



Fungal Diseases

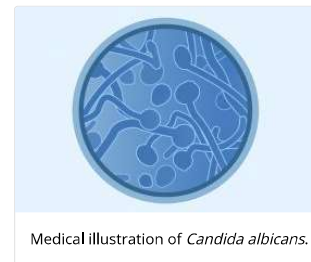
About Invasive Candidiasis

What is invasive candidiasis?

Invasive candidiasis is an infection caused by a yeast (a type of fungus) called *Candida*. Unlike *Candida* infections in the mouth and throat (also called “thrush”) or vaginal “yeast infections,” which are localized to one part of the body, invasive candidiasis is a serious infection that can affect the blood, heart, brain, eyes, bones, or other parts of the body.¹

Candida normally lives inside the body (in places such as the mouth, throat, gut, and vagina) and on the skin without causing any problems.² However, in certain patients who are at risk, *Candida* can enter the bloodstream or internal organs and cause an infection. A *Candida* bloodstream infection, also called candidemia, is the most common form of invasive candidiasis.¹ In the United States, candidemia is one of the most common causes of bloodstream infections in hospitalized patients,³⁻⁴ and it often results in long hospital stays and death. It is also responsible for high medical costs.⁵

Antifungal medication can treat invasive candidiasis. Certain patients such as those with cancer or bone marrow or organ transplants might receive antifungal medication to prevent invasive candidiasis.⁶



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Where Invasive Candidiasis Comes From

Candida lives in and on the body

Candida, the fungus that causes invasive candidiasis, normally lives inside the body (in places such as the mouth, throat, gut, and vagina) and on the skin without causing any problems.¹ In some [people who are at higher risk for the infection](#), *Candida* can enter the bloodstream or internal organs and cause invasive candidiasis. For example, this can happen when a central venous catheter is inserted and left in place for a long time, during surgery, or when the immune system is weakened during chemotherapy. Healthcare workers can also carry *Candida* on their hands.^{2,3} A few outbreaks of candidemia have been linked to healthcare workers' hands,^{4,5} so [hand hygiene in healthcare settings](#) is important for preventing the spread of infections.

Types of *Candida*

There are over hundreds of species of *Candida*, but only a few are known to cause infections.⁶ The most common species that cause infections are *C. albicans*, *C. glabrata*, *C. parapsilosis*, *C. tropicalis*, and *C. krusei*.

Another species called *C. auris* is emerging as a cause of invasive candidiasis around the world and in certain areas of the United States – [read more about this concerning and often drug-resistant species](#).

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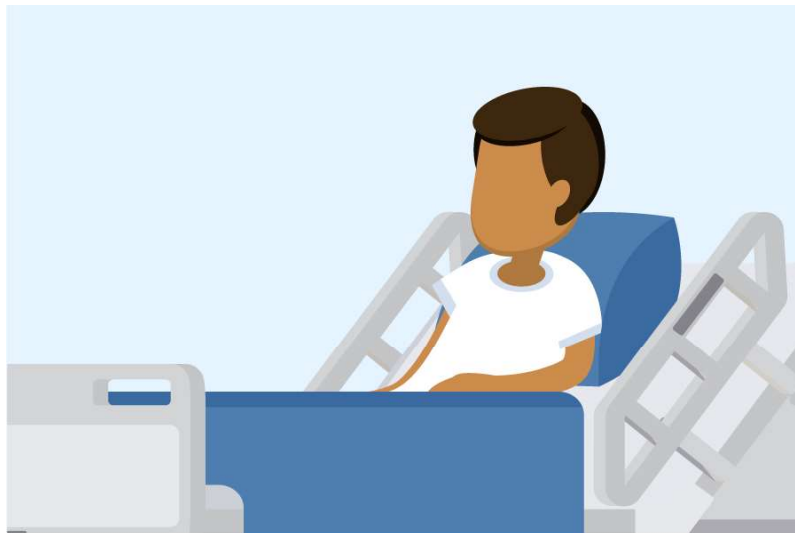
Invasive Candidiasis Risk & Prevention

Groups at risk for invasive candidiasis

People who are at high risk for developing invasive candidiasis include those who:¹

- Have spent a lot of time in the intensive care unit (ICU)
- Have a [central venous catheter](#)
- Have a weakened immune system (for example, people on cancer chemotherapy, people who have had an organ transplant, and people with low white blood cell counts)
- Have recently had surgery, especially multiple abdominal surgeries
- Have recently received lots of antibiotics in the hospital
- Receive total parenteral nutrition (food through a vein)
- Have kidney failure or are on hemodialysis
- Have diabetes
- Are pre-term babies

People who inject drugs are also at risk for invasive candidiasis, especially for bloodstream infections, heart valve infections, and bone and joint infections.⁶



Is invasive candidiasis contagious?

Invasive candidiasis doesn't spread directly from person to person.

However, some species of the fungus that causes invasive candidiasis normally live on skin, so it's possible that *Candida* can be passed from one person to another and possibly cause an infection in someone who is at high risk.^{2, 3}

Preventing invasive candidiasis

- **Antifungal medication.** If you're at high risk for developing invasive candidiasis, your healthcare provider may prescribe antifungal medication to prevent the infection. This is called "antifungal prophylaxis," and it is typically recommended for:⁴
 - Some organ transplant patients
 - Certain patients in the intensive care unit (ICU)
 - Patients who are on certain types of chemotherapy or have low white blood cell counts (neutropenia)
 - Patients who have a stem cell or bone marrow transplant and have low white blood cell counts (neutropenia)
- Some doctors may also consider giving antifungal prophylaxis to very low birth weight infants (less than 2.2 pounds) in nurseries with high rates of invasive candidiasis.
- **Be a safe patient.** There are some actions that you can take to help protect yourself from infections, including:
 - Speak up. Patients and caregivers can ask whether a [central venous catheter \(central line\)](#) is needed, and if so, how long it should stay in place. Tell your doctor if the skin around the catheter becomes red or painful.
 - Keep hands clean. Be sure everyone cleans their hands before touching you. Washing hands can prevent the spread of germs.
 - For more tips, please see CDC's webpage about [What You Can Do to Be a Safe Patient](#).
- **Healthcare providers** can follow CDC-recommended infection control practices every time they work with a central line. For more prevention information, please visit [CDC's Healthcare-Associated Infections website](#).

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Symptoms of Invasive Candidiasis

People who develop invasive candidiasis are often already sick from other medical conditions, so it can be difficult to know which symptoms are related to a *Candida* infection. However, the most common symptoms of invasive candidiasis are fever and chills that don't improve after antibiotic treatment for suspected bacterial infections. Other symptoms can develop if the infection spreads to other parts of the body, such as the heart, brain, eyes, bones, or joints.



Fever and chills are the most common symptoms of invasive candidiasis.

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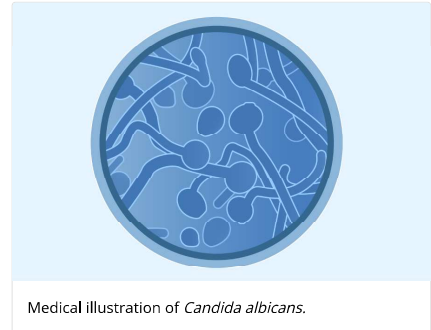
Diagnosis and testing for Invasive Candidiasis

How is invasive candidiasis diagnosed?

Healthcare providers rely on your medical history, symptoms, physical examinations, and laboratory tests to diagnose invasive candidiasis. The most common way that healthcare providers test for invasive candidiasis is by taking a blood sample or sample from the infected body site and sending it to a laboratory to see if it will grow *Candida* in a culture.

How long will it take to get my test results?

Results from a test will usually be available in a few days.



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Treatment for Invasive Candidiasis

How is invasive candidiasis treated?

The specific type and dose of antifungal medication used to treat invasive candidiasis usually depends on the patient's age, immune status, and location and severity of the infection. For most adults, the initial recommended antifungal treatment is an echinocandin (caspofungin, micafungin, or anidulafungin) given through the vein (intravenous or IV). Fluconazole, amphotericin B, and other antifungal medications may also be appropriate in certain situations.



How long does the treatment last?

For candidemia, treatment should continue for 2 weeks after signs and symptoms have resolved and *Candida* yeasts are no longer in the bloodstream. Other forms of invasive candidiasis, such as infections in the bones, joints, heart, or central nervous system, usually need to be treated for a longer period of time.

Healthcare providers can [click here for the Infectious Diseases Society of America's Clinical Practice Guidelines for the Management of Candidiasis](#).

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Invasive Candidiasis Statistics

How common is invasive candidiasis?

Candidemia is one of the most common bloodstream infections in the United States.¹ During 2013–2017, the average incidence (rate of new infections) was approximately 9 per 100,000 people; however, this number varies substantially by geographic location and patient population. CDC estimates that approximately 25,000 cases of candidemia occur nationwide each year.²

Though it is the most common form of invasive candidiasis, candidemia does not represent all forms of invasive candidiasis. The infection can also occur in the heart, kidney, bones, and other internal organs without being detected in the blood. In fact, the number of cases of invasive candidiasis might be twice as high as the estimate for candidemia.



HAIC Viz is an interactive tool that displays trends in candidemia incidence, outcomes, species distribution, and antimicrobial resistance patterns using data collected through the Emerging Infections Program.

Public health surveillance for candidemia in the United States

Since 2008, CDC has performed continuous, active population-based surveillance for *Candida* bloodstream infections (candidemia) through the [Emerging Infections Program \(EIP\)](#). EIP is a network of 10 state health departments and their collaborators in local health departments, academic institutions, other federal agencies, public health and clinical laboratories, and healthcare facilities.

Active, population-based surveillance for candidemia is being conducted in 10 EIP sites: California, Colorado, Connecticut, Georgia, Maryland, Minnesota, New Mexico, New York, Oregon, and Tennessee (Figure 1). CDC and its partners recruit laboratories and hospitals serving the counties under surveillance to submit reports of candidemia in patients within the surveillance area.

[Learn more](#) about methods used for CDC's candidemia surveillance through EIP.

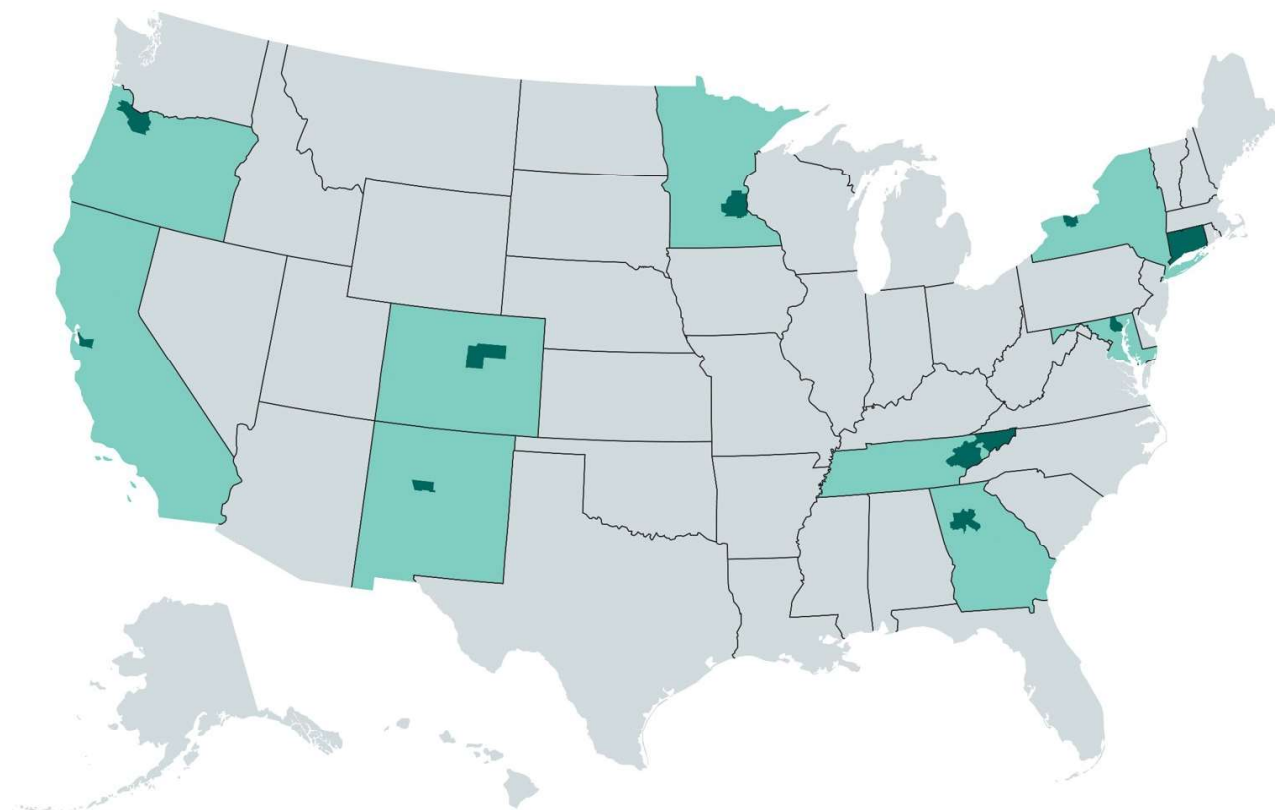


Figure 1. [Emerging Infections Program](#) sites where candidemia surveillance is being conducted; dark green represents counties under surveillance at each EIP site.

Through this program, CDC monitors epidemiologic trends in candidemia and performs species confirmation and susceptibility testing on all available *Candida* bloodstream isolates to:

- Track incidence of candidemia and monitor laboratory and epidemiologic trends
- Identify new risk factors for candidemia
- Detect changes in resistance to antifungal agents and communicate these results back to submitting laboratories
- Determine the burden (number of cases, treatment costs, etc.) of infections caused by antimicrobial-resistant *Candida* species and understand the causes of resistance. Antimicrobial resistance happens when germs like bacteria and fungi develop the ability to defeat the drugs designed to kill them. That means the germs are not killed and continue to grow.
- Identify areas where candidemia prevention and intervention strategies should be focused

CDC also collects data on healthcare-associated infections, including [central line-associated *Candida* infections](#), through the [National Healthcare Safety Network \(NHSN\)](#), the largest healthcare-associated infection reporting system in the United States.

Candidemia trends in the United States

Although there are notable differences by site, overall candidemia incidence has declined. Candidemia incidence declined during 2008–2013 and then stabilized at approximately 9 cases per 100,000 population per year during 2013–2017.^{3,4} The observed declines in candidemia during 2008–2013 may be related to healthcare delivery improvements such as those involving catheter care and maintenance.³ Increases in incidence for certain surveillance areas may be due to increases in the number of candidemia cases related to injection drug use, which has recently re-emerged as a risk factor for candidemia.^{5,7}

Demographic trends

Candidemia rates by age group have recently changed. Rates decreased significantly among infants and the elderly during 2009–2012, but have remained more stable since 2012.^{8,9} The reasons for the decline in candidemia rates in some age groups are not fully understood but might be related to factors such as changes in prophylaxis guidelines and improved infection control practices, such as hand hygiene and catheter care. Among all ages, candidemia rates are approximately twice as high among Black people compared with other races/ethnicities. The differences by race might be due to differences in underlying conditions, socioeconomic status, healthcare access and availability, or other factor.

[Learn more](#) about candidemia incidence rates by age group and race.

Trends in species distribution

Up to 95% of all invasive *Candida* infections in the United States are caused by five species of *Candida*: *C. albicans*, *C. glabrata*, *C. parapsilosis*, *C. tropicalis*, and *C. krusei*. The proportion of infections caused by each species varies by geographic region and by patient population.¹⁰ Although *C. albicans* is still the leading cause of candidemia in the United States, increasing proportions of cases in recent years have been attributed to non-*albicans* species that are often resistant to antifungal drugs.^{11–13} Altogether, non-*C. albicans* species cause approximately two-thirds of candidemia cases in the United States.^{3,11} In some locations, *C. glabrata* is the most common species. Since 2015, an emerging species called *Candida auris* (*C. auris*) has been an increasing cause of invasive *Candida* infections in the United States.¹⁴

[Learn more](#) about *Candida* species distribution.

Trends in antimicrobial resistance

Some types of *Candida* are increasingly resistant to the first-line and second-line antifungal medications, such as fluconazole and the echinocandins (anidulafungin, caspofungin, and micafungin). About 7% of all *Candida* bloodstream isolates tested at CDC are resistant to fluconazole. More than 70% of these resistant isolates are the species *C. glabrata* or *C. krusei*.^{11,15} CDC's surveillance data indicate that the proportion of *Candida* isolates resistant to fluconazole has remained fairly constant over the past 20 years.^{11,16,17} Echinocandin resistance, however, appears to be emerging, especially among *C. glabrata* isolates. Approximately 3% of *C. glabrata* isolates are resistant to echinocandins, but the percentage may be higher in some hospitals. This is especially concerning because echinocandins are the first-line treatment for *C. glabrata*, which already has high levels of resistance to fluconazole.¹⁵

[Learn more](#) about trends in antimicrobial resistance in *Candida* spp. isolates.

Deaths due to invasive candidiasis

Invasive *Candida* infections are often associated with high rates of morbidity and mortality, as well as increased length of hospital stay. CDC's surveillance data indicate that the in-hospital all-cause (crude) mortality among people with candidemia is approximately 25%. However, because people who develop invasive candidiasis are typically already sick with other medical conditions, it can be difficult to determine the proportion of deaths directly attributable to the infection. One study estimated the candidemia attributed mortality to be 19–24%.¹⁸

Candida infections lead to high costs

Candida is a leading cause of healthcare-associated bloodstream infections in U.S. hospitals. Invasive *Candida* infections are costly for patients and healthcare facilities because of the long hospital stays. Each case of candidemia is estimated to result in an additional 3 to 13 days of hospitalization and \$6,000 to \$29,000 in healthcare costs.¹⁹

Invasive candidiasis outbreaks

Most cases of invasive candidiasis are not associated with outbreaks. However, periodic outbreaks of *C. parapsilosis* infection have been reported for decades, including clusters of invasive candidiasis in neonatal intensive care units likely transmitted via healthcare workers' hands.^{20–22} Recently, *Candida auris* has caused outbreaks of invasive infections around the world likely because of its ability to colonize patient skin and persist on healthcare surfaces. Of concern, *C. auris* is commonly resistant to antifungal medications, and some disinfectants used in healthcare settings do not kill *C. auris*.

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