Hand hygiene has been a hot-button topic in the healthcare community for many years, with experts continually reminding us that hands are the main transmitters of healthcare-associated infections (followed by work clothing and other inanimate objects). This isn't surprising, as hands are constantly in contact with their surroundings—not only when caring for patients, but also when performing other necessary activities such as opening a door or touching a clipboard.

According to the Centers for Disease Control and Prevention (CDC), clean hands are the single most important factor in preventing the spread of pathogens and antibiotic resistance in healthcare settings. Moreover, the organization believes that more widespread use of hand hygiene products that improve adherence to recommended hand hygiene practices will promote patient safety and prevent infections. Fortunately, by following proper hand hygiene procedures, healthcare workers greatly reduce the risk of spreading infection among patients—and themselves.

Before taking a closer look at recommended hand hygiene procedures, it's important to note that hand hygiene begins with the personal hygiene of each individual. For example, several studies have documented that the area beneath the fingernails are colonized with high concentrations of bacteria. Even after careful washing or the use of soap-based surgical scrubs, these areas often harbor substantial numbers of potential pathogens. The CDC, World Health Organization (WHO) and Association for Professionals in Infection Control and Epidemiology (APIC) all have specific recommendations calling for clean, short nails.

In addition, while it has not been determined whether artificial nails contribute to the transmission of healthcare-associated infections, it has been shown that healthcare personnel who wear artificial nails are more likely to harbor gram-negative pathogens on their fingertips than those with natural nails, both before and after hand washing. As such, all three organizations recommend against wearing them.

Finally, several studies have also demonstrated that skin underneath rings is more heavily colonized than comparable areas of skin on fingers without rings. Moreover, the wearing of rings increases the frequency of hand contamination with potential healthcare-associated pathogens. Wearing a ring for routine care might be acceptable, but in high-risk settings such as in the operating room, all rings and other jewelry should be removed. A simple and practical solution is to suggest to healthcare workers that they wear their ring(s) on necklaces as pendants.
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The Three Elements of Hand Hygiene

It is important that healthcare personnel are aware of the permanent presence of possibly pathogenic organisms and the special situation in which they are working—a situation that strongly calls for a hand hygiene system that consists of hand washing and hand antiseptic and skin care.

Hand Washing

In healthcare, the point of washing the hands is mainly to remove visible soiling and only occasionally to reduce the microbial colonization of the skin. Hand washing is therefore indicated considerably less often than generally assumed. It makes sense to wash the hands before starting work, after finishing work and following visits to the bathroom. In all other clinical situations in which hand hygiene measures are required, hand disinfection should be preferred on grounds of efficacy and skin tolerability, as frequent and prolonged hand washing attacks the skin’s protective acid mantle and skin lipids are washed off the skin. This has been proven to lead to skin irritations and contact dermatitis in some instances.

- **Proper hand washing technique:**
  1. Hand washes should be performed with lukewarm water. The hotter the water, the greater the swelling and oil-stripping effect.
  2. Wet hands first with water, then apply the amount of product recommended by the manufacturer to hands.
  3. Liquid, bar, leaflet or powdered forms of plain soap are acceptable when washing hands with a non-antimicrobial soap and water. When bar soap is used, soap racks that facilitate drainage and small bars of soap should be used.
  4. Rub hands together vigorously, covering all surfaces of the hands and fingers. Total hand washing time should be at least 15 seconds, but should not exceed one minute.
  5. Rinse hands with water and dry thoroughly with a disposable towel. Use a towel to turn off the faucet.
  6. Multiple-use cloth towels of the hanging or roll type are not recommended for use in healthcare settings.

Hand Antisepsis

In principle, hand antisepsis refers to reducing the number of viable microorganisms on the hands. There are two methods of hand antisepsis: using an alcohol-based hand rub and hand washing with water and antimicrobial soap or other detergents. The best option is to use an alcohol-based rub-in product, which has the fastest and broadest antimicrobial efficacy. This opinion is shared by the CDC, WHO and Institute for Healthcare Improvement (IHI), who based their positions on the numerous studies detailing the benefits of alcohol-based hand antiseptics. Additionally, well-formulated alcohol-based hand antiseptics contain skin emollients, which support the protective function of the skin. Thus, compliance with hand hygiene guidelines can actually enhance skin health.

- **Proper alcohol-based hand antiseptic technique:**
  1. Apply product in a cupped hand.
  2. Apply product to clean, dry hands by activating the lever of a manual dispenser with the hand or preferably with the elbow (it is documented that the elbow hosts fewer organisms than the hands).
  3. Rub backward and forward with clasped fingers of right hand in left palm (and then) with clasped fingers of left hand in right palm. Thoroughly work hand rub under nails and into cuticles.
  4. Rub hands palm to palm, including wrists.
  5. Right palm over left back of hand with interlaced fingers and left palm over right back of hand with interlaced fingers.
  6. Palm to palm with fingers interlaced.
  7. Tops of fingers to opposing palms with fingers interlocked.
  8. Rotational rubbing of left thumb clasped in right palm and rotational rubbing of right thumb clasped in left palm.
Well-formulated alcohol-based hand antiseptics contain skin emollients, which support the protective function of the skin.

**Skin Care**

Healthcare providers perform hand washing and hand antisepsis frequently. The number of indications requiring a skin treatment can be as many as 60 per working day depending on the type of patient care area, the individual patient and the type of work being carried out. In normal cases, the skin’s defense mechanisms are adequate, that is, the skin is able to compensate for stresses.

To maintain a natural barrier, skin needs to be soft, hydrated and pliable. One measure to support this natural barrier and the skin’s regeneration process is the use of skincare creams or lotions that are hospital-approved for healthcare use. It is proven that the use of a hand cream or lotion can reduce skin dryness and roughness.

The most critical aspect of skin care is the prevention of activities that put a strain on the skin. Skin-stressing activities include prolonged hand washing, washing with hot water, scrubbing with a brush, prolonged wearing of gloves and contact with irritant substances. If skin-stressing habits are continued, the skin’s defenses might become exhausted with time. The skin could then react with redness, flaking and even the development of irritant contact dermatitis.

- **Proper skin care technique:**
  1. Spread product evenly between backs of both hands.
  2. Massage the lotion completely into the skin, right palm over left back of hand with interlaced fingers and left palm over right back of hand with interlaced fingers.
  3. Massage lotion completely into the cuticles and fingertips.
  4. Massage lotion completely into the wrists.

**Indications for Hand Hygiene**

In patient care, there are many situations in which hand hygiene is regarded as essential. This depends on the type of patient care setting, the individual patient and the type of work being carried out. It is important to understand the clinical situations requiring hand antisepsis. Healthcare workers should perform antisepsis procedures:

- **BEFORE** any direct contact with patients, including before donning exam and sterile gloves and before inserting indwelling urinary catheters or other invasive devices that do not require a surgical procedure;
- **DURING** patient care, such as moving to a clean body site during patient care after coming from a contaminated body site;
- **AFTER** any contact with the patient or the patient’s environment, including after contact with a patient’s intact skin, contact with body fluids or excretions, mucous membranes, non-intact skin and wound dressings if hands are not visibly soiled, contact with inanimate objects (including medical equipment) in the immediate vicinity of the patient and after removing gloves.

There are a few clinical situations that also require an additional hand wash. When there is visible heavy contamination, heavily soiled hands should be carefully rinsed, then washed with soap and water, being careful not to spread contaminants on clothing or surroundings. Hands should then be dried with a disposable towel and the contamination area disinfected. When wearing a gown, the gown should be changed and then the hands are disinfected. If contamination occurs due to a puncture or glove perforation, gloves should be removed, hands should be disinfected and new gloves should be applied.

Other than with these exceptions, the following applies: If an additional hand wash is desired, it should be performed after antisepsis. If hands are washed prior to using a hand antiseptic, microorganisms are distributed wherever the water splashes during the hand washing process and are transmitted to the environment or the clothing of the personnel.

A final note in relation to contamination with spore-forming bacteria. Alcohols, chlorhexidine, iodophors and other antiseptic agents have poor activity against bacterial spores. Therefore, disinfect hands first in order to reduce the vegetative cell of the spore-forming bacterium. Then hands should be washed. The physical action of washing and rinsing hands should reduce the remaining spores.

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