

I

General Hygiene



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1 General hygiene

If one asks the question: “What is Hygiene?”, the response is mainly: “Cleanliness”. Is that correct?

Hygieinos comes from the Greek and means “healthy”.

Hygiene (also known as “infection control”) is the **science that deals with the promotion and preservation of human health and prevention of disease.**

So it really means a bit more than cleanliness, does it not?

For example, if we don't have good drinking water, we can clean forever but will, nonetheless, contract e.g. cholera or typhoid fever.

We make a distinction between drinking water hygiene, environmental hygiene, kitchen hygiene, epidemic hygiene, hospital hygiene, etc.

Hygieia (Fig.) was the daughter of the famous Greek demigod and physician Asclepius (Aesculapius), and right up to the present day the Asclepian serpent continues to be the symbol used by the medical profession. Hence hygiene has the function of protecting humans against health hazards.



A major problem in hospitals and other healthcare establishments is **hospital infections** (= nosocomial infections, hospital-acquired infections), i.e. infections contracted within the hospital.

Hospital hygiene is aimed at protecting patients in healthcare institutions against additional diseases, but it also aims to protect healthcare workers.

In other words, hospital hygiene endeavours to ensure that patients do not become more ill than they already are.

1.1 Personal hygiene

The following rules apply for personal hygiene in the workplace:

| | |
|--|--|
| 1. Uniform: | <ul style="list-style-type: none"> • wear only in the workplace • change: daily and immediately if visibly soiled • do not mix uniform and private clothing • uniform must not be laundered at home in many countries |
| 2. Shoes: | <ul style="list-style-type: none"> • should be sturdy (non-slip, good grip, no high heels) • easy to clean (shoes made of suede, felt or textiles are not suitable for hygiene reasons) • regular cleaning (around once weekly) and if visibly soiled |
| 3. Hair: | <ul style="list-style-type: none"> • hair should be worn such that there is no need to keep touching it with one's hands (pushing it back) • if necessary, protective headgear should be used to fully cover the hair |
| 4. Hands: | <ul style="list-style-type: none"> • hand washing and disinfection: see Hand Hygiene chapter • fingernails: well cared for and short • no false nails |
| 5. Jewellery: | <ul style="list-style-type: none"> • no hand jewellery • other jewellery may be worn provided that it is not excluded by the following: interfere with working activities, hazardous, difficult to clean and/or disinfect. |
| 6 Eating, drinking, smoking | <ul style="list-style-type: none"> • eating, drinking or smoking in the workplace are prohibited • food and drinks must not be stored in general in the workplace |
| 7. Personal protective equipment (PPE) | <ul style="list-style-type: none"> • in workplaces with a high risk of contamination or splashing of possibly infectious materials, personal protective equipment must be worn (gown or apron, disposal shoes, goggles, orofacial masks) |

2 Hand hygiene

2.1 Fundamentals

Already more than 150 years ago, Ignaz Semmelweis (1818-1865) recognized that transmission of puerperal fever (childbed fever) could be prevented if doctors disinfected their hands with chlorinated lime before examining the women.

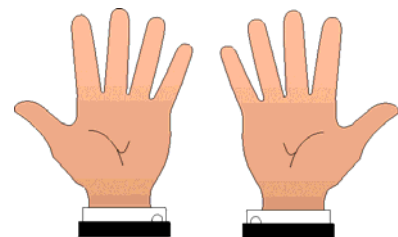
He also recognized that the hands could spread disease-causing microbes, and today we know that the hands are the main vehicles implicated in the spread of hospital infections



Our hands can harbour a multitude of microorganisms, and the number that can accumulate on the hands within the space of a few hours can be as high as 100,000 or more per hand.

Note: bacteria cannot walk, jump or fly, but they can take a taxi!

The taxi generally taken by bacteria are our



To ensure good hand hygiene, we must note the following rules:

Hand and finger jewellery (incl. wrist watches) must be removed before beginning work, because:



- otherwise it would not be possible to carry out proper hand disinfection and washing.
- soap and disinfectant residues could persist beneath the jewellery and could be harmful to the skin.
- gloves could be damaged by jewellery.

Fingernails must be short and well cared for

Fingernails should not extend beyond the fingertips and should be cut in a round shape.



Long fingernails can serve as a repository for soils and also bacteria, they can damage gloves and in general interfere with working practices.

False fingernails are not permitted since they could become detached and bacteria are known to collect beneath them.

Nail polish is not permitted!

Nail polish becomes easily chipped and could get into instrument sets.



2.2 Hand hygiene measures

- Non-contamination, (this means avoiding soiling of hands as far as possible)
- Hand washing and drying
- Hand disinfection
- Hand care

2.2.1 Principle of non-contamination

Non-touch techniques serve to protect both patients and staff.

- Good preparation for work:

If one has kept everything to hand, there will be no need later to run around having to look for various things

- Avoid hand contact:

For example, elbow-operated levers for taps, soap and disinfectant dispensers, multiple-plug connectors, door openers, etc.

- Safe disposal

Make provision for suitable waste and disposal containers that enable non-touch disposal of items that are no longer needed (puncture-proof containers for pointed and sharp objects)

- Use gloves



2.2.2 Gloves

Even if one thinks that one has no hand injuries, there can be minute injuries and cracks (microlesions). When handling e.g. bloody instruments there is a risk of transmission of hepatitis B, hepatitis C or HIV viruses if hands are not protected. Gloves can to a large extent prevent direct contact between the skin and infectious materials (e.g. body fluids).

Gloves should therefore always be worn if:

- instruments or other objects contaminated with blood or other body fluids are handled
- there are any injuries on the hands or forearms.

Since gloves do not offer 100 % protection, one should try to avoid as far as possible coming into contact with infectious materials, even if wearing gloves. After finishing work tasks, the gloves must be immediately disposed of and the hands disinfected.



Tear-resistant gloves (with turnback cuffs) should be worn when reprocessing instruments since this involves handling pointed and sharp instruments.

It is imperative to replace gloves:

- on changing one's workplace
- if gloves are visibly damaged

IMPORTANT!

On the unclean side, hygienic hand disinfection must be carried out immediately after removing gloves. On the clean side, hygienic hand disinfection must be carried out immediately before donning and after removing gloves.

2.2.3 Hand washing and drying

Hand washing removes soils and sweat, while at the same time reducing the microbial count. However, this does not kill the microorganisms but merely flushes them away:

| Baseline microbial count 100,000 bacteria | |
|--|---|
| Hand washing | Hand disinfection |
| (reduction by 2-3 powers of ten) | (reduction by 4-5 powers of ten) |
| 100 - 1000 bacteria still remain | max. 1 –10 bacteria still remain |

Tab. 1: Comparative reduction in the microbial count

Hands must always be washed if there are visible soils or if this is advocated by the general hygiene rules:

- before starting and on finishing work
- if there is visible contamination but without any risk of infection
- before eating
- after using the toilet

Method:

- Turn on the water without touching the tap (arm-operated lever, foot pedal, knee-operated lever, light barrier)
- Take wash lotion from dispenser (e.g. with elbow-operated lever)
- Wash hands thoroughly, including wrists (without splashing)
- Rinse thoroughly
- Dry hands with disposable towels

To ensure impeccable hygienic hand washing, the hand washing facility must meet the following criteria:

- water supply that is bacteriologically safe (drinking water quality)
- mixer taps with hands-free operation (preferably elbow- or knee-operated mechanism), preferably no water-jet regulator (filter) on tap
- enough free space beneath the tap to wash hands without coming into contact with fittings
- as far as possible, hand washbasin without overflow mechanism, and where water jet is not oriented directly into the drain
- wash lotion from dispenser, NO bars of soap !!
- disposable towels from dispenser, NO shared towels !!

IMPORTANT!

Hand washing is no substitute for hygienic hand disinfection!!

Hand washing with disinfectant soaps (antiseptic wash lotions) is as a rule not a substitute for hand disinfection because the exposure time is longer and is therefore rarely observed, and one would have to continue standing at the washbasin, whereas with hand disinfection one is free to move on.

2.2.4 Hygienic hand disinfection

Apart from hygienic hand disinfection, **surgical hand disinfection** is stipulated for the operating team before conductance of surgical procedures. However, since this is not of relevance for personnel working in medical device reprocessing units, it will not be further discussed here.

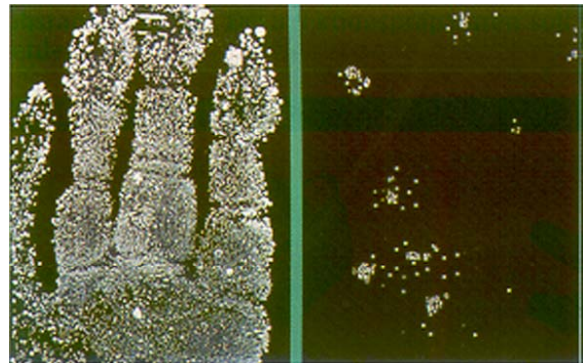
The goal of **hygienic hand disinfection** is to kill as far as possible all bacteria on the hands.

Hygienic hand disinfection is thus the most important (and at the same time the easiest and least expensive) measure for prevention of infection in healthcare settings and helps to protect patients as well as healthcare workers.

Hygienic hand disinfection is required:

- before starting work
- before performing clean tasks
- before eating
- before and after work breaks
- following contact with potentially infectious body fluids (blood, saliva, secretions)
- following contact with potentially contaminated surfaces or objects
- after performing unclean tasks
- after removing protective gloves
- after sneezing, coughing, blowing one's nose
- after using the toilet

Hand disinfection is performed using an alcohol-based hand disinfectant. In some countries a list of approved products is available (e.g. the ÖGHMP Expertise List (see Fundamentals of Cleaning, Disinfection and Sterilization). If such a list is available, an approved product should be used. But if no independent and approved list is available in one's own country, one should consult another country's list.



It is important not just that hand disinfection be carried out but also how this is done:

In a study focusing on 150 subjects using fluorescent hand disinfectant, Buchrieser et al. investigated the most common problem sites when carrying out hygienic hand disinfection. Here it was revealed that the most sites with inadequate wetting were the fingertips, thumbs and back of the hands

| Areas with disinfection gaps | | Gaps [%] |
|------------------------------|--|----------|
| Underside of hand | Fingertips | 35% |
| | Thumbs | 12% |
| | Palms | 7% |
| | Interdigital spaces (area between the fingers) | 3% |
| Back of hand | Thumbs | 56% |
| | 1st finger joints | 33% |
| | Back of hand | 27% |
| | Interdigital spaces | 13% |

Conductance of hygienic hand disinfection:

Since 1998 there has been a European standard regulating testing of hand disinfectants and stipulating how hand disinfection is to be carried out (EN 1500). The figures below show the correct procedure, as recommended in the standard. **The standard in question is a test standard, i.e. other techniques are also possible, what is important is that all hand surfaces should be wetted with the disinfectant**



1: Palm to palm



2: Palm of right hand over back of left hand and palm of left hand over back of right hand



3: Palm to palm with fingers interlaced



4: Back of fingers to opposing palms with fingers interlocked



5: Rotational rubbing of right thumb clasped in left palm and vice versa



6: Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa

Other points to bear in mind:

- Apply hand disinfectant only to clean, dry hands!!
- Hand disinfectant must never be used on wet hands since this would result in dilution of the disinfectant (inadequate efficacy) and the skin would be more adversely affected (drying).
- Take approx. 3 ml or a handful of hand disinfectant
- Rub the disinfectant into the hands and wrists, paying special attention to thumbs, fingertips and interdigital spaces.
- Keep hands moist for at least 30 sec, if disinfectant dries too early, it may be necessary to add more.

If one has accidentally become contaminated e.g. with blood or other potentially infectious materials, proceed as follows:

- Remove coarse contaminants from the hands by wiping them with a towel impregnated with hand disinfectant (disposable cellulose towel)
- Dispose of towel
- Clean hands thoroughly with wash lotion under running water, while avoiding splashing
- Dry hands with disposable towel
- Perform hand disinfection (see above)
- Following contact with blood, prolong exposure time to at least 60 sec. (repeat procedure)

**2.2.5 Hand care**

Frequent hand washing and disinfection constitutes an inevitable strain on the skin, but repeated washing with soap is more harmful than equally frequent use of an alcohol-based disinfectant.

IMPORTANT!

A precondition for correct hand disinfection is healthy, smooth, undamaged skin.

Therefore regular care is indispensable to maintain healthy hands.

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