

INFECTION CONTROL AND PREVENTION TRAINING

Infection Control in Health Care:

An Overview:

KEY POINTS

- Infection control is what you do to help prevent germs from spreading and getting people sick.
- Understanding where germs live and how they spread can help you recognize risks and take the right infection control actions.
- Healthcare is a unique setting. We think about germs differently in healthcare than we do in other places.

Why it's important:

When you work in healthcare, each day brings its own challenges. But caring for and protecting patients and yourself, is always the top priority. This includes protecting patients from getting sick while they are receiving care, and protecting yourself from getting sick so that you can provide safe care.

Infection control is what you do, or the actions you take, to prevent or stop the spread of germs. These actions are a critical part of protecting your patients, yourself, and others within the healthcare setting.

With a foundational knowledge about germ spread and the “why” behind infection control, you can recognize infection risks and make the right decisions to prevent people from getting sick.

Recognizing infection risks

Risk is a part of life. When you approach a broken stoplight at a busy intersection or see a small child reaching toward a hot stove, almost automatically you slow down your car or reach for the child to prevent something bad from happening. **This is our brain recognizing risk and taking action.**

You can use this same process of recognizing risk when it comes to infection control in healthcare. If you learn to identify the opportunities for germs to spread, then you can step in to stop them and prevent infections. To recognize these opportunities, you need to know where germs live and how they spread.

Questions to ask yourself before tasks to help you recognize infection risks and stop the spread of germs:

- What reservoirs are involved?
- What pathways might move germs in and out of each reservoir?
- Is it possible that the task I'm about to do will cause germs to spread?
- What actions can I take to help stop the spread of germs and prevent infections?

Where germs live and how they spread:

Although we can't see them, germs are everywhere, and they need somewhere to grow – a place where they can live. These places, called **reservoirs**, are in and on our bodies and in the environment.

Germs also need a way to get from place to place or to people, which are called **pathways**.

We approach germs differently in healthcare settings. The reservoirs and pathways in healthcare settings present more opportunities for potentially harmful germs to spread. There's greater risk for infections because:

- Healthcare settings are where people who are sick come for care.
- Patients are more likely to have weakened immune systems.
- Patients need procedures that might break through their body's natural defenses, making them more vulnerable to infection.
- Healthcare workers interact with a lot of people, touch a lot of things and use shared devices and equipment, which increases the risk of spreading germs.

Understanding reservoirs and pathways can help you choose the right infection control actions to stop the spread of germs and protect your patients, yourself, and your coworkers.

Common reservoirs in and on the human body

Skin:

- Many germs live and grow on healthy skin and normally do not cause harm.
- Your skin interacts with the environment daily, especially when you touch things with your hands.
- Pathways for germs to spread from skin include:
 - Touch, especially with your hands.
 - A healthcare procedure that moves germs on the skin's surface or on the medical device you're using, into the patient's body or bloodstream.

Gut:

- The gut, or gastrointestinal (GI) system, includes the lower intestine, rectum, and anus. It's part of the digestive system.

- Large numbers of bacteria and yeasts live in the intestines. While many of them are helpful, they can be dangerous under certain circumstances to those with weakened immune systems.
- Pathways for germs to spread from the gut include:
 - Touch, germs in stool can easily spread onto your hands and skin and then spread to other parts of the body or to the environment.
 - Flushing certain toilets, which can also spread germs in stool.

Respiratory system:

- The respiratory system includes the nose, mouth, throat, windpipe, and lungs.
- Most of the germs commonly found in the upper respiratory system keep those parts of the body healthy, but when those germs get into the airway or lungs, they can cause infection.
- Pathways for germs to spread from the respiratory system include:
 - Breathing in the germs in respiratory droplets
 - Splashes and sprays that get into your eyes, nose, or mouth
 - Touch, germs in the nose and mouth can easily spread to your skin and hands, which can then spread those germs to other surfaces, devices, and people.

Blood:

- Blood is not supposed to have germs in it.
- However, blood is a very good place for germs to grow and is a nutritious food for bacteria.
- Pathways for germs to spread from blood include:
 - When a patient's blood is on a sharp item that causes a needlestick, cut, or break in someone's skin, and then enters their body
 - Blood on linens or surfaces that contains bacteria, which can spread to others

Common reservoirs in the healthcare environment:

Water and wet surfaces:

- Wet surfaces are a good place for bacteria to grow.
- Tap water is safe to drink but is not sterile. That's why we use sterile water for intravenous therapy (IVs) and injections.
- Pathways of spread for water and wet surfaces include:
 - Touch, germs from water and wet surfaces can get on your hands, which can then spread those germs to other surfaces, devices, and people.
 - Splashes and sprays to the eyes, nose, or mouth

Dry surfaces:

- Germs that are found on the body, in the air, and in stool can live on dry surfaces.
- High-touch surfaces like bed rails, door handles, light switches, and keyboards are more likely to have germs.
- Many germs can live on dry surfaces for a very long time – days or even weeks.
- Pathways of spread for dry surfaces include:
 - Touch, hands can pick up germs from dry surfaces and can then spread those germs to other surfaces, devices, and people.

Dirt and dust:

- Germs that live in dirt and soil are usually not harmful, but they can be harmful for patients with weakened immune systems.
- In health care, we're generally concerned about construction inside or outside the building that can create dust that has germs in it.
- Pathways of spread for dust and dirt include:
 - Breathing in germs from dirt and dust in the air
 - Touch, hands can spread dirt and dust that land on surfaces

Devices:

- Medical devices can have germs on them and come into contact with multiple surfaces and people.
- Pathways of spread for devices include:
 - Touch, any germs on a device can be spread to other surfaces, devices, and people.
 - A healthcare procedure that moves germs on a medical device you are using into the patient's body or bloodstream

How germs spread and cause infection

Knowing where germs live and how they get from place to place is important, but for an infection to spread in healthcare it involves more than just **reservoirs** and **pathways**.

Germs also need a **person** to infect. That person can be a patient, or you, or one of your coworkers. Once the germs spread to a person, getting an infection isn't inevitable. For infection to occur, the germs need to get around the **body's defenses**. And finally, the germs **need to survive** throughout this entire journey.

Infection control actions at any of these points help keep germs from spreading and causing infection. For example, Standard Precautions are the things you do every day, for every patient, to keep germs from spreading. Because infection risks will always exist in healthcare settings, you follow these Standard Precautions to protect patients, your coworkers and yourself.

Standard Precautions include:

- Hand hygiene
- Cleaning and disinfecting surfaces throughout the healthcare setting
- Giving injections and medications safely
- Based on your assessment of the situation and the risk for germs to spread, choosing the right personal protective equipment (PPE) and using it the right way, at the right time, for the right task
- Minimizing potential exposures to germs with strategies like source control
- Cleaning and disinfecting reusable medical equipment between each patient

Infection Control Guidance: Respiratory Viruses

- When respiratory viruses, such as flu, RSV, and COVID-19 are spreading in the community, the risk for spread in healthcare settings increases as well.
- As a healthcare worker, you have the infection control knowledge and tools to take action and protect patients, yourself, and your coworkers from getting sick.



Infection Control Guidance: Respiratory Viruses

Summary of recommendations:

- Use masks and respirators to help decrease the spread of respiratory viruses.
- Get vaccinated and [encourage patients to do the same](#).
- Practice physical distancing and implement screening and triage procedures.
- Practice respiratory hygiene and cough etiquette.
- Keep your [hands clean](#).
- Clean and disinfect. Make sure you read labels correctly when using disinfectants.
- Check that the air handling in your facility is functioning as it should.

Recommendation details:

Use masks and respirators to decrease the spread of respiratory viruses during respiratory season.

Well-fitting facemasks or respirators covering a person's mouth and nose can prevent the spread of germs when people are breathing, talking, sneezing, or coughing. Project Firstline [signs](#) are available to help facilities, when desired, encourage masking.

When a facility doesn't require masking, they should still allow individuals to use a mask or respirator if they choose.

General metrics and data sources are available to help facilities determine how and when to implement broader use of masking, including:

The [RESP-NET interactive dashboard](#) or data from the [National Emergency Department Visits for COVID-19, Influenza, and Respiratory Syncytial Virus](#).

[Companion Guide: NSSP ED Data on Respiratory Illness](#)

- Outpatient respiratory illness visits determined by data reported to [ILINet](#), which are aggregated to provide state-level estimates.
- Local health department data on respiratory virus activity for your jurisdiction.
- Visits/admissions for respiratory symptoms within your facility.
- Hospital admissions data on the [CDC COVID data tracker](#).
- Long-term care data from the [CMS COVID-19 Nursing Home Data](#).

Get vaccinated!

Vaccines remain the best way to reduce your and your patients' risk of getting sick and help stop the spread of viruses to others. If you or your patients do get the flu or COVID-19, vaccines can make the illnesses shorter and less severe, reduce the amount of time spent away from work to recover, and help avoid hospitalization.

Healthcare providers are the most trusted source of health information for patients. CDC has [resources](#) to help you talk with your patients about their risks for severe illness, so they can take the right steps to keep themselves and their families safe.

To learn more about the importance of vaccinating healthcare workers, check out CDC's [Safe Healthcare Blog](#).

For more information on vaccine recommendations for respiratory viruses visit:

- [ACIP Seasonal Influenza Vaccine Recommendations](#)
- [ACIP COVID-19 Vaccine Recommendations](#)
- [ACIP RSV Vaccine Recommendations](#)

Practice physical distancing and implement screening and triage procedures.

To limit the spread of germs, encourage physical distancing – particularly in shared spaces, such as waiting rooms. Consider:

- Posting signs reminding people to notify facility staff at check in if they have respiratory symptoms
- Setting up triage stations that facilitate rapid screening of people for respiratory symptoms during times of higher community respiratory virus transmission
- Separating people with respiratory symptoms from others as soon as possible, and request that they wear a mask to limit spread

Practice respiratory hygiene and cough etiquette:

Remember to practice respiratory hygiene and cough etiquette and encourage others to do the same. Provide masks, tissues, and no-touch receptacles for tissue disposal at facility entrances, triage areas, and waiting rooms.

Keep your hands clean.

Hands are a main way germs spread in healthcare settings. [Cleaning your hands](#) regularly with an alcohol-based hand sanitizer or soap and water is a simple yet effective tool to stop the spread of germs.

Clean and disinfect.

Regular environmental cleaning is a necessity. Lobby areas, cafeterias, and waiting rooms are all high-traffic spaces where germs can spread. It's also important to disinfect reusable devices and not reuse disposable items. Review the infographic on [How to Read a Disinfectant Label](#) to help ensure you are using products correctly.

Check that the air handling in your facility is functioning as it should.

Make sure nothing is blocking air vents. Consult with your healthcare facilities management to ensure the heating, ventilation and air conditioning, or HVAC, system is working efficiently for good [ventilation](#).

Resources

For weekly updates from CDC, visit [CDC Respiratory Virus Updates](#).

For more information on infection control recommendations for healthcare settings, visit the [Interim Infection Prevention and Control Recommendations for Healthcare Personnel During the Coronavirus Disease 2019 \(COVID-19\) Pandemic](#).

For more information on seasonal influenza, visit [Prevention Strategies for Seasonal Influenza in Healthcare Settings](#).

Clinical Safety: Hand Hygiene for Healthcare Workers

KEY POINTS

- Protect yourself and your patients from deadly germs by cleaning your hands.
- All healthcare personnel should understand how to care for and clean their hands.

Why it matters.

Hand hygiene protects both healthcare personnel and patients. Hand hygiene means cleaning your hands with:

- Handwashing with water and soap (e.g., plain soap or with an antiseptic)
- Antiseptic hand rub (alcohol-based foam or gel hand sanitizer)
- Surgical hand antisepsis

Cleaning your hands reduces:

- The potential spread of deadly germs to patients
- The spread of germs, including those resistant to antibiotics
- The risk of healthcare personnel colonization or infection caused by germs received from the patient

Some healthcare personnel may need to clean their hands as often as 100 times during a work shift to keep themselves, patients, and staff safe. A common challenge is keeping the skin on your hands healthy and clean.

Background

CDC provides the following recommendations for hand hygiene in healthcare settings:

Know when to clean your hands:

- Immediately before touching a patient
- Before performing an aseptic task such as placing an indwelling device or handling invasive medical devices
- Before moving from work on a soiled body site to a clean body site on the same patient
- After touching a patient or patient's surroundings
- After contact with blood, body fluids, or contaminated surfaces
- Immediately after glove removal

Know when to use alcohol-based hand sanitizer (ABHS) versus soap and water during routine patient care.

When to use an alcohol-based hand sanitizer (ABHS):

Unless hands are visibly soiled, ABHS is preferred over soap and water in most clinical situations because it:

- Is more effective at killing germs on hands than soap
- Is easier to use when providing care, especially when moving from soiled to clean activities on the same patient or when moving between care of patients in shared rooms
- Results in improved skin condition with less irritation and dryness than soap and water
- Improves hand hygiene adherence

When to wash with soap and water:

- When hands are visibly soiled
- Before eating
- After using the restroom
- During the care of patients with suspected or confirmed infection during outbreaks of *C. difficile* and norovirus

Know how to use alcohol-based hand sanitizer (ABHS)

1. Put product on hands and rub hands together.
 - a. The efficacy (effectiveness) of alcohol-based hand sanitizer depends on the volume applied to the hands. Use the right amount of alcohol-based hand sanitizer product to clean your hands.
2. Cover all surfaces and rub until hands feel dry.
 - a. This should take around 20 seconds.

3. **Pay attention to the areas providers often miss:**
 - a. Thumbs
 - b. Fingertips
 - c. Between fingers

Know how to wash hands with soap and water.

1. Wet hands with water.
2. Apply the manufacturer recommended amount of product to your hands.
3. Rub hands together vigorously for at least 15 seconds, covering all surfaces of the hands and fingers.
4. Rinse hands with water and use disposable towels to dry. Use a towel to turn off the faucet.
5. Avoid using hot water to prevent drying of the skin.

Note: Other entities recommend cleaning hands with soap and water for at least 20 seconds. Either time is acceptable. The focus should be on cleaning your hands at the right times and scrubbing hands and fingers with soap.

Know the safety risks of refilling or “topping off” alcohol-based hand sanitizer (AHBS) and soap:

Refilling AHBS dispensers:

ABHS is an FDA-regulated over-the-counter product that should be stored and dispensed in an effective and safe manner.

The safety of refilling or "topping off" containers of ABHS such as pump bottles, pocket-sized dispenser bottles, and single-use wall-mounted dispensers of ABHS is not well studied. Safety risks associated with refilling or "topping off" containers of ABHS include:

- Accidental contamination.
- Reduced effectiveness from alcohol evaporation.
- Irritant effects from mixing formulations.

Therefore, refilling or "topping off" ABHS dispensers should only be considered in accordance with manufacturer's guidance and FDA regulations.

Refilling soap dispensers:

Refilling or "topping off" containers of liquid soap has been associated with outbreaks of pathogenic bacteria. Soap should not be added to partially empty soap dispensers.

Know when to wear (and change) gloves.

Gloves **are not** a substitute for hand hygiene.

- If your task requires gloves, perform hand hygiene before donning gloves and touching the patient or the patient's surroundings.
- Always clean your hands after removing gloves.
- Remember to remove gloves carefully to prevent hand contamination as dirty gloves can soil hands.

When to wear gloves:

- When needed for Standard Precautions: When you anticipate that you will come in contact with blood or other infectious materials, mucous membranes, non-intact skin, potentially contaminated skin, or contaminated equipment
- When needed for [Transmission-Based Precautions](#)

When to change gloves and clean hands:

- If gloves become damaged
- If gloves become soiled with blood or body fluids after a task
- If moving from work on a soiled body site to a clean body site on the same patient or if a clinical indication for hand hygiene occurs
- If moving from care on one patient to another patient
- If they look dirty or have blood or body fluids on them after completing a task
- Before exiting a patient room

Follow specific recommendations when treating a patient with confirmed or suspected *C. difficile* infection.

C. difficile is a spore-forming bacterium that can lead to a common healthcare-associated infection causing severe diarrhea. Spores are an inactive form of the germ and have a protective coating allowing them to live on surfaces for months.

The bacteria can be transferred to patients via the hands of healthcare providers who have touched a contaminated surface or item.

- **Unless hands are visibly soiled, alcohol-based hand sanitizer (ABHS) is preferred over soap and water for cleaning hands in most clinical situations.** This recommendation does not vary when caring for patients with *C. difficile* infection (CDI).

- Although there is a theoretical advantage to cleaning hands with soap and water when caring for patients with CDI, CDC still indicates a preference for ABHS as studies have not shown a clear prevention benefit for soap and water and removing ABHS risks reducing hand hygiene compliance overall.
- **When entering the room of a patient with *C. difficile*, the priority should be to ensure glove use (in addition to a gown) and proper technique when removing gloves to minimize the risk of self-contamination.** Current evidence shows that *C. difficile* spores may not be fully removed from hands, regardless of the method used to clean hands. This further emphasizes the need for appropriate use of gloves for the care of patients with CDI.

As an added precaution during outbreaks of *C. difficile*, CDC encourages hand washing with soap and water after the care of patients with known or suspected infections.

This is recommended due to the theoretical increased efficacy of soap and water for removing spores from hands, although evidence for this recommendation is limited. Proper use of gloves (in addition to a gown) to reduce bioburden on the hands should be emphasized. Access to ABHS should not be restricted.

C. diff and hand hygiene studies:

- One study found that most hand wash products produced less than a 1-log reduction in *C. difficile* spores and found the number of spores removed did not vary statistically from the number of spores removed from washing hands with tap water alone.
- Several controlled studies have found alcohol-based hand rub to be ineffective at removing or inactivating *C. difficile* spores from the hands of volunteers contaminated with a known number of spores compared to hand washing.
- Notably, one study did find a reduction of spores from the palmar surface of the hand with the alcohol-based hand rub.
- Although alcohol-based hand rub is ineffective at removing or disinfecting *C. difficile* spores in controlled laboratory experiments, clinical studies have not demonstrated an increase in CDI with the use of ABHS products or a decrease in CDI with the use of soap and water. For example:
 - Knight et al. found no evidence of an increase in CDI after implementation of an ABHS policy in a 795-bed community teaching hospital, including during the care of patients with CDI (incidence rate of 3.98 per 10,000 patient-days after implementation, compared with 4.96 before; P=.0036).
 - Boyce et al. demonstrated no increase in the incidence of CDI over a three-year period despite a significant and progressive increase in the use of ABHS in their 500-bed hospital. In addition, they found an increase in the overall hand hygiene compliance rate from 38% at baseline to 63% after ABHS implementation.
 - An observational study compared three years without ABHS use to three years with ABHS as the primary method for cleaning hands and demonstrated a 21% decrease in healthcare-acquired methicillin-resistant *Staphylococcus*

aureus (MRSA), a 41% decrease in vancomycin-resistant Enterococcus (VRE), and no change in the incidence of CDI.

Follow hand hygiene recommendations for surgery:

Bacteria on the hands of surgeons can cause wound infections if present in the operative field during surgery. Bacterial growth slows after preoperative scrubbing with an antiseptic agent. Before donning sterile gloves and performing surgery, perform surgical hand antisepsis using the following steps:

1. Before the surgical hand scrub, remove rings, watches, and bracelets.
2. Remove debris from underneath fingernails using a nail cleaner under running water.
3. When using an antimicrobial soap:
 - Scrub hands and forearms for the length of time recommended by the manufacture, usually 2-6 minutes long. Scrub times like 10 minutes are not needed.
4. When using ABHS with persistent activity:
 - Follow the manufacturer's instructions.
 - Before you apply the alcohol solution, prewash hands and forearms with a non-antimicrobial soap and completely dry hands and forearms.
 - After application of the alcohol-based product as recommended, allow hands and forearms to dry before donning sterile gloves.

Other recommended steps:

- Rapid growth of bacteria occurs under surgical gloves with hands washed with non-antimicrobial soap. Using antimicrobial soap is important.
- Double glove during invasive procedures such as surgery that pose an increased risk of blood exposure.
- Reducing resident skin flora on the hands of the surgical team for the duration of a procedure reduces the risk of bacteria being released in the surgical field from punctured or torn gloves during surgery.

Maintain hand skin health.

- ABHS is less irritating and drying to skin than soap and water. Use ABHS in most clinical situations.
- Lotions and creams can prevent and decrease skin dryness that happens from cleaning your hands.
 - Use hand lotions approved by your healthcare facility because they won't interfere with hand sanitizing products.
- When washing hands, use techniques to promote healthy hand skin, such as:
 - Avoiding hot water

- Patting rather than rubbing hands dry
- Healthcare personnel with hand irritation should use cotton glove liners and follow guidance on their:
 - Laundering
 - Discarding

Maintain fingernail and jewelry safety.

- Natural nails should not extend past the fingertip.
- Do not wear artificial fingernails or extensions when having direct contact with high-risk patients like those at intensive-care units or operating rooms.
 - Germs can live under artificial fingernails both before and after using an alcohol-based hand sanitizer and handwashing.
- Some studies have shown that skin underneath rings contain more germs than fingers without rings.
 - Further studies should determine if wearing rings increases the spread of deadly germs.

Healthcare facilities: Make hand hygiene a priority.

- Require healthcare personnel to perform hand hygiene based on CDC recommendations.
- Ensure that healthcare providers perform hand hygiene with soap and water when hands are visibly soiled.
- Ensure supplies for adhering to hand hygiene are accessible when delivering patient care.