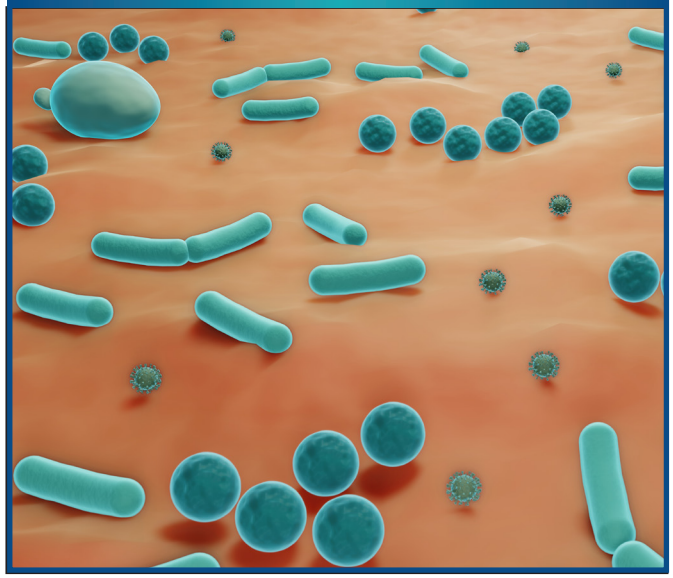
BACTERIAL SKIN INFECTIONS

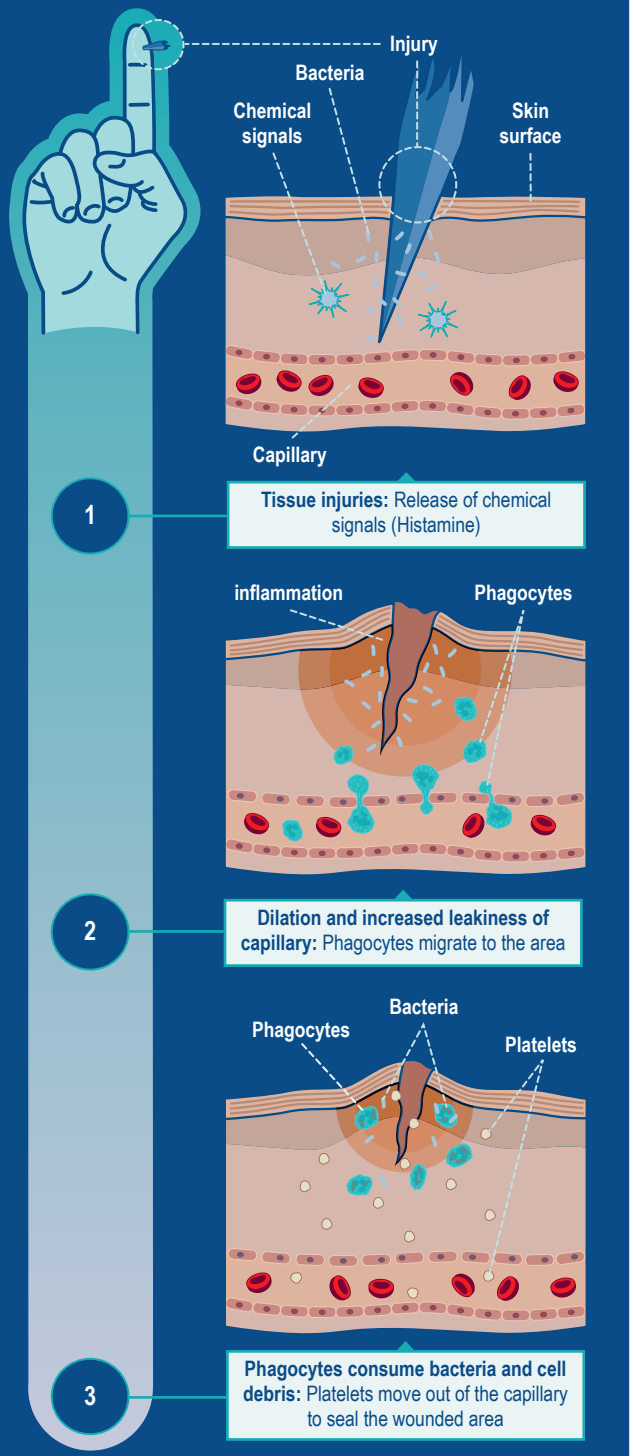


WHAT ARE BACTERIAL SKIN INFECTIONS?

- Bacterial skin infections develop when bacteria enter through hair follicles or through small breaks in the skin that result from scrapes, punctures, wounds, burns, or surgery
- To fight the bacteria, the body's immune system mounts an inflammatory response. When this happens, it can lead to pain, swelling, and redness
- Some bacterial skin infections, such as cellulitis, affect the top of the skin and can vary in size
- Other types of infection, such as an abscess (also known as a boil) can go deep into your skin and can produce pus

Below: Abscess

INJURY INFLAMMATION

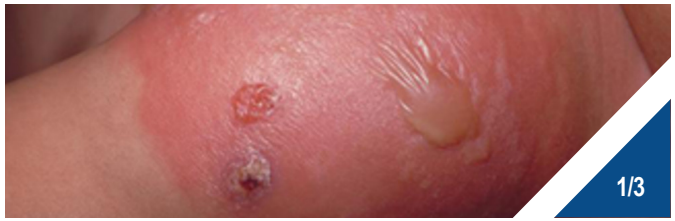


COMMON BACTERIAL SKIN INFECTIONS:

▶skin abscess ▶wound infections ▶erysipelas ▶cellulitis

- Skin infections are often classified by whether they are associated with purulence (or pus formation)
- Skin abscess and wound infections are considered purulent (those with pus)
  - A skin abscess (or boil) is a mass or bump that can develop in any part of the body under the surface of the skin that contains pus or fluid. Abscesses are often painful and tender and may be surrounded by pink to deep red skin
  - Wounds are caused by external damage to intact skin and include surgical wounds, bites, burns, minor cuts and abrasions. A wound infection is characterized by pus draining from a wound with surrounding redness and swelling
- Erysipelas and cellulitis are non-purulent (those without pus) skin infections
  - Erysipelas tends to affect only the upper layers of skin
  - Cellulitis is a spreading bacterial infection of the skin and the tissues immediately beneath the skin
  - The skin typically appears red, feels warm, and is tender to the touch. The skin may be slightly swollen and pitted like the skin of an orange. Sometimes there are blisters
  - The legs are the most common site of infection, but any area of skin can be involved
  - When present, systemic symptoms such as fevers, chills or malaise are suggestive of more severe infection

Below: Cellulitis on arm, cellulitis with blisters



RISK FACTORS

People with diabetes, who are likely to have poor blood flow
(especially to the hands and feet), and have a high level of sugar (glucose) in their blood, which decreases their ability to fight infections

People who are hospitalized or living in a nursing home

People who are older

People who have a weakened immune system

Chronic skin conditions such as eczema or psoriasis

BACTERIAL CAUSES

- Many types of bacteria can cause skin infections. The most frequent pathogens causing community-acquired skin infections are *Staphylococcus aureus* (*S. aureus* or "staph" for short) and beta-hemolytic Streptococcus ("Strep")
- Streptococcal species (*Streptococcus pyogenes* and others)
  - Are thought to cause the large majority of cases of cellulitis and erysipelas
  - May also cause abscesses and wound infections
- *Staphylococcus aureus*
  - Responsible for up to 75% of all cases of skin abscess in the United States
  - Also a major cause of wound infections
  - Less commonly associated with cellulitis
  - Resistance to frequently used antibiotics is a growing problem (see below)
- Other bacteria
  - Other bacterial species may cause skin infections especially when there are certain characteristic environmental exposures

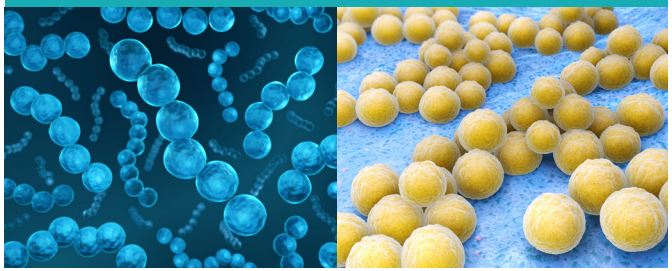
ANTIBIOTIC RESISTANT BACTERIA IN SKIN INFECTIONS: MRSA

- Methicillin-resistant *Staphylococcus aureus,* also known by the abbreviation MRSA, is a type of staph bacteria that has become resistant to a group of antibiotics related to penicillin that were commonly used to treat skin infections
- MRSA has long been associated with infections occurring within the hospital. However, in the late 1990s, reports of MRSA skin infections originating in the community (outside the hospital) became increasingly common
- Community-onset MRSA is now a leading cause of abscesses and wound infections. MRSA makes up roughly 50% of all staph infections in the United States although the exact percentage may vary based on region
- MRSA is also frequently resistant to other classes of antibiotics (macrolides, fluoroquinolones, and clindamycin) that may be used to treat skin infections
- Because MRSA does not respond to treatment with several antibiotic classes, doctors must tailor their treatment based on the antibiotic resistance patterns of MRSA found in the local area
- The CDC has classified MRSA as a serious public health threat

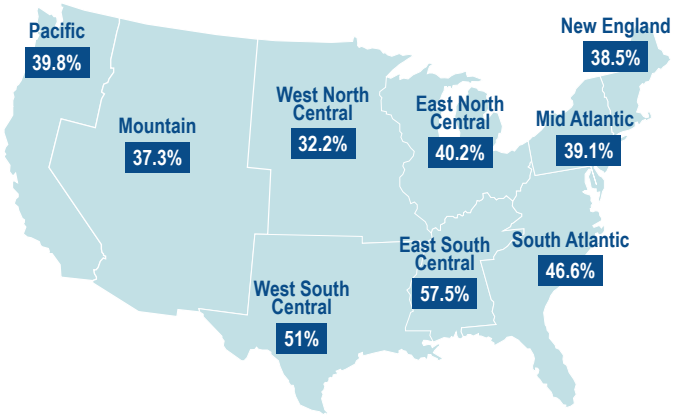
HOW ARE SKIN INFECTIONS DIAGNOSED?

- Skin infections are usually diagnosed based on their appearance and the person's symptoms
- Redness, pain, and tenderness are felt over an area of skin, the skin often feels warm to the touch, and some people have a fever, chills, and other more serious symptoms
- Testing samples of blood, pus, or tissue specimens may be performed to identify the type of bacteria causing the infection

Left: Streptococcus bacteria **Right:** *Staphylococcus aureus*



REGIONAL PREVALENCE OF MRSA ACROSS THE U.S.



323,700
Estimated cases in hospitalized patients in 2017

10,600
Estimated deaths in 2017

$1.7B
Estimated attributable health care cost in 2017

Based on 1,666 clinical isolates collected from U.S. medical centers during 2020. JMI Laboratories Sentry Antimicrobial Surveillance Database.
This is an example of how geography can influence local resistance rates.

GENERAL TREATMENT PRINCIPLES

- Incision, drainage, or debridement to remove infected tissue
  - Drainage of abscesses and/or removal of dead tissue from infected wounds, when present
  - Abscesses should be cut open by a doctor and allowed to drain; your doctor may drain the pus and fluid out of the abscess (usually with a needle)
  - Any dead tissue must be surgically removed (debrided) from infected wounds
  - These procedures speed up recovery by improving the healing potential of remaining healthy tissue
  - A sample of the fluid from the abscess or wound may also be tested in a laboratory to identify the bacteria that is causing the infection and determine which antibiotics will work best against it

- Antibiotic therapy to control the infection
  - An antibiotic ointment may be used for minor skin infections
  - Most patients with uncomplicated skin infections can be treated outside of the hospital with antibiotics taken by mouth
  - For more serious infections requiring hospitalization, antibiotics may be given by injection. Treatment in the hospital is recommended if there is concern for deeper infection, if the patient has weakened immune system, or if the initial antibiotic regimen taken by mouth is not adequately controlling the infection
  - Your doctor will choose the antibiotic regimen based on the most likely bacteria to be causing the infection along with their knowledge of local antibiotic resistance patterns
    - Most purulent infections (abscess, wounds) can be treated with standard antibiotics that have activity *versus* staph, including MRSA
    - Most non-purulent infections (cellulitis, erysipelas) can be treated with standard antibiotics that have activity *versus* streptococci. Some doctors may choose antibiotics that are also active against *Staphylococcus aureus* in their initial treatment regimen of non-purulent infections
  - Once available, the results of laboratory tests can help guide your doctor in prescribing the right antibiotics to treat the infection

- Adjunctive treatments
  - For cellulitis involving the arm or leg, the affected limb should be elevated to facilitate drainage and hasten resolution of infection
  - Underlying conditions that predispose to cellulitis, such as toe space fissuring, chronic fluid accumulation in the limbs, or fungal toenail infection, should be treated to prevent recurrences of infection

PREVENTION

- Cleaning skin with soap and water
- Preventing bacterial skin infections involves keeping the skin undamaged and clean. When the skin is cut or scraped, the injury should be washed with soap and water and covered with a sterile bandage
- Comprehensive wound care can help prevent infection by stopping further skin breakdown, relieving pain, and promoting wound closure

ADDITIONAL RESOURCES

Medline

https://medlineplus.gov/skininfections.html

Uptodate

https://www.uptodate.com/contents/skin-and-soft-tissue-infection-cellulitis-beyond-the-basics?topicRef=15728&source=relatted_link

Merck Manual

https://www.merckmanuals.com/home/skin-disorders/bacterial-skin-infections/overview-of-bacterial-skin-infections?query=skin%20infections

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ASK YOUR DOCTOR

Local patterns of antibiotic resistance

Adverse reactions and side effects of the treatment being prescribed for you

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