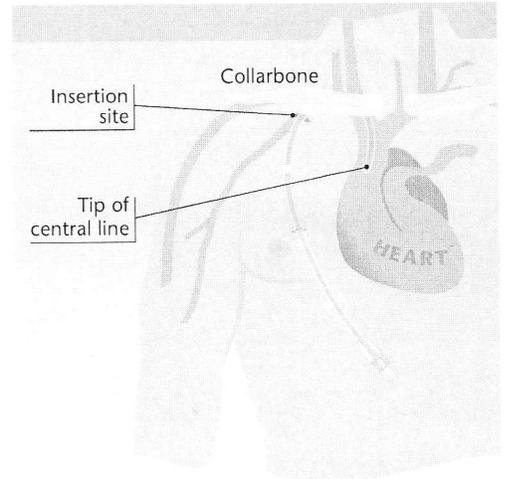




Central Venous Catheter

A central venous catheter (KATHeter), also known as a central line or CVC, is long, soft, thin, hollow tube that is placed into a large vein (blood vessel). A central line is much like an intravenous (IV) catheter that is placed in a small vein in an arm, except that a central line is longer and is placed in a large vein leading to the heart in the neck, upper chest, leg, or arm. This type of catheter has special benefits in that it can deliver fluids into a larger vein, and that it can stay in the body for a much longer period of time than a usual, shorter IV.



Why would a person need a central venous catheter?

Common reasons for having a central line include:

- To give IV medications over a long period of time because a large vein can tolerate an IV catheter for a longer time than a small vein. Examples of such medications are antibiotics and chemotherapy.
- To deliver IV medications as an outpatient. Compared with a shorter IV, a central venous catheter is less likely to come out of the vein and this allows patients to be more active and receive IV medications at home.
- To rapidly deliver large amounts of fluid or blood, for example when a person is in shock.
- To directly measure blood pressure in a large or central vein. This can help manage how much fluid a person needs.
- To take frequent blood samples (more than once each day) without being “stuck” many times.
- To deliver nutrition directly into the blood when food or liquids cannot be

given through the mouth, stomach, or intestine.

- To connect a person with kidney failure to a hemodialysis machine that clears the body of wastes and extra fluid (see related Information Sheet on Hemodialysis).
- As part of the procedure of inserting a right heart catheter (also known as a pulmonary artery or Swan Ganz catheter (see related Information Sheet on Right Heart Catheterization)).

Risks of a central venous catheter

Some of the possible risks of a central venous catheter may include:

- **Discomfort during placement**—Discomfort can result from the needle stick and placement of the catheter at the time it is inserted. Your health care provider will lessen the pain with a local numbing medicine (an anesthetic). The discomfort is usually mild and lessens once the catheter is in place.
- **Bleeding**—Bleeding can occur at the time the catheter is inserted. The bleeding is usually mild and stops by itself.

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- **Infection**—Any tube (catheter) entering the body can make it easier for bacteria from the skin to get into the bloodstream. Special care in cleaning and bandaging the skin at the catheter site can decrease the risk of infection. Some central venous catheters are tunneled under the skin so the entry site into the vein is away from the skin entry site. With care, central venous catheters can remain in the body for several months without becoming infected.
- **Blocking or kinking**—Blood clots may begin to form in the catheter but regular flushing of the catheter usually prevents the clots from blocking the tube. If the catheter becomes kinked, it must be repositioned or removed by your health care provider.
- **Collapsed lung**—This is called a pneumothorax. The lung is very close to the veins in the neck and chest. When a central venous catheter is placed in the chest area, if the needle passes through or misses the vein, the needle could pierce the lung causing the lung to collapse. If this happens, your health care provider can reinflate the lung by placing a tube between the ribs to remove the air that has leaked from the lung (see related Information Sheet on Chest Tube Thoracostomy).

Common Questions

How long will the catheter stay in?

In general, the tube will stay in as long as it is needed and the catheter is not blocked or infected. This may be days or months.

How can I keep the catheter from getting infected?

Anything that touches the catheter site and anything that goes into the catheter must be

sterile. If you are caring for your catheter at home, your health care provider will show you how to care for your catheter.

How do I know if there is a problem with the catheter?

- The catheter may be infected if you have:
 - Redness, tenderness, or swelling where the catheter enters the skin
 - Fever or chills
- The catheter may be blocked if it is difficult or impossible to flush.
- The catheter may be coming out of the vein if the length of catheter outside the skin is getting longer.

Authors: Bonnie Fahy, RN, MN, Marianna Sockrider, MD, DrPH

Adapted from: Constantine A. Manthous, MD & Martin J. Tobin, MD, "A Primer on Critical Care for Patients and Their Families" ATS Website, <http://www.thoracic.org/sections/clinical-information/critical-care/patient-information.html>

Additional Lung Health Information

American Thoracic Society

www.thoracic.org/sections/clinical-information/critical-care/patient-information.html

University of Pittsburgh Medical Center

<http://patienteducation.upmc.com/Pdf/CVC.pdf>

Rx What to do

- ✓ Work with your health care provider to learn how to care for your central venous catheter.
- ✓ If you have any sign of infection or other catheter problem, call your health care provider immediately.

Doctor's Office Telephone:

Central Line Associated Bloodstream Infection (CLABSI) Prevention

Your child's doctor has recommended a central venous catheter (or central line) for your child. A central line is a thin tube inserted into a large vein that goes to the heart. A central line catheter can be useful in situations requiring frequent intravenous (IV) medications, blood transfusions, blood draws for lab work, or IV nutrition. Your child's doctor determines the location where the catheter can be safely inserted, the catheter type that your child will need, and how long the catheter will be in place.

Central lines are helpful for taking care of your child; however, they can increase the risk of infections when bacteria grow in the line and travel to the bloodstream. This is called a Central Line Associated Blood Stream Infection or CLABSI. A CLABSI can be serious and life threatening.

Fortunately there are steps we can take to prevent CLABSIs. The most important step is handwashing. At Children's, we monitor all central line catheters for signs of infection every day. We also take steps to keep infections from happening by:

- Washing our hands and/or using alcohol-based hand rub frequently;
- Using antiseptic soap on the skin before inserting the catheter;
- Wearing a mask and sterile gloves when changing the dressing;
- Carefully handling medications and fluids given through the catheter;
- Central lines are assessed hourly for signs of infection;
- Daily checks to see if the catheter is still needed.

We also follow strict protocols when inserting central lines as recommended by the Centers for Disease Control and Prevention (CDC).

How should I care for my child?

Parents and patients also have a role to play in preventing CLABSIs:

- Wash your hands with soap and water, or use alcohol-based hand rub found in each room. Hand hygiene is required:
 - When you enter and leave your child's room;
 - Before and after you prepare food, eat, or feed your child;
 - Before and after you use the bathroom or change a diaper.
- Ask your child's visitors to wash their hands when they enter and exit your child's room.
- Do not allow visitors to touch the catheter or tubing.
- Watch your nurses and doctors to make sure they wash their hands before and after handling the central line. Do not be afraid to remind them to wash their hands!
- Keep the central line out of the diaper area when changing the diaper, and do not allow your child to suck on the catheter.
- If you have any concerns about your child's central line, or the way it is cared for, talk to your child's doctor or nurse.

We value providing safe care for your child during their illness. Thank you for your help in providing a germ free environment for your child's central line catheter. If you have any questions, ask your child's nurse or doctor.

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Minneapolis, MN 55404
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1 in 20



About 1 in 20 patients gets an infection each year while receiving medical care.

41,000

About 41,000 bloodstream infections strike hospital patients with central lines each year.

37,000

About 37,000 bloodstream infections happen each year to kidney dialysis patients with central lines.

Making Health Care Safer

Reducing bloodstream infections

A central line is a tube that a doctor usually places in a large vein of a patient's neck or chest to give important medical treatment. When not put in correctly or kept clean, central lines can become a freeway for germs to enter the body and cause serious bloodstream infections. These infections can be deadly. Of patients who get a bloodstream infection from having a central line, up to 1 in 4 die. Bloodstream infections in patients with central lines are largely preventable when healthcare providers use CDC-recommended infection control steps. Medical professionals have reduced these infections in hospital intensive care unit (ICU) patients by 58% since 2001. Even so, many still occur in ICUs, in other parts of hospitals, and in outpatient care locations. In 2008, about 37,000 bloodstream infections occurred in hemodialysis* outpatients with central lines.

*Use of a machine to clean or filter the blood when kidneys no longer work.

Learn what you can do to reduce central line bloodstream infections.

→ See page 4

Want to learn more? Visit

[www http://www.cdc.gov/vitalsigns](http://www.cdc.gov/vitalsigns)

Bloodstream Infections in Patients with Central Lines

Problem

A preventable and costly threat to patient safety.

1. Progress has been made in hospitals, but more needs to be done to protect patients from infection.

- ◇ New data show that 58% fewer bloodstream infections occurred in hospital ICU patients with central lines in 2009 than in 2001. In 2009, about 18,000 bloodstream infections occurred in ICU patients with central lines. About 23,000 more happened to patients who got treatment in other areas of the hospital.
- ◇ Overall, the decrease in infections saved up to 27,000 lives and is associated with \$1.8B in excess medical costs. In 2009 alone, reducing infections saved about 3,000-6,000 lives and about \$414 million in extra medical costs compared with 2001.
- ◇ Bloodstream infections from staph (*Staphylococcus aureus*) in ICU patients with central lines were reduced by 73%, more than from any other germ.

2. Many bloodstream infections occur in people who receive outpatient hemodialysis treatment through central lines.

- ◇ About 350,000 people receive life-saving hemodialysis treatment at any given time. About 8 in 10 of these patients start treatment through a central line.
- ◇ Infections are one of the leading causes of hospitalization and death for patients on hemodialysis.
- ◇ About 37,000 bloodstream infections occurred in 2008 in hemodialysis patients with central lines.
- ◇ A hemodialysis patient is 100 times more likely to get a bloodstream infection from MRSA than other people. MRSA is a type of staph that is resistant to certain antibiotics.

How patients with central lines can get infected with germs

Where medicines are injected can get dirty

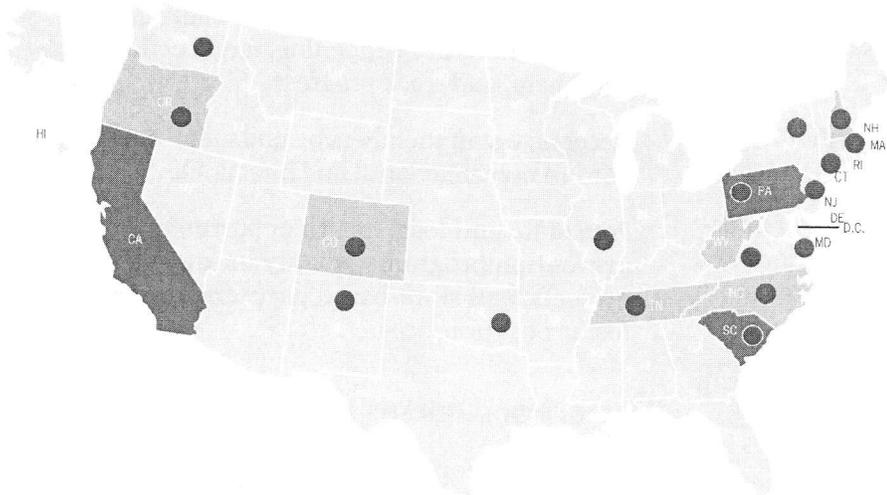
Hand or glove touching the line can be dirty

Central line

Skin where line is placed can be dirty

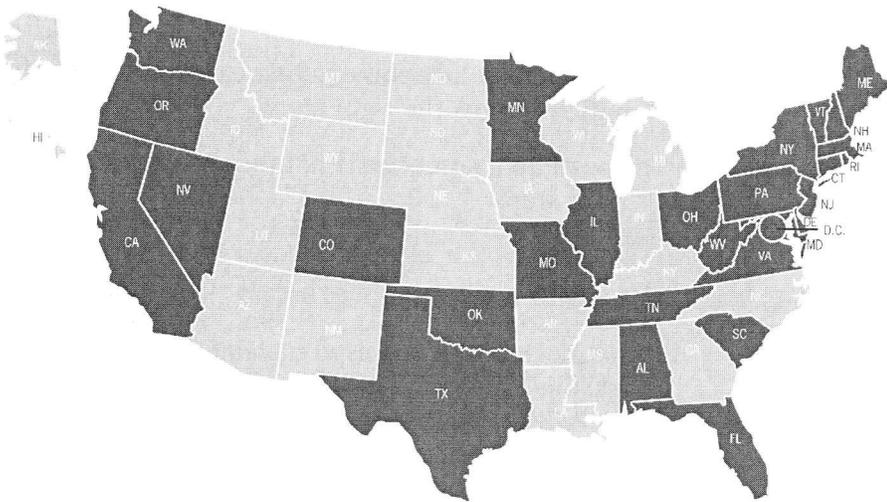
US State Info

States where hospitals are tracking central line bloodstream infections using CDC's National Healthcare Safety Network



- ICU only
 - ICU and ward – Ward tracking less than or equal to 20%
 - ICU and ward – Ward tracking greater than or equal to 70%
 - State validating healthcare-associated infection data as of 2010
- Validation means double checking data to ensure accurate infection tracking.

States required to publicly report some healthcare-associated infections



(Both maps as of 2011)

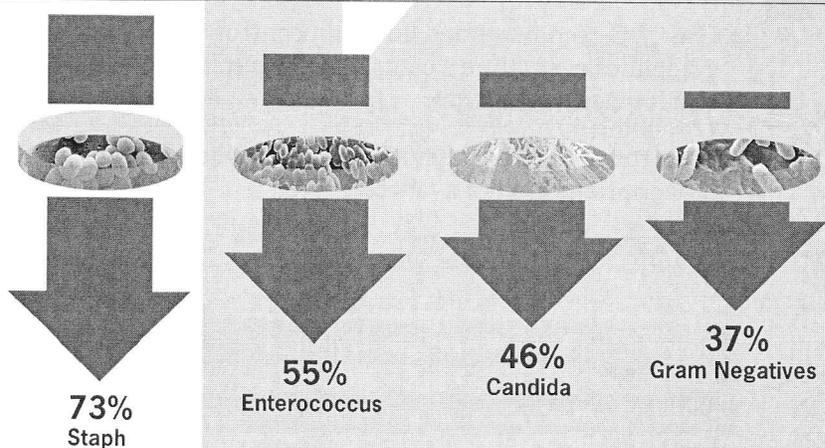
- YES
- NO

Type of Germ

Reduction Rate (%)

Decrease in bloodstream infections in patients with central lines, by germ

SOURCE: CDC's National Healthcare Safety Network, 2010

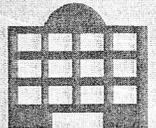


What Can Be Done



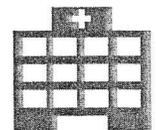
US Government can

- ◇ Develop and promote further guidelines and tools that increase widespread adoption of best practices to prevent infections.
- ◇ Engage partners to promote prevention.
- ◇ Apply the success in reducing central line bloodstream infections to other types of infections in health care. Identify which actions and germs cause the most problems and how to prevent them.
- ◇ Promote research of new methods to prevent bloodstream infections. Track and report progress toward reducing infections.



State governments can

- ◇ Join, start, or expand programs to keep bloodstream infections from happening in patients with central lines.
- ◇ Encourage facilities to join CDC's infection tracking system and validate their data (National Healthcare Safety Network, <http://www.cdc.gov/NHSN>).
- ◇ Join **On the CUSP: Stop BSI** program to develop a prevention roadmap and share best practices (<http://www.onthecuspstophai.org>).
- ◇ Build partnerships with and give technical support to hospitals, dialysis centers, and other medical care locations.



Hospitals, dialysis centers, and other medical care locations can

- ◇ Use CDC-recommended infection control guidelines every time a central line is put in and for central line care.
- ◇ Use central lines for hemodialysis only when other options are not available.

- ◇ Use data for action. Track infection rates and germ types with CDC's National Healthcare Safety Network (NHSN) to learn where and why infections are happening, target actions to stop them, and track progress.
- ◇ Recognize staff members or units that work hard to prevent central line infections.
- ◇ Join state and local health department prevention programs, quality improvement projects, and state-based partnerships to foster best practices.

Doctors and nurses can

- ◇ Use CDC-recommended infection control steps every time a central line is put in and used.
- ◇ Remove central lines as soon as they are no longer needed.
- ◇ Be sure that all people taking care of the patient follow the right steps.
- ◇ Speak up if someone is not following the right steps.



Patients and caregivers can

- ◇ Ask doctors and nurses to explain why the central line is needed, how long it will be in place, and which infection prevention methods they will use.
- ◇ Make sure that all healthcare providers clean their hands with soap and water or alcohol-based hand rub before and after caring for the patient.
- ◇ Inform a nurse or doctor if the area around the central line is sore or red, or if the bandage falls off or becomes wet or dirty.



CS220503B

For more information, please contact

Telephone: 1-800-CDC-INFO (232-4636)

TTY: 1-888-232-6348

E-mail: cdcinfo@cdc.gov

Web: www.cdc.gov

Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333

Publication date: 03/01/2011

www.cdc.gov/vitalsigns

www.cdc.gov/mmwr

Do No Harm

Prevent Central Line-Associated Bloodstream Infections

Did You Know?

Central venous catheters (CVCs) are the most frequent cause of healthcare-associated bloodstream infections.

Annual number of deaths associated with HAIs in the U.S.

100,000 estimated HAI Deaths

1/3 from CLABSI

Greater CLABSI risk in developing countries

In these countries the rates of healthcare-associated infections (HAIs) related to devices are, in most cases, three to five times greater.



ICU

250,000 CLABSIs occur in the U.S. each year, 80,000 in intensive care units (ICUs).



CLABSI increases a patient's chance of acquiring another disease or dying.

The CDC estimates: The annual cost of CLABSI is more than \$1 billion, the cost per patient is more than \$16,000.

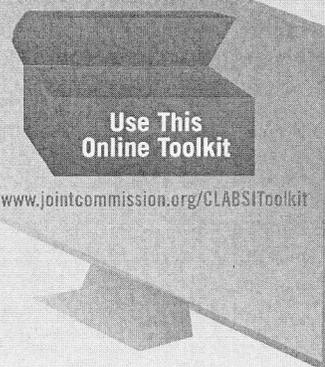
Free Tools to Reduce CLABSI

- Improve patient safety
- Reduce costs
- Implement simple, affordable, evidence-based practices
- Applicable to resource limited settings



Useful resources & checklists

- Insertion bundle document
- Insertion checklist
- Maintenance bundle document
- Maintenance checklist
- Organizational self-assessment



Toolkit directory contains education and training information for staff on:

- Inserting a CVC
- Maintaining a CVC
- Removing a CVC
- Conducting clinical surveillance

 The Joint Commission

 Joint Commission Resources

 Joint Commission International

Access the FREE Online CLABSI Toolkit at www.jointcommission.org/CLABSIToolkit



FAQs

(frequently asked questions)

about

“Catheter-Associated Bloodstream Infections”

(also known as “Central Line-Associated Bloodstream Infections”)

What is a catheter-associated bloodstream infection?

A “central line” or “central catheter” is a tube that is placed into a patient’s large vein, usually in the neck, chest, arm, or groin. The catheter is often used to draw blood, or give fluids or medications. It may be left in place for several weeks. A bloodstream infection can occur when bacteria or other germs travel down a “central line” and enter the blood. If you develop a catheter-associated bloodstream infection you may become ill with fevers and chills or the skin around the catheter may become sore and red.

Can a catheter-related bloodstream infection be treated?

A catheter-associated bloodstream infection is serious, but often can be successfully treated with antibiotics. The catheter might need to be removed if you develop an infection.

What are some of the things that hospitals are doing to prevent catheter-associated bloodstream infections?

To prevent catheter-associated bloodstream infections doctors and nurses will:

- Choose a vein where the catheter can be safely inserted and where the risk for infection is small.
- Clean their hands with soap and water or an alcohol-based hand rub before putting in the catheter.
- Wear a mask, cap, sterile gown, and sterile gloves when putting in the catheter to keep it sterile. The patient will be covered with a sterile sheet.
- Clean the patient’s skin with an antiseptic cleanser before putting in the catheter.
- Clean their hands, wear gloves, and clean the catheter opening with an antiseptic solution before using the catheter to draw blood or give medications. Healthcare providers also clean their hands and wear gloves when changing the bandage that covers the area where the catheter enters the skin.
- Decide every day if the patient still needs to have the catheter. The catheter will be removed as soon as it is no longer needed.
- Carefully handle medications and fluids that are given through the catheter.

What can I do to help prevent a catheter-associated bloodstream infection?

- Ask your doctors and nurses to explain why you need the catheter and how long you will have it.

- Ask your doctors and nurses if they will be using all of the prevention methods discussed above.
- Make sure that all doctors and nurses caring for you clean their hands with soap and water or an alcohol-based hand rub before and after caring for you.

If you do not see your providers clean their hands, please ask them to do so.

- If the bandage comes off or becomes wet or dirty, tell your nurse or doctor immediately.
- Inform your nurse or doctor if the area around your catheter is sore or red.
- Do not let family and friends who visit touch the catheter or the tubing.
- Make sure family and friends clean their hands with soap and water or an alcohol-based hand rub before and after visiting you.

What do I need to do when I go home from the hospital?

Some patients are sent home from the hospital with a catheter in order to continue their treatment. If you go home with a catheter, your doctors and nurses will explain everything you need to know about taking care of your catheter.

- Make sure you understand how to care for the catheter before leaving the hospital. For example, ask for instructions on showering or bathing with the catheter and how to change the catheter dressing.
- Make sure you know who to contact if you have questions or problems after you get home.
- Make sure you wash your hands with soap and water or an alcohol-based hand rub before handling your catheter.
- Watch for the signs and symptoms of catheter-associated bloodstream infection, such as soreness or redness at the catheter site or fever, and call your healthcare provider immediately if any occur.

If you have additional questions, please ask your doctor or nurse.

Co-sponsored by:



Central Line-associated Bloodstream Infections: Resources for Patients and Healthcare Providers

Central line-associated bloodstream infections (CLABSIs) result in thousands of deaths each year and billions of dollars in added costs to the U.S. healthcare system, yet these infections are preventable. CDC is providing guidelines and tools to the healthcare community to help end CLABSIs.

What is a central line?

A central line (also known as a central venous catheter) is a catheter (tube) that doctors often place in a large vein in the neck, chest, or groin to give medication or fluids or to collect blood for medical tests. You may be familiar with intravenous catheters (also known as IVs) that are used frequently to give medicine or fluids into a vein near the skin's surface (usually on the arm or hand), for short periods of time. Central lines are different from IVs because central lines access a major vein that is close to the heart and can remain in place for weeks or months and be much more likely to cause serious infection. Central lines are commonly used in intensive care units.

What is a central line-associated bloodstream infection?

A central line-associated bloodstream infection (CLABSI) is a serious infection that occurs when germs (usually bacteria or viruses) enter the bloodstream through the central line. Healthcare providers must follow a strict protocol when inserting the line to make sure the line remains sterile and a CLABSI does not occur. In addition to inserting the central line properly, healthcare providers must use stringent infection control practices each time they check the line or change the dressing. Patients who get a CLABSI have a fever, and might also have red skin and soreness around the central line. If this happens, healthcare providers can do tests to learn if there is an infection present.

What are some of the things that healthcare providers are doing to prevent CLABSI?

Healthcare providers can take the following steps to help prevent CLABSIs:

- Follow recommended central line insertion practices to prevent infection when the central line is placed, including:
 - Perform hand hygiene
 - Apply appropriate skin antiseptic
 - Ensure that the skin prep agent has completely dried before inserting the central line
 - Use all five maximal sterile barrier precautions:
 - Sterile gloves
 - Sterile gown
 - Cap
 - Mask
 - Large sterile drape
- Once the central line is in place:
 - Follow recommended central line maintenance practices
 - Wash their hands with soap and water or an alcohol-based handrub before and after touching the line
- Remove a central line as soon as it is no longer needed. The sooner a catheter is removed, the less likely the chance of infection.

What can patients do to help prevent CLABSI?

Here are some ways patients can protect themselves from CLABSI:

- Research the hospital, if possible, to learn about its CLABSI rate.
- Speak up about any concerns so that healthcare personnel are reminded to follow the best infection prevention practices.
- Ask a healthcare provider if the central line is absolutely necessary. If so, ask them to help you understand the need for it and how long it will be in place.
- Pay attention to the bandage and the area around it. If the bandage comes off or if the bandage or area around it is wet or dirty, tell a healthcare worker right away.
- Don't get the central line or the central line insertion site wet.
- Tell a healthcare worker if the area around the catheter is sore or red or if the patient has a fever or chills.
- Do not let any visitors touch the catheter or tubing.
- The patient should avoid touching the tubing as much as possible.
- In addition, everyone visiting the patient must wash their hands—before and after they visit.

For more information

- CDC Vital Signs: Making Healthcare Safer Reducing Bloodstream Infections  [PDF 2.44 MB]
- Patients with Central Lines — What You Need to Know to Avoid a Bloodstream Infection PSA (:60)
- FAQs about Catheter-associated Bloodstream Infections  [PDF - 208 KB]
- En español: Preguntas frecuentes infecciones sanguíneas asociadas al catéter intravenoso™  [PDF - 217 KB]
- Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011
- National Healthcare Safety Network (NHSN)



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Updates

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National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)
Division of Healthcare Quality Promotion (DHQP)