Infection control

**Infection control** is the discipline concerned with preventing [nosocomial](https://en.wikipedia.org/wiki/Nosocomial_infection) or healthcare-associated infection, a practical (rather than academic) sub-discipline of [epidemiology](https://en.wikipedia.org/wiki/Epidemiology). It is an essential, though often under recognized and under supported, part of the infrastructure of health care. Infection control and hospital epidemiology are akin to public health practice, practiced within the confines of a particular health-care delivery system rather than directed at society as a whole. Anti-infective agents include [antibiotics](https://en.wikipedia.org/wiki/Antibiotics), [antibacterials](https://en.wikipedia.org/wiki/Antibacterials), [antifungals](https://en.wikipedia.org/wiki/Antifungals), [antivirals](https://en.wikipedia.org/wiki/Antivirals) and antiprotozoals.[[1]](https://en.wikipedia.org/wiki/Infection_control#cite_note-1)

Infection control addresses factors related to the spread of infections within the healthcare setting (whether patient-to-patient, from patients to staff and from staff to patients, or among-staff), including prevention (via hand hygiene/hand washing, cleaning/disinfection/sterilization, vaccination, surveillance), monitoring/investigation of demonstrated or suspected spread of infection within a particular health-care setting (surveillance and outbreak investigation), and management (interruption of outbreaks). It is on this basis that the common title being adopted within health care is "infection prevention and control."

Infection control in healthcare facilities []

[Aseptic technique](https://en.wikipedia.org/wiki/Aseptic_technique) is a key component of all invasive medical procedures. Similarly, infection control measures are most effective when Standard Precautions (health care) are applied because undiagnosed infection is common.[[2]](https://en.wikipedia.org/wiki/Infection_control#cite_note-2)

**Hand hygiene** []

Independent studies by [Ignaz Semmelweis](https://en.wikipedia.org/wiki/Ignaz_Semmelweis) in 1846 in [Vienna](https://en.wikipedia.org/wiki/Vienna) and [Oliver Wendell Holmes, Sr.](https://en.wikipedia.org/wiki/Oliver_Wendell_Holmes,_Sr.) in 1843 in [Boston](https://en.wikipedia.org/wiki/Boston) established a link between the hands of health care workers and the spread of [hospital-acquired](https://en.wikipedia.org/wiki/Nosocomial_infection) disease.[[3]](https://en.wikipedia.org/wiki/Infection_control#cite_note-3) The [U.S. Centers for Disease Control and Prevention](https://en.wikipedia.org/wiki/U.S._Centers_for_Disease_Control_and_Prevention) (CDC) state that “It is well documented that the most important measure for preventing the spread of pathogens is effective handwashing.”[[4]](https://en.wikipedia.org/wiki/Infection_control#cite_note-4) In the developed world, [hand washing](https://en.wikipedia.org/wiki/Hand_washing#Medical_hand_washing) is mandatory in most health care settings and required by many different regulators.[*[citation needed](https://en.wikipedia.org/wiki/Wikipedia:Citation_needed" \o "Wikipedia:Citation needed)*]

In the United States, OSHA standards[[5]](https://en.wikipedia.org/wiki/Infection_control#cite_note-5) require that employers must provide readily accessible hand washing facilities, and must ensure that employees wash hands and any other skin with soap and water or flush mucous membranes with water as soon as feasible after contact with blood or other potentially infectious materials (OPIM).

In the UK healthcare professionals have adopted the 'Ayliffe Technique', based on the 6 step method developed by [Graham Ayliffe](https://en.wikipedia.org/wiki/Graham_Ayliffe), JR Babb and AH Quoraishi.[[6]](https://en.wikipedia.org/wiki/Infection_control#cite_note-6)

Drying is an essential part of the hand hygiene process. In November 2008, a non-peer-reviewed[[7]](https://en.wikipedia.org/wiki/Infection_control#cite_note-7) study was presented to the European Tissue Symposium by the [University of Westminster](https://en.wikipedia.org/wiki/University_of_Westminster), London, comparing the bacteria levels present after the use of [paper towels](https://en.wikipedia.org/wiki/Paper_towel), warm air hand dryers, and modern jet-air hand dryers.[[8]](https://en.wikipedia.org/wiki/Infection_control#cite_note-8) Of those three methods, only paper towels reduced the total number of bacteria on hands, with "through-air dried" towels the most effective.

The presenters also carried out tests to establish whether there was the potential for cross-contamination of other washroom users and the washroom environment as a result of each type of drying method. They found that:

**Sterilization**[[edit](https://en.wikipedia.org/w/index.php?title=Infection_control&action=edit&section=3" \o "Edit section: Sterilization)]

Sterilization is a process intended to kill all microorganisms and is the highest level of microbial kill that is possible. Sterilizers may be heat only, steam, or liquid chemical.[[10]](https://en.wikipedia.org/wiki/Infection_control#cite_note-miller-10) Effectiveness of the sterilizer (e.g., a steam autoclave) is determined in three ways.[[10]](https://en.wikipedia.org/wiki/Infection_control#cite_note-miller-10) First, mechanical indicators and gauges on the machine itself indicate proper operation of the machine. Second heat sensitive indicators or tape on the sterilizing bags change color which indicate proper levels of heat or steam. And, third (most importantly) is biological testing in which a microorganism that is highly heat and chemical resistant (often the bacterial endospore) is selected as the standard challenge. If the process kills this microorganism, the sterilizer is considered to be effective.[[10]](https://en.wikipedia.org/wiki/Infection_control#cite_note-miller-10)

Sterilization, if performed properly, is an effective way of preventing [bacteria](https://en.wikipedia.org/wiki/Bacteria) from spreading. It should be used for the cleaning of the medical instruments or [gloves](https://en.wikipedia.org/wiki/Gloves), and basically any type of medical item that comes into contact with the [blood stream](https://en.wikipedia.org/wiki/Blood_stream) and sterile tissues.

There are four main ways in which such items can be sterilized: [autoclave](https://en.wikipedia.org/wiki/Autoclave) (by using high-pressure [steam](https://en.wikipedia.org/wiki/Steam)), dry [heat](https://en.wikipedia.org/wiki/Heat) (in an oven), by using chemical sterilants such as glutaraldehydes or [formaldehyde](https://en.wikipedia.org/wiki/Formaldehyde) solutions or by [radiation](https://en.wikipedia.org/wiki/Radiation) (with the help of physical agents). The first two are the most used methods of sterilizations mainly because of their accessibility and availability. Steam sterilization is one of the most effective types of sterilizations, if done correctly which is often hard to achieve. Instruments that are used in [health care facilities](https://en.wikipedia.org/wiki/Health_care_facilities) are usually sterilized with this method. The general rule in this case is that in order to perform an effective sterilization, the steam must get into contact with all the surfaces that are meant to be disinfected. On the other hand, dry heat sterilization, which is performed with the help of an oven, is also an accessible type of sterilization, although it can only be used to disinfect instruments that are made of [metal](https://en.wikipedia.org/wiki/Metal) or [glass](https://en.wikipedia.org/wiki/Glass). The very high [temperatures](https://en.wikipedia.org/wiki/Temperatures) needed to perform sterilization in this way are able to melt the instruments that are not made of glass or metal.

Steam sterilization is done at a temperature of 121 C (250 F) with a pressure of 209 kPa (15 lbs/in2). In these conditions, rubber items must be sterilized for 20 minutes, and wrapped items 134 C with pressure of 310 kPa for 7 minutes. The time is counted once the temperature that is needed has been reached. Steam sterilization requires four conditions in order to be efficient: adequate contact, sufficiently high temperature, correct time and sufficient [moisture](https://en.wikipedia.org/wiki/Moisture).[[11]](https://en.wikipedia.org/wiki/Infection_control#cite_note-Sterilization-11) Sterilization using steam can also be done at a temperature of 132 C (270 F), at a double pressure. Dry heat sterilization is performed at 170 C (340 F) for one hour or two hours at a temperature of 160 C (320 F). Dry heat sterilization can also be performed at 121 C, for at least 16 hours.[[12]](https://en.wikipedia.org/wiki/Infection_control#cite_note-12)

Chemical sterilization, also referred to as cold sterilization, can be used to sterilize instruments that cannot normally be disinfected through the other two processes described above. The items sterilized with cold sterilization are usually those that can be damaged by regular sterilization. Commonly, glutaraldehydes and formaldehyde are used in this process, but in different ways. When using the first type of disinfectant, the instruments are soaked in a 2-4% solution for at least 10 hours while a solution of 8% formaldehyde will sterilize the items in 24 hours or more. Chemical sterilization is generally more expensive than steam sterilization and therefore it is used for instruments that cannot be disinfected otherwise. After the instruments have been soaked in the chemical solutions, they are mandatory to be rinsed with sterile water which will remove the residues from the [disinfectants](https://en.wikipedia.org/wiki/Disinfectants). This is the reason why [needles](https://en.wikipedia.org/wiki/Hypodermic_needle) and [syringes](https://en.wikipedia.org/wiki/Syringes) are not sterilized in this way, as the residues left by the chemical solution that has been used to disinfect them cannot be washed off with [water](https://en.wikipedia.org/wiki/Water) and they may interfere with the administered treatment. Although formaldehyde is less expensive than glutaraldehydes, it is also more irritating to the [eyes](https://en.wikipedia.org/wiki/Human_eyes), [skin](https://en.wikipedia.org/wiki/Human_skin) and [respiratory tract](https://en.wikipedia.org/wiki/Respiratory_tract) and is classified as a potential [carcinogen](https://en.wikipedia.org/wiki/Carcinogen).[[11]](https://en.wikipedia.org/wiki/Infection_control#cite_note-Sterilization-11)

Other sterilization methods exist, though their efficiency is still controversial. These methods include [gas](https://en.wikipedia.org/wiki/Gas), UV, [gas plasma](https://en.wikipedia.org/wiki/Gas_plasma), and chemical sterilization with agents such as [peroxyacetic acid](https://en.wikipedia.org/wiki/Peroxyacetic_acid" \o "Peroxyacetic acid) or [paraformaldehyde](https://en.wikipedia.org/wiki/Paraformaldehyde).

**Cleaning**[[edit](https://en.wikipedia.org/w/index.php?title=Infection_control&action=edit&section=4" \o "Edit section: Cleaning)]

Infections can be prevented from occurring in homes as well. In order to reduce their chances to contract an infection, individuals are recommended to maintain a good hygiene by washing their hands after every contact with questionable areas or bodily fluids and by disposing of [garbage](https://en.wikipedia.org/wiki/Waste) at regular intervals to prevent [germs](https://en.wikipedia.org/wiki/Microorganism) from growing.[[13]](https://en.wikipedia.org/wiki/Infection_control#cite_note-13)

**Disinfection**[[edit](https://en.wikipedia.org/w/index.php?title=Infection_control&action=edit&section=5)]

Disinfection uses liquid chemicals on surfaces and at room temperature to kill disease causing microorganisms. Ultraviolet light has also been used to disinfect the rooms of patients infected with [*Clostridium difficile*](https://en.wikipedia.org/wiki/Clostridium_difficile_(bacteria)) after discharge.[[14]](https://en.wikipedia.org/wiki/Infection_control#cite_note-14) Disinfection is less effective than sterilization because it does not kill bacterial endospores.[[10]](https://en.wikipedia.org/wiki/Infection_control#cite_note-miller-10)

[Personal protective equipment (PPE)](https://en.wikipedia.org/wiki/Personal_protective_equipment) is specialized clothing or equipment worn by a worker for protection against a hazard. The hazard in a health care setting is exposure to blood, saliva, or other bodily fluids or aerosols that may carry infectious materials such as [Hepatitis C](https://en.wikipedia.org/wiki/Hepatitis_C), [HIV](https://en.wikipedia.org/wiki/HIV), or other blood borne or bodily fluid [pathogen](https://en.wikipedia.org/wiki/Pathogen). PPE prevents contact with a potentially infectious material by creating a physical barrier between the potential infectious material and the healthcare worker.

The United States [Occupational Safety and Health Administration](https://en.wikipedia.org/wiki/Occupational_Safety_and_Health_Administration) (OSHA) requires the use of [Personal protective equipment (PPE)](https://en.wikipedia.org/wiki/Personal_protective_equipment) by workers to guard against blood borne pathogens if there is a reasonably anticipated exposure to blood or other potentially infectious materials.[[15]](https://en.wikipedia.org/wiki/Infection_control#cite_note-15)

Components of PPE include [gloves](https://en.wikipedia.org/wiki/Medical_gloves), [gowns](https://en.wikipedia.org/wiki/Hospital_gown), bonnets, shoe covers, [face shields](https://en.wikipedia.org/wiki/Face_shield), [CPR masks](https://en.wikipedia.org/wiki/CPR_mask), [goggles](https://en.wikipedia.org/wiki/Goggles), [surgical masks](https://en.wikipedia.org/wiki/Surgical_mask), and respirators. How many components are used and how the components are used is often determined by regulations or the infection control protocol of the facility in question. Many or most of these items are [disposable](https://en.wikipedia.org/wiki/Disposable) to avoid carrying infectious materials from one patient to another patient and to avoid difficult or costly [disinfection](https://en.wikipedia.org/wiki/Disinfection). In the US, OSHA requires the immediate removal and disinfection or disposal of a worker's PPE prior to leaving the work area where exposure to infectious material took place.[[16]](https://en.wikipedia.org/wiki/Infection_control#cite_note-16)