Antiseptics and disinfectants

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Definitions

Antiseptics are used to kill or eliminate microorganisms and/or inactivate viruses on living tissues (intact or broken skin and mucous membranes).  
Disinfectants are used to kill or eliminate microorganisms and/or inactivate viruses on inanimate objects and surfaces (medical devices, instruments, equipment, walls, floors).  
Certain products are used both as an antiseptic and as a disinfectant (see specific information for each product).

Selection

**Recommended products**

1) *Core list*  
No single product can meet all needs with respect to cleaning, disinfection and antisepsis. However, use of a limited selection of products allows greater familiarity by users with the products in question and facilitates stock management:  
– ordinary soap;  
– a detergent and, if available, a detergent-disinfectant for instruments and a detergent-disinfectant for floors and surfaces;  
– a disinfectant: chlorine-releasing compound (e.g. NaDCC);  
– an antiseptic: 10% povidone iodine or chlorhexidine.

2) *Complementary list*  
Other products can be used, according to the activities carried out, resources, and options for obtaining the product, locally or otherwise:

– **Ethanol** and **isopropanol**  
By virtue of its rapid action (< 30 seconds), alcohol, if available locally, is useful to disinfect:  
• intact skin, before taking a blood sample or performing an injection (except vaccines),  
• latex stoppers of injection vials.  
Alcohol acts faster than polyvidone iodine, but its duration of action is shorter.  
Application to mucous membranes or broken skin is contra-indicated, however, alcohol may be used on broken skin in the event of accidental exposure to blood.  
Alcohol is more effective at 60-70% concentration than at 90-95%.

– **Alcohol-based** hand rub solutions  
Alcohol-based hand rubs (ABH) are used for standard hand antisepsis. Some, but not all, ABH may also be used for surgical hand antisepsis.  
Not all ABH preparations are equivalent. For example, for antiseptic hand rub, depending on the product specifications:  
• Bactericidal effect may be achieved with a single application of 30 seconds duration, or 2 consecutive applications of 30 seconds each, or a single application of 60 seconds duration.  
• The volume of rub required per application may be 3 or 5 ml.  
Thus, when purchasing locally, it is important to verify the quality of the product and specific instructions for use (number of applications, duration of application, and volume to be used per application).  
For surgical activity, ensure that the product is suitable for use as a surgical hand rub. Follow manufacturer’s instructions for use.  
All alcohols and alcohol-based products are flammable. Precautions should be taken during storage and use to avoid contact with a heat source (flame, electrocautery, etc.).

–**Povidone iodine** (**PVI**)**scrub solution**  
7.5% or 4% PVI scrub solution is used for antiseptic cleansing of healthy skin, contaminated wounds and surgical site, as well as antiseptic hand wash and surgical hand wash.  
Given the possible interactions between different groups of antiseptics, antiseptic cleansing and antisepsis should only be carried out using products from the same class. For example, for pre-operative skin preparation, PVI scrub solution is used for cleansing, then PVI 10% dermal solution is used for antisepsis.

– **Glutaraldehyde** (2% solution)  
Glutaraldehyde is used for high-level disinfection of heat-sensitive items, which cannot withstand heat sterilisation, notably endoscopes/endoscopy equipment.  
Instructions for glutaraldehyde use must be followed scrupulously:  
1) two preliminary washes of the equipment through immersion in a detergent-disinfectant solution for instruments, followed each time by rinsing;  
2) complete immersion of the equipment in a 2% glutataldehyde solution for 20 minutes;  
3) thorough final rinsing, with filtered water (or sterile water for endoscopes introduced into a sterile cavity) to eliminate any residue;  
4) thorough drying with a sterile towel;  
5) sterile wrapping and use within 24 hours.  
Glutaraldehyde is available as 2% ready-to-use solution (e.g. Korsolex RTU®, Steranios 2%®); concentrated solution that must be diluted to obtain a 2% solution (e.g. 25% or 38.5% solutions); preparations requiring « activation » (alkalinisation) before use, through addition of the agent provided with the product (e.g. Cidex®, Glutrex®).  
Glutaraldehyde solution is irritating to skin and mucous membranes, and releases toxic vapours. Personnel exposed to glutaraldehyde should take precautions to protect skin and eyes and avoid inhalation of vapours (risk of nausea, headache, breathing disorders, rhinitis, eye irritation, dermatitis).  
Glutaraldehyde solutions are flammable. Precautions should be taken during storage and use to avoid contact with a heat source.

**Non-recommended products**

– Hydrogen peroxide (3% or 10 volumes) has limited efficacy as antiseptic agent but can be useful to clean contaminated wounds. In addition, concentrated solutions are dangerous to transport and handle.

– Mercury compounds such as phenylmercuric borate, merbromin (Mercurochrome®), mercurobutol (Mercryl®), thimerosal (Merthiolate®, Timerosal®) have limited efficacy, may cause serious adverse effects (toxic for kidneys, central nervous system and digestive tract; allergies) and pollute the environment. Their use must be abandoned.

– Hexachlorophene is toxic for the central nervous system and its efficacy is limited.

– Ether is often wrongly used as an antiseptic; it removes sticky residues of plaster.

– Eosin is often wrongly used as an antiseptic; it is a colouring agent used for staining as well as a drying agent.

None of these products is included in the WHO list of essential medicines.

Preparation and use of antiseptic solutions

**Preparation**

Aqueous solutions of many antiseptics can be contaminated by pathogens (especially *Pseudomonas aeruginosa*) during handling. To avoid this, the following precautions must be taken:

– Prepare all aqueous antiseptic solutions with clean water that has been boiled for a few minutes and cooled.

– Prepare solutions immediately before use.

– Only prepare small amounts at a time to avoid wastage and the temptation to keep expired and/or contaminated solutions.

– Wash bottles with hot water and leave to dry before each refill.

– Never use a cork stopper (it promotes contamination; cork inactivates certain antiseptics such as chlorhexidine).

– Mark on the bottles:  
• the name of the product,  
• its concentration,  
• the date and time of preparation.

Every medical facility should define a clear policy concerning the renewal of antiseptic solutions.

**Use**

– Do not use antiseptic solutions belonging to different classes for the same procedure: incompatibilities between different compounds exist.

– Antiseptics should be used when wounds are contaminated or infected. Clean, non-infected wounds may be cleaned with 0.9% sodium chloride; it is not necessary to apply an antiseptic.

– In case of accidental exposure to blood (needlestick or broken skin): the injured area should be washed well with soap and water. No evidence exists that antiseptics reduce the risk of transmission, however, their use – after thorough cleaning – is not contraindicated. Use 2.6% bleach diluted 1/5 or 1/10, or 70% alcohol, or 10% povidone iodine solution and leave in contact for 5 minutes.

– Disinfection of skin when administrating a vaccine is not recommended; rather, simply clean the injection site with clean water. Certain vaccines (for example, BCG) may be inactivated in the presence of an antiseptic. If an antiseptic is used despite this recommendation, it must be allowed to dry before vaccine injection.

Preparation and use of disinfectant solutions

The effectiveness of disinfection can be impaired by error in preparation (concentration, temperature), failure to follow recommended contact times, or deterioration of the product due to poor storages conditions.

Personnel carrying out disinfection should wear protective clothing when preparing or using disinfectant solutions: gown, rubber apron, gloves with long cuffs, goggles and mask.

**Preparation**

Solutions should be prepared with clean water (chlorine solutions should be prepared with cold water only, in non-metal containers).

– Solution for disinfecting floors and surfaces: prepare just before use, and discard any unused solution.

– Solution for pre-disinfection of medical devices and instruments: replace daily. The solution may be used for a maximum of 24 hours; if visibly soiled, discard and replace with fresh soaking solution before 24 hours are up.

– Solution for disinfection of medical devices and instruments: prepare just before and discard after use.

Do not add any product (e.g. a detergent, descaling agent) to disinfectant solutions.

**Disinfection of floors and surfaces**

– Apply detergent-disinfectant intended for floors and surfaces[1](https://medicalguidelines.msf.org/viewport/EssDr/english/antiseptics-and-disinfectants-16688206.html" \l "Footnote1" \o "Footnote: Click here to display the footnote), without rinsing. Follow manufacturer’s instructions for dilution and specific preparation procedures.  
Or  
– After cleaning with a detergent (cleaning product without an antimicrobial agent) and rinsing with water, apply a 0.1% active chlorine solution. Preliminary washing and rinsing are essential: the activity of chlorine is reduced in the presence of organic material (sputum, vomit, faeces, pus, blood and other body fluids), and the detergent used may be incompatible with chlorine. Contact time is 15 minutes. Stainless steel surfaces should be rinsed with water after disinfection with chlorine solution.

The use of detergent-disinfectant products reduces workload (cleaning and disinfection are carried out as a single procedure), but they have the disadvantage of being weak detergents and leaving a film, which causes dirt to build up on the floors. It is thus necessary to alternate their use with that of a detergent alone. Each medical facility should establish a clear policy addressing this issue.

**Disinfection of linen**

After hand washing, followed by rinsing: soak the clean linen in a solution of 0.1% active chlorine for 15 minutes and rinse thoroughly (3 rinses).

After machine-washing at 60 °C: soak the linen in a 0.1% active chlorine solution for 2 to 3 minutes and rinse thoroughly (3 rinses).

**Pre-disinfection of reusable medical devices/instruments**

– After use, soak medical devices (disassembled, forceps and scissors opened):  
• In a detergent-disinfectant solution intended for medical devices and instruments[1](https://medicalguidelines.msf.org/viewport/EssDr/english/antiseptics-and-disinfectants-16688206.html" \l "Footnote1" \o "Footnote: Click here to display the footnote). Use a syringe to irrigate the cavities of hollow devices with the same solution.  
For correct dilution and soak times, follow manufacturer ’s instructions; use a timer.  
Or  
• In 0.1% available chlorine solution for 15 minutes (use a timer). Use a syringe to irrigate the cavities of hollow devices with the solution.  
Comply with recommended soaking times and concentrations (risk of corrosion of metal instruments). Soaking for too long (> 15 minutes) and/or in a solution that is too concentrated will increase the risk of corrosion.

– Rinse with clean water, using a syringe for hollow cavities.

– Dry with a clean, dry, lint-free cloth.

**Washing-disinfection of reusable medical devices/instruments**

After the pre-disinfection step:  
– Immerse the material in a detergent-disinfectant solution intended for medical devices and instruments[1](https://medicalguidelines.msf.org/viewport/EssDr/english/antiseptics-and-disinfectants-16688206.html" \l "Footnote1" \o "Footnote: Click here to display the footnote)(for correct dilution and soak times, follow manufacturer’s directions). Scrub with a soft, non abrasive brush. Use a bottle brush for hollow devices, or irrigate with a syringe. Rinse with clean water, drain and dry with a clean, dry, lint-free cloth.  
Or  
– Wash (as above) with detergent and rinse with clean water. Then soak in 0.1% available chlorine solution for 20 minutes (use a timer). Comply with recommended soak times and concentrations (risk of corrosion of metal instruments). Rinse with clean water, drain and dry with a clean, dry, lint-free cloth.

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| [1](https://medicalguidelines.msf.org/viewport/EssDr/english/antiseptics-and-disinfectants-16688206.html#FootnoteMarker1-0) | For example a quaternary ammonium detergent-disinfectant. [ [a](https://medicalguidelines.msf.org/viewport/EssDr/english/antiseptics-and-disinfectants-16688206.html#FootnoteMarker1-0) [b](https://medicalguidelines.msf.org/viewport/EssDr/english/antiseptics-and-disinfectants-16688206.html#FootnoteMarker1-1) [c](https://medicalguidelines.msf.org/viewport/EssDr/english/antiseptics-and-disinfectants-16688206.html#FootnoteMarker1-2) ] |