

## **SAFETY TIPS FOR THE PROFESSIONAL**

**Ever since hepatitis B and HIV brought concern to the medical profession, the use of gloves for self-protection has increased considerably. Nevertheless, press reports from the USA still show that there are problems with hygiene. "2 million nosocomial infections p.a. - 77,000 of these patients die." Do we still pay too little attention to this issue?**

### **The Dermatologists' Concept**

Gloves were first introduced into surgery over one hundred years ago - by William S. Halsted in 1896. Since then, they have made a vital contribution to general hygiene and have become state of the art in modern medicine, particularly when working under aseptic conditions (but not only for surgical interventions).

The original idea was to protect the hands from the adverse dermatological effects of antiseptic solutions. Ultimately, the mutual exchange of pathogens between the doctor and patient, and direct contact with blood, body fluids and excrements was to be prevented. However, with the regular (and often automatic) use of gloves in the health profession it was found that the benefit of the gloves also depends on background knowledge and handling.

### **Hazardous Workplace**

Certain microbes are found slightly more frequently in hospitals. Hospital pathogens are omnipresent and have therefore become a considerable hazard. In addition to the pyogenic organisms and organisms that cause wound infections, pneumonia or cerebral abscesses, these include the staph and strep populations, *E. coli* (infections of the urinary tract), enterococci, salmonella, *Pseudomonas aeruginosa*, tubercle bacillus, and fungi - especially *Candida albicans*.

On the other hand, we have the susceptible patients, whose immune response are often changed (treatment with broad-spectrum antibiotics) or weakened.

Staff carrying out their daily duties are also a potential transmitter of pathogens to the patients. This can happen by breathing, on their clothing, and especially through personal contact, for example when shaking hands.

There is a great number of pathogens on the hands. Most hospital infections are caused by bacteria, some of which are facultative pathogenic members of the normal physiological flora. The share of viral infections is estimated to be 1%. On average, the prevalence of hospital infections today is about 3-4% in acute care hospitals, and as high as 60% in chronic care institutions. About two thirds of the infections are accounted for by the surgical disciplines (Flamm et al., 1999).

The gynecologist Ignaz P. Semmelweis was one of the first to realize this in the middle of the 19th century. By disinfecting his hands with chloride of lime before examining pregnant patients, he made a major contribution towards the prevention of puerperal fever lying-in women, which was greatly feared in those days. This revolutionary discovery illustrated the true value of hygiene for the first time.

We should also remember that the people working in the medical professions are themselves at risk. In the 70's and 80's, thousands of doctors lost their jobs due to chronic hepatitis B and became patients themselves (AUVA). Despite the progress made in hygiene and the high status of medicine achieved as a result, problematic pathogens such as e.g. MRSA (methicillin-resistant *Staphylococcus aureus*) occur time and time again.

Blood bank experts often postulate that a shock from the discovery of a new unknown pathogen must be expected about every ten years.

## Fastidious Disinfection

The use of medical gloves cannot replace washing the hands thoroughly. It is absolutely necessary to disinfect the hands before and after each time gloves are used.

Because the infection chain can only be broken by cleaning the hands consistently and regularly, there are a number of indications for washing the hands that should be matter of course:

- before starting to work
- before each meal
- after using the toilet
- before any clean work (such as placing catheters, changing bandages, removing sutures, etc.)
- before every operation
- after every dirty work
- at the end of the work shift

For a maximum reduction of pathogens in the transient flora (contact flora), a combination of washing the hands with soap, sterile scrubbing of the nails with a nailbrush, water, and the use of hand disinfectants after drying the skin is necessary.

Table 1: "Classes of skin disinfection with reference infection risk"

Class I (low infection risk ) - Intra-, subcutaneous and intravenous injections, blood collection
Class II (moderate infection risk) - Intravenous indwelling cannula, intramuscular injections, blood cultures
Class III (high infection risk) - Surgery, tapping of body cavities (joints)

Depending on the type and scope of the intervention, we generally distinguish between hygienic and surgical disinfection. The classes of skin disinfection in Table 1 apply both to the doctor and to the patient.

Hygienic disinfection of the hands consists of washing the hands for 2 to 3 minutes with a suitable, contamination-free washing and drying technique, and disinfecting the hands once or twice, allowing the disinfectant 30 seconds to act each time.

The original teachings suggested disinfection first, followed by washing. However, if the hands are dirty and contaminated this method will usually be counterproductive, since pathogens enveloped in blood and dirt cannot be killed off very effectively. It is indicated before and after the use of gloves for routine hospital tasks and for classes I and II in Table 1.

The correct pre-operative preparation of the hands entails more than mere surgical disinfection of the hands. On entering the surgical unit, the hands are washed or disinfected hygienically; after changing into scrubs, the hands are washed surgically (up to the elbows) and dried (with a clean single-use towel), disinfected surgically (allowing the disinfectant 3-5 minutes to act), and finally sterile gloves are put on after the disinfectant has dried.

In the majority of countries alcohol is used mainly to disinfect the hands, since it acts fastest and most effectively. Preferably, a re-greasing disinfectant in gel form is used (Flamm et al., 1999), and it is rubbed in using a standard method. The important thing is that the hands are dry before they are disinfected, and that the skin is kept alcohol-moist while the disinfectant is allowed to act. By the way the more conscientious the senior staff follows the procedures, the better the measures will be accepted.

### **Tips for Subjects with Allergy and Atopic Subjects**

The protective measures described above to break the infection chain can also have disadvantages, especially for atopic subjects.

Regular washing and disinfection of the hands results in an inevitable stress for the skin. The protective fatty acid layer is dried out and destroyed, resulting in greater brittleness, small wound surfaces due to tears, and susceptibility for external influences - regardless of whether they are physical, chemical or microbial. Repeated washing with soap is more stressful than using alcoholic hand disinfectants in a suitable presentation form with the same frequency (Paulson et al.: *Am J Infect Control*, 1999)

Eczemas can often be avoided by consistent prevention measures. Even if the skin is already slightly irritated, the right care can stop the pathological process.

Preventive care starts with the washing process itself (not washing for too long, not using hot water, not scrubbing excessively, rinsing soap residues off and drying the skin properly, applying alcohol to dry skin and not wiping it off with a towel, using the right presentation forms of hand disinfectants), and continues through the use of protective gloves, the application of good hand creams (containing fat, acid pH) and protecting the hands from cold weather.

According to various studies, about 12% to 56% of medical staff that wears gloves regularly are affected by "intolerance or incompatibility reactions" (*Occup Med*, 1998). We generally distinguish between an allergic hand eczema (type IV reaction) and toxic-irritating contact dermatitis, which can subsequently develop into atopic hand eczema; the latter condition is dominant among the named problems (Bauerle et al., 1985). In addition, there are also type I hypersensitivity reactions, which are not considered eczematous reactions and show the symptoms of urticaria. They can be triggered by the proteins contained in natural latex.

All the eczematous skin reactions have a tendency towards becoming chronic in common, a process associated with inflammatory, redness, scaling and fissures in the skin, usually accompanied by very unpleasant burning and itching.

The preventive care described above, and possibly the use of powder-free gloves without natural latex or with a reduced protein content can help in these cases.

When latex gloves are used, the patient may also show an allergic reaction. Moreover, powdered gloves can cause inflammatory reactions (granulomatous peritonitis) and intraperitoneal adhesions in abdominal surgery (Woods et al.: *J Emerg Med*, 1997), and they can even promote tumor growth (van den Tal et al.: *Br J Surg*, 2001). However, according to a Danish study, powdered gloves were still being used by 22% of surgeons.

For the reasons stated it is recommended to use only powder-free gloves, natural latex gloves with a reduced protein content or gloves made of synthetic materials (vinyl, nitrile or neoprene), and to conduct more laparoscopies. Some gloves not only have a clearly reduced protein content, but also a synthetic inner coating. In the future, an increase in quality products with a combination of natural latex and synthetics can be expected in the field of medical gloves.

### **Intra-operative Glove Change**

According to studies, 24 to 37% of surgical gloves have perforations after use, and in abdominal surgery 70% of the perforations are not detected. Perforation usually happens at the end of the operation, usually on the index finger of the non-dominating hand (*World J Surg.*, 1999).

Apart from mechanical perforation by instruments, the occurrence of defects can also be explained by successive swelling of the latex (AUVA, Jager). In longer surgery, more and more perspiration collects between the surface of the skin and the glove. This results in both maceration of the skin and in swelling of the protective glove film.

Therefore, it is necessary to establish the right conditions to reduce or avoid perforations: Changing gloves during longer surgery (10% of all surgery takes longer than one hour -especially cardiac/thoracic surgery!), shorter duration of the surgery, use of 2 pairs of gloves at the same time, "no-touch" technique, no cutting needles, increased endoscopic work (Gesundheitswesen, 1999). Naturally we must not forget that the surgeon's experience is a factor of self-safety that cannot be underestimated.

### **The Care for Latex**

The question that we must then ask ourselves is why natural latex gloves are still in use at all, if there is a substantial allergy risk for some members of staff? The answer is not really surprising:

The natural latex glove is superior to the alternatives in a number of properties:

- Better elasticity
- Very good tactile sensitivity
- Proven in very high pathogenic exposition (no transmission of dangerous viruses)
- Small holes seal up again (handling sharp instruments)
- Good value for money.

Surgical gloves generally form a safe barrier between the doctor and the patient. Their benefit increases considerably if they are used intelligently. The skin on the hands, like the surgeon's tools, should be protected and cared for. The manufacturers can be commissioned to further improve the technology. Purchasers in the medical services should avoid powdered gloves and gloves with uncertain quality controls and doubtful origins.

Last but not least, adequate information in the sense of instructions for use should be provided in the hospitals, whether in the form of lectures or textbooks or brochures.