



CONTINUING EDUCATION

INFECTION CONTROL

How Infections Spread

GermS are a part of everyday life and are found in our air, soil, water, and in and on our bodies. Some germS are helpful, others are harmful. Many germS live in and on our bodies without causing harm and some even help us to stay healthy. Only a small portion of germS are known to cause infection.

How Infections Occur?

An infection occurs when germS enter the body, increase in number, and cause a reaction of the body.

Three things are necessary for an infection to occur:

- **Source:** Places where infectious agents (germs) live (e.g., sinks, surfaces, human skin)
- **Susceptible Person** with a way for germS to enter the body
- **Transmission:** a way germS are moved to the susceptible person

Source

A Source is an infectious agent or germ and refers to a virus, bacteria, or other microbe.

In healthcare settings, germS are found in many places. People are one source of germS including:

- Patients
- Healthcare workers
- Visitors and household members

People can be sick with symptoms of an infection or colonized with germS (not have symptoms of an infection but able to pass the germS to others). GermS are also found in the healthcare environment. Examples of environmental sources of germS include:

- Dry surfaces in patient care areas (e.g., bed rails, medical equipment, countertops, and tables)
- Wet surfaces, moist environments, and biofilms (e.g., cooling towers, faucets and sinks, and equipment such as ventilators)
- Indwelling medical devices (e.g., catheters and IV lines)
- Dust or decaying debris (e.g., construction dust or wet materials from water leaks)

Susceptible Person

A susceptible person is someone who is not vaccinated or otherwise immune, or a person with a weakened immune system who has a way for the germS to enter the body. For an infection to occur, germS must enter a susceptible person's body and invade tissues, multiply, and cause a reaction.

Devices like IV catheters and surgical incisions can provide an entryway, whereas a healthy immune system helps fight infection.

When patients are sick and receive medical treatment in healthcare facilities, the following factors can increase their susceptibility to infection.

- Patients in healthcare who have underlying medical conditions such as diabetes, cancer, and organ transplantation are at increased risk for infection because often these illnesses decrease the immune system's ability to fight infection.
- Certain medications used to treat medical conditions, such as antibiotics, steroids, and certain cancer fighting medications increase the risk of some types of infections.
- Lifesaving medical treatments and procedures used in healthcare such as urinary catheters, tubes, and surgery increase the risk of infection by providing additional ways that germs can enter the body.

Recognizing the factors that increase patients' susceptibility to infection allows providers to recognize risks and perform basic infection prevention measures to prevent infection from occurring.

Transmission

Transmission refers to the way germs are moved to the susceptible person.

Germs don't move themselves. Germs depend on people, the environment, and/or medical equipment to move in healthcare settings.

There are a few general ways that germs travel in healthcare settings – through contact (i.e., touching), sprays and splashes, inhalation, and sharps injuries (i.e., when someone is accidentally stuck with a used needle or sharp instrument).

- Contact moves germs by touch (example: MRSA or VRE). For example, healthcare provider hands become contaminated by touching germs present on medical equipment or high touch surfaces and then carry the germs on their hands and spread to a susceptible person when proper hand hygiene is not performed before touching the susceptible person.
- Sprays and splashes occur when an infected person coughs or sneezes, creating droplets which carry germs short distances (within approximately 6 feet). These germs can land on a susceptible person's eyes, nose, or mouth and can cause infection (example: pertussis or meningitis).
 - Close range inhalation occurs when a droplet containing germs is small enough to breathe in but not durable over distance.
- Inhalation occurs when germs are aerosolized in tiny particles that **survive on air currents over great distances** and time and reach a susceptible person. Airborne transmission can occur

when infected patients cough, talk, or sneeze germs into the air (example: TB or measles), or when germs are aerosolized by medical equipment or by dust from a construction zone (example: Nontuberculous mycobacteria or aspergillus).

- Sharps injuries can lead to infections (example: HIV, HBV, HCV) when bloodborne pathogens enter a person through a skin puncture by a used needle or sharp instrument.

Infection Control Basics

There are 2 tiers of recommended precautions to prevent the spread of infections in healthcare settings:

- Standard Precautions, and
- Transmission-Based Precautions.

Standard Precautions for All Patient Care

Standard Precautions are used for all patient care. They are based on a risk assessment and make use of common-sense practices and personal protective equipment use that protect healthcare providers from infection and prevent the spread of infection from patient to patient.

- ✓ Perform hand hygiene
- ✓ Use personal protective equipment (PPE) whenever there is an expectation of possible exposure to infectious material
- ✓ Follow respiratory hygiene/cough etiquette principles
- ✓ Ensure appropriate patient placement
- ✓ Properly handle and properly clean and disinfect patient care equipment and instruments/devices
- ✓ Handle textiles and laundry carefully
- ✓ Follow safe injection practices: Wear surgical mask when performing lumbar punctures
- ✓ Ensure health worker safety including proper handling of needles and other sharps

Transmission-Based Precautions

Transmission-Based Precautions are the second tier of basic infection control and are to be used in addition to standard precautions for patients who may be infected or colonized with certain infectious agents for which additional precautions are needed to prevent infection transmission.

Contact Precautions

Use Contact Precautions for patients with known or suspected infections that represent an increased risk for contact transmission.

- **Ensure appropriate patient placement** in a single patient space or room if available in acute care hospitals. In long-term and other residential settings, make room placement decisions

balancing risks to other patients. In ambulatory settings, place patients requiring contact precautions in an exam room or cubicle as soon as possible.

- **Use personal protective equipment (PPE) appropriately**, including gloves and gown. Wear a gown and gloves for all interactions that may involve contact with the patient or the patient's environment. Donning PPE upon room entry and properly discarding before exiting the patient room is done to contain pathogens.
- **Limit transport and movement of patients** outside of the room to medically-necessary purposes. When transport or movement is necessary, cover or contain the infected or colonized areas of the patient's body. Remove and dispose of contaminated PPE and perform hand hygiene prior to transporting patients on Contact Precautions. Don clean PPE to handle the patient at the transport location.
- **Use disposable or dedicated patient-care equipment** (e.g., blood pressure cuffs). If common use of equipment for multiple patients is unavoidable, clean and disinfect such equipment before use on another patient.
- **Prioritize cleaning and disinfection of the rooms** of patients on contact precautions ensuring rooms are frequently cleaned and disinfected (e.g., at least daily or prior to use by another patient if outpatient setting) focusing on frequently-touched surfaces and equipment in the immediate vicinity of the patient.

Droplet Precautions

Use Droplet Precautions for patients known or suspected to be infected with pathogens transmitted by respiratory droplets that are generated by a patient who is coughing, sneezing, or talking.

- **Source control:** put a mask on the patient.
- **Ensure appropriate patient placement** in a single room if possible. In *acute care hospitals*, if single rooms are not available, utilize the recommendations for alternative patient placement considerations in the Guideline for Isolation Precautions. In *long-term care* and other residential settings, make decisions regarding patient placement on a case-by-case basis considering infection risks to other patients in the room and available alternatives. In *ambulatory settings*, place patients who require Droplet Precautions in an exam room or cubicle as soon as possible and instruct patients to follow Respiratory Hygiene/Cough Etiquette recommendations.
- **Use personal protective equipment (PPE) appropriately.** Don mask upon entry into the patient room or patient space.

- **Limit transport and movement of patients** outside of the room to medically-necessary purposes. If transport or movement outside of the room is necessary, instruct patient to wear a mask and follow Respiratory Hygiene/Cough Etiquette.

Airborne Precautions

Use Airborne Precautions for patients known or suspected to be infected with pathogens transmitted by the airborne route (e.g., tuberculosis, measles, chickenpox, disseminated herpes zoster).

- **Source control:** put a mask on the patient.
- **Ensure appropriate patient placement in an airborne infection isolation room (AIIR)** constructed according to the Guideline for Isolation Precautions. In settings where Airborne Precautions cannot be implemented due to limited engineering resources, masking the patient and placing the patient in a private room with the door closed will reduce the likelihood of airborne transmission until the patient is either transferred to a facility with an AIIR or returned home.
- **Restrict susceptible healthcare personnel from entering the room** of patients known or suspected to have measles, chickenpox, disseminated zoster, or smallpox if other immune healthcare personnel are available.
- **Use personal protective equipment (PPE) appropriately**, including a fit-tested NIOSH-approved N95 or higher-level respirator for healthcare personnel.
- **Limit transport and movement of patients** outside of the room to medically-necessary purposes. If transport or movement outside an AIIR is necessary, instruct patients to wear a surgical mask, if possible, and observe Respiratory Hygiene/Cough Etiquette. Healthcare personnel transporting patients who are on Airborne Precautions do not need to wear a mask or respirator during transport if the patient is wearing a mask and infectious skin lesions are covered.
- **Immunize susceptible persons as soon as possible following unprotected contact** with vaccine-preventable infections (e.g., measles, varicella or smallpox).

WHAT'S THE PROBLEM?

-  **1 IN 10 PATIENTS** get an infection while receiving care
-  **UP TO 32% OF SURGICAL PATIENTS** get a post-op infection, up to 51% antibiotic resistant
-  **UP TO 90% OF HEALTH CARE WORKERS** do not clean their hands in some facilities
-  **INFECTIONS CAUSE UP TO 56% OF DEATHS** among hospital-born babies
-  **UP TO 20% OF AFRICAN WOMEN** get a wound infection after a caesarean section
-  **50-70% OF INJECTIONS** given in some developing countries are unsafe
-  **INFECTIONS** can lead to disability, **ANTIBIOTIC RESISTANCE**, increased hospital time and death

PREVENT INFECTIONS SAVE LIVES IN HEALTH CARE




HEALTH CARE WITHOUT AVOIDABLE INFECTIONS

INFECTION PREVENTION AND CONTROL CONTRIBUTES TO ACHIEVING SUSTAINABLE DEVELOPMENT GOALS and could save millions of lives.

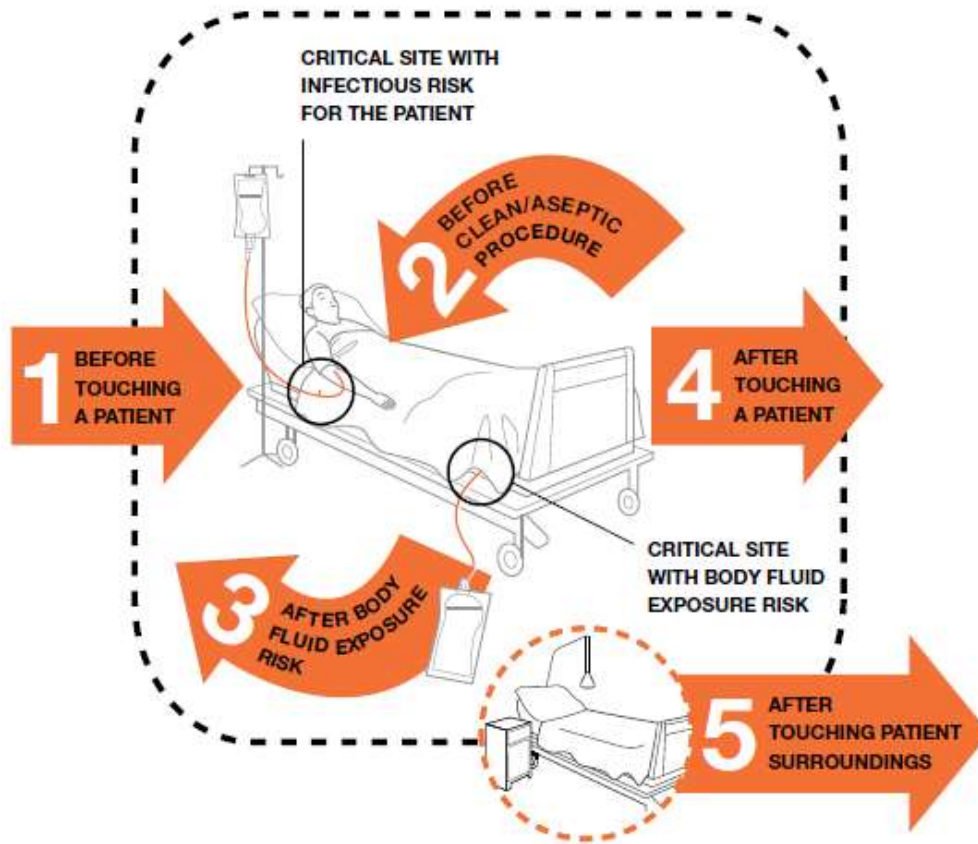





WHAT'S THE SOLUTION?

-  **HAVE ACTIVE INFECTION PREVENTION AND CONTROL PROGRAMMES** and target antibiotic resistance
-  **USE CLEAN PRACTICES** and asepsis for interventions
-  **PRACTICE HAND HYGIENE** to prevent infections and reduce the spread of antibiotic resistance
-  **HAVE ENOUGH STAFF**, a clean and hygienic environment and don't overcrowd health care facilities
-  **MONITOR INFECTIONS** and make action plans to reduce their frequency
-  **NEVER RE-USE** needles and syringes
-  Only dispense antibiotics when **TRULY NEEDED** to **REDUCE THE RISK OF RESISTANCE**

**YOUR 5 MOMENTS
FOR HAND HYGIENE***



*NOTE: Hand hygiene must be performed in all indications described regardless of whether gloves are used or not.

1	BEFORE TOUCHING A PATIENT	WHEN?	Clean your hands before touching a patient when approaching him/her.
		WHY?	To protect the patient against harmful germs carried on your hands.
2	BEFORE CLEAN/ASEPTIC PROCEDURE	WHEN?	Clean your hands immediately before performing a clean/aseptic procedure.
		WHY?	To protect the patient against harmful germs, including the patient's own, from entering his/her body.
3	AFTER BODY FLUID EXPOSURE RISK	WHEN?	Clean your hands immediately after an exposure risk to body fluids (and after glove removal).
		WHY?	To protect yourself and the health-care environment from harmful patient germs.
4	AFTER TOUCHING A PATIENT	WHEN?	Clean your hands after touching a patient and her/his immediate surroundings, when leaving the patient's side.
		WHY?	To protect yourself and the health-care environment from harmful patient germs.
5	AFTER TOUCHING PATIENT SURROUNDINGS	WHEN?	Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving – even if the patient has not been touched.
		WHY?	To protect yourself and the health-care environment from harmful patient germs.



World Health Organization

Patient Safety

A World Alliance for Safer Health Care

**SAVE LIVES
Clean Your Hands**

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WHO infection prevention and control core components summary

The 2016 World Health Organization (WHO) Guidelines on Core Components of Infection Prevention and Control (IPC) Programmes at the National and Acute Health Care Facility Level build on the original WHO Core Components for Infection Prevention and Control Report published in 2009. They have been developed by international experts adhering to WHO's Guideline Development Process, to support IPC in every country and every health facility across the world, in particular acute health care facilities.

Summary

The objectives of the new Guidelines are:

1. to provide evidence- and expert consensus-based recommendations on the core components of IPC programmes needed at the national and facility level, to effectively prevent health care-associated infections (HAIs) and combat antimicrobial resistance (AMR);
2. to support countries and health care facilities to develop or strengthen IPC programmes and AMR action plans, and improve IPC practices through a feasible, effective and acceptable framework that can be adapted to the local context, while taking account of available resources and public health needs.

Why a new set of guidelines?

1. Increasing acknowledgement of the threats posed by epidemics, pandemics and AMR and international support for IPC as one important part of the solution to protect people from these threats.
2. Renewed focus on the International Health Regulations (IHR) which position IPC as a key strategy for dealing with public health threats of international concern.
3. Sustainable Development Goals 3 and 6 and the requirement for effective, integrated IPC programmes to support quality health service delivery in the context of universal health coverage and water, sanitation and health (WASH) at national and facility levels.

What's new in these Guidelines?

Many of the principles of what constitute the central elements of IPC programmes remain the same as those presented in 2009. However, the following aspects are highlighted as new:



Guideline Recommendations (R) & Good Practice Statements (GPS)

1. IPC Programmes

R1a Strong. An IPC programme with a dedicated, trained team should be in place in each acute health care facility for the purpose of preventing HAI and combating AMR through IPC good practices.

GPS1b GPS. Stand-alone, active national IPC programmes with clearly defined objectives, functions and activities for the purpose of preventing HAI and combating AMR through IPC good practices should be established. National IPC programmes should be linked to other relevant national programmes and professional organizations.

2. Evidence-based guidelines

R2 Strong. Evidence-based guidelines should be developed and implemented for the purpose of reducing HAI and AMR. Education and training of the relevant health care workers on guideline recommendations and monitoring of adherence with guideline recommendations should be undertaken to achieve successful implementation.

3. Education & training

R3a Strong. At the facility level, IPC education should be in place for all health care workers by utilizing team and task-based strategies that are participatory and include bedside and simulation training to reduce the risk of HAI and AMR.

GPS1b GPS. The national IPC programme should support education and training of the health workforce as one of its core functions.

4. Surveillance

R4a Strong. Facility-based HAI surveillance should be performed to guide IPC interventions and detect outbreaks, including AMR surveillance with timely feedback of results to health care workers and stakeholders and through national networks.

R4b Strong. National HAI surveillance programmes and networks that include mechanisms for timely data feedback and with the potential to be used for benchmarking purposes should be established to reduce HAI and AMR.

5. Multimodal strategies

R5a Strong. At the facility level, IPC activities should be implemented using multimodal strategies to improve practices and reduce HAI and AMR.

R5b Strong. National IPC programmes should coordinate and facilitate the implementation of IPC activities through multimodal strategies at the national or sub-national level.

6. Monitoring, audit and feedback

R6a Strong. Regular monitoring/audit and timely feedback of health care practices should be undertaken according to IPC standards to prevent and control HAI and AMR at the health care facility level. Feedback should be provided to all audited persons and relevant staff.

R6b Strong. A national IPC monitoring and evaluation programme should be established to assess the extent to which standards are being met and activities are being performed according to the programme's goals and objectives. Hand hygiene monitoring with feedback should be considered as a key performance indicator at the national level.

7. Workload, staffing & bed occupancy

R7 Strong. In order to reduce the risk of HAI and the spread of AMR, the following should be addressed: (1) bed occupancy should not exceed the standard capacity of the facility; (2) health care worker staffing levels should be adequately assigned according to patient workload.

8. Built environment, materials & equipment

GPS8a GPS. At the facility level, patient care activities should be undertaken in a clean and/or hygienic environment that facilitates practices related to the prevention and control of HAI, as well as AMR, including all elements around the WASH infrastructure and services and the availability of appropriate IPC materials and equipment.

R8b Strong. At the facility level, materials and equipment to perform appropriate hand hygiene should be readily available at the point of care.

BIBLIOGRAPHY AND FURTHER READING

Infection control is culled from the CDC website available at: <https://www.cdc.gov/infectioncontrol/index.html>

For more information about CDC Guidelines and Guidance, visit: <https://www.cdc.gov/infectioncontrol/guidelines/index.html>

For more information about Training and Education resources, visit: <https://www.cdc.gov/infectioncontrol/training?Sort=CE%20Expiration%20Date%3A%3Adesc>

For more information about Tools for Healthcare Settings, visit: <https://www.cdc.gov/infectioncontrol/tools/index.html>

World Health Organization = www.who.int