

Hand hygiene and personal protection

Hand hygiene – hand disinfection

There is conclusive evidence that contaminated hands are responsible for transmitting infections and are a major contributing factor in the current infection threats to hospital in-patients. Hand hygiene prevents cross-infection in hospitals, but among healthcare workers, compliance with guidelines is poor. For most hand disinfection purposes, alcohol-based hand rubs are preferable to hand washing with soap and water. Alcohol-based hand rubs should be available not only at each bedside but also in all places where disinfected hands are important, e.g. in the sterilizing unit, storage facilities etc. An alcohol-based hand-rub requires less time, acts faster, is less irritant to the skin of the hands, and contributes significantly to sustained improvement in compliance associated with decreased infection rates.

The microorganisms that occur on the skin of the hands and under the fingernails consist partly of so-called normal or permanent skin flora, and partly of so-called transient skin flora. The permanent skin flora comprise microorganisms that normally colonize the skin and under the fingernails. These bacteria are usually nonpathogenic and provide a certain protection against pathogenic bacteria. The transient microflora of the skin can comprise many different types of microorganisms, depending on what the hands may have touched, e.g. saliva or blood. Hand-washing, cleaning fingernails and disinfection are primarily intended to target the transient microflora.

Part of the normal function of the skin is to provide a barrier protection against microorganisms, wear and chemical agents and to regulate body temperature and protect the body from dehydration. The skin is a kind of permeable membrane between the body and the outside world. Under normal conditions, the thickness of the skin remains constant, and the rate of regeneration of skin cells, determined mainly by external influences (wear, chemical effect etc) is directed by different cellular functions.

The fat (glycerol lipids) normally found in the skin is an essential part of its barrier protection. The cleaning agent in soap dissolves fat and splits protein and partly removes the protective layer of fat from the skin, split parts of the outer epithelium and thereby reduces the ability of the skin to maintain a fully effective barrier protection.

Hand-washing with soap and water for 15 seconds reduces the transient bacterial flora around 10-fold; for 30 seconds, around 1000-fold. Washing with soap can, however, have the opposite effect – increasing the bacterial flora on the hands, partly as described above, by disrupting the protective barrier of the skin of the hands and partly because certain strains of bacteria can colonize and multiply in soap solutions. This applies particularly to pseudomonas and liquid soap in dispensers.

Hand disinfection with alcohol-based disinfectant for 30 seconds reduces the bacterial flora on the skin of the hand 10,000-fold; and for 60 seconds up to 100,000-fold and is thus markedly more effective than washing with soap and water.

Alcohol-based hand disinfectants

The most common hand disinfectant is 70 volume-% ethyl alcohol, giving a disinfectant effect corresponding to about 77 vol-% ethanol or 60 vol-% isopropyl alcohol (isopropanol). Propyl alcohols (e.g. isopropanol) are volatile at high concentrations.

Hand disinfectants based on isopropanol therefore usually contain 45 vol-% isopropanol together with some other alcohol or chemical disinfectant in order to attain a concentration of about 60 vol-% isopropanol. The occupational hazards of alcohols are negligible.

Alcohols have a dehydrating effect on the skin of the hands, and this can also cause a similar effect to the one described above with respect to hand cleaning with soap and water. In order to avoid dehydration of the skin surface, alcohol-based disinfectants contain some kind of rehydrating agent, usually 1-3% glycerol.

In general, alcohol is an effective disinfectant for vegetative bacteria, including MRSA (methicillin resistant staphylococcus aureus), mycobacteria, fungi and most viruses e.g. encapsulated viruses such as herpes simplex virus, HIV, influenza virus, hepatitis B-virus and hepatitis C-virus.

Alcohols are not as effective against naked viruses such as Hepatitis A-virus and polio virus. To compensate for this, a somewhat higher concentration of alcohol is required, or the addition of other disinfectant agents. Alcohol has no effect against bacterial spores and protozoa (unicellular animals, e.g. amoeba).

Wash hands with soap at the beginning of the working day and thereafter only when the hands are visibly soiled.

Hand disinfection with alcohol-based hand disinfectant: always before handling clean goods and after handling contaminated/used goods.

Hand disinfectant based on ethanol or isopropanol, with a disinfectant effect corresponding to about 77 vol-% ethanol, or alternatively isopropyl alcohol > 60 vol-% (or equivalent).

Hand disinfectant containing 1 - 3% glycerol as a rehydrating agent.

Use liberally: 3 – 5 ml.

Apply thoroughly to all the skin of the hand – don't forget the fingertips

The time to take effect is at least 30 seconds (before the hands begin to feel dry).

If necessary, the hands should be rinsed in cold running water before hand disinfection.