

# Hand hygiene and handwashing: key to preventing the transfer of pathogens

**Claire Ford**, Lecturer, Adult Nursing (claire.ford@northumbria.ac.uk), and **Laura J Park**, Graduate Tutor, Adult Nursing, of Northumbria University, describe how to maintain good skin health to reduce the risk of infection

One of the most common means of transmission that is found in healthcare environments is touch: directly by shaking someone's hand or indirectly by touching an object that has been previously touched by another. Consequently, hands can be populated with an enormous number of microorganisms, which can be inadvertently transferred from surface to surface or person to person.

Hands are colonised by two types of microorganisms: transient and resident. The first are found on the skin surface, can move around and are readily acquired from contact with other body sites, people and the environment. They are thus easily transferred to others. Resident microorganisms are the normal skin flora found in the deeper skin layers, hair follicles and sweat glands. They are more difficult to remove.

The World Health Organization (WHO) (2009a) highlights that within healthcare environments there are five key moments when the transfer of microorganisms can take place (Figure 1) and Loveday et al (2014) also advocate a further moment after removing personal protective equipment. Hand hygiene, which is seen as the single most important factor in reducing and preventing infection, should therefore be a key priority for every health practitioner (WHO, 2009a).

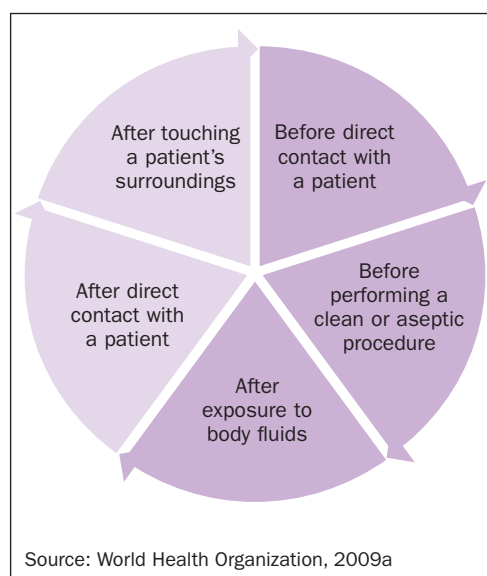
Various hand hygiene products can be used. Hands can be washed with liquid soap, antiseptic and antimicrobial solutions, or cleansed with antiseptic hand wipes or alcohol hand solutions (National Institute for Health and Care Excellence (NICE), 2017).

Washing with soap, which has been traditionally recognised as the best way to decontaminate hands, removes transient microorganisms and makes the hands socially clean.

Antiseptic solutions, such as chlorhexidine and iodine, have been shown to have a

residual effect, often continuing to work after they have been applied and reducing both transient and resident microorganisms. Therefore, they are routinely used before surgery, invasive procedures and during outbreaks of infections. More recently, alcohol hand gel has proven to be an effective product that can be used alongside, or in some cases as an alternative to, soap and water (Gould et al, 2010).

NICE (2017) and Loveday et al (2014) claim alcohol can be routinely used, because it kills both transient and resident microorganisms, is quicker to use, does not require washing facilities and can be provided at the point of care. However, although alcohol gel is an effective product for decontaminating hands, it is imperative that health workers fully understand when it is not appropriate to use, i.e. when the hands are visibly soiled, if the patient has *Clostridium difficile*, a gastrointestinal infection or if faecal to oral transmission is possible (Kozier et al, 2012).



**Figure 1. Situations during which the transfer of microorganisms takes place**

## Hand health

Skin, which is the largest and principal organ of the body, is a multifunctional membrane structure with a primary role in protecting the body surface from pathogens (Patton and Thibodeau, 2018). It is composed of three layers—the epidermis, dermis and hypodermis (subcutaneous)—which are subdivided further into layers (Figure 2) (WHO, 2009a).

The outermost layer is the epidermis, which is regularly replaced and renewed every 30–35 days, by the process of replication and detachment (Boore et al, 2016).

The most outward sublayer of the epidermis is the stratum corneum. It is this layer that is routinely exposed to environmental elements, such as physical, chemical and microbial assaults (Langøen and Bianchi, 2013). These can lead to irritation, dehydration and damage to the delicate structures of the stratum corneum, reducing the skin's ability to protect against infectious agents.

Therefore, it is necessary for health professionals to regularly inspect their fingers, nails, hands and forearms to ensure that the protective stratum is in good health, because open wounds and cuts on the skin can serve as a portal of entry for infectious agents. If hands are dry, hand cream should be applied regularly, and if skin irritation and excoriation is present, advice must be sought from occupation health or a general practitioner, as alternative hand-hygiene products, such as alcohol-based hand rubs containing humectants, may be required (WHO, 2009a; Weston, 2013; NICE, 2017).

## Handwashing preparation

Before hands are washed it is essential that additional precautions are undertaken to increase the efficiency and effectiveness of the handwashing procedure. The following information has been collated by

Northumbria University staff in response to questions asked by students during handwashing teaching sessions.

### Why is it important to have bare arms below the elbow?

Being bare below the elbow is necessary in order to ensure adequate washing of the wrists and forearms (if required). The sleeves of clothing, jewellery and watches also pose a risk because they act as temporary reservoirs for pathogens and increase the possibility of cross-contamination (NICE, 2017; Dougherty and Lister, 2015).

### What happens if I don't dry my hands properly?

Ensuring that the hands are dried thoroughly is vital, because microorganisms thrive in a warm moist environment. Inadequate drying may therefore cause damage to the stratum corneum (WHO, 2009a; Dougherty and Lister, 2015).

### Can I wear acrylic or false nails?

- First, longer nails increase the surface area for organisms to reside
  - Second, microorganisms can often become trapped between the two surfaces
  - Finally, they may hinder the washing technique due to their length
- (Loveday et al, 2014; Dougherty and Lister, 2015).

### Why do I need to remove nail varnish?

Due to wear and tear, sections of the varnish can flake and fall off, leaving ridges along the surface of the varnish that can harbour microorganisms. A top tip would be to carry some nail varnish remover in your bag or keep some in your work locker (WHO, 2009a; Dougherty and Lister, 2015).

### Why do rings need to be removed?

Rings, especially if they have inset stones, have an irregular surface area, and these ridges can act as a reservoir for potential pathogens (Dougherty and Lister, 2015; NICE, 2017). Due to the stones and irregular shapes, they are also difficult to clean. It is good practice to remove all jewellery while in clinical practice.

N.B. Some trusts allow plain wedding bands and some religious jewellery.

### How long does handwashing take?

Handwashing, using the appropriate technique, should take 40–60 seconds and

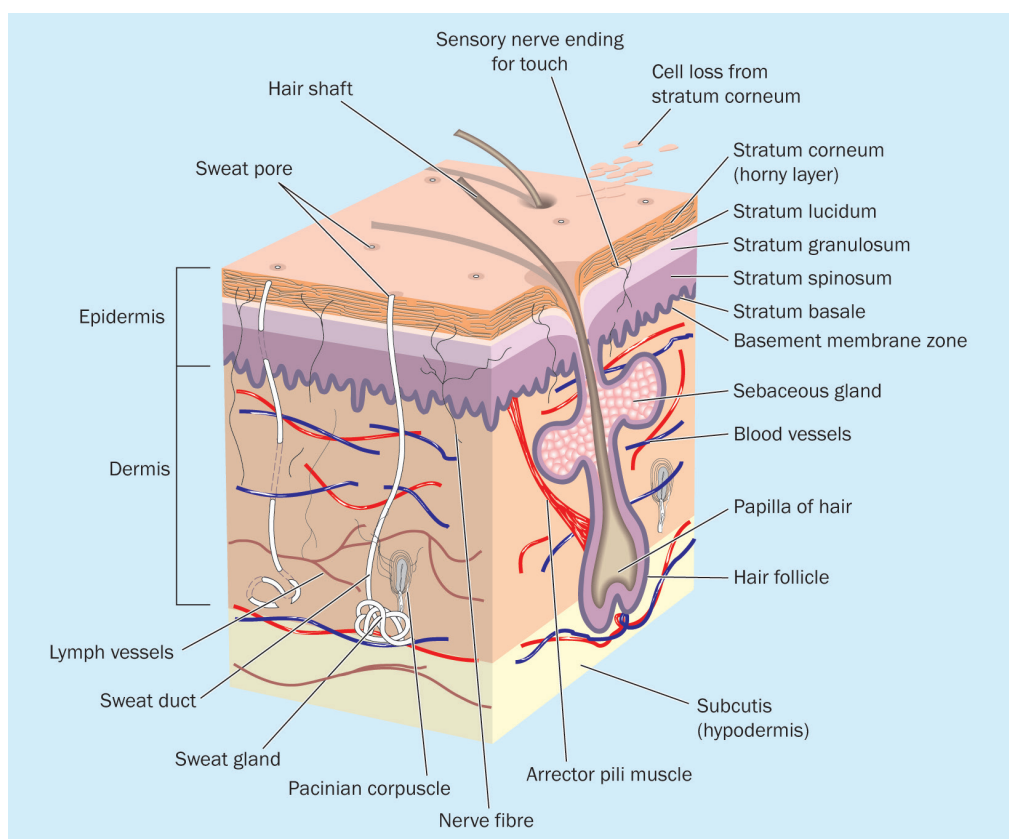


Figure 2. Cross-section of skin, showing the structure of the epidermis and dermis

application of hand rub should take 20–30 seconds (WHO, 2009b).

### How to decontaminate hands using liquid soap

Hand decontamination is the easiest and most effective way of preventing the spread of infection. This has resulted in the clinical skill of handwashing becoming a popular scholarly topic and recognised as a significant fundamental principle of infection control (NICE, 2017).

Figure 3 (overleaf) provides a step-by-step guide to the handwashing technique using liquid soap, which should be performed by all health professionals in all clinical areas. **BJN**

- Boore J, Cook N, Shepherd A. Essentials of anatomy and physiology for nursing practice. London: Sage; 2016
- Dougherty L, Lister S, eds. The Royal Marsden manual of clinical nursing procedures. 9th edn. Chichester: Wiley; 2015
- Gould DJ, Moralejo D, Drey N, Chudleigh JH. Interventions to improve hand hygiene compliance in patient care. Cochrane Database Syst Rev. 2010; 9:CD005186. <https://doi.org/10.1002/14651858.CD005186.pub3>
- Kozier B, Erb G, Berman A, Snyder S, Harvey S, Morgan-Samuel H. Fundamentals of nursing: concepts, process and practice. 2nd edn. Harlow: Pearson Education; 2012
- Langøen A, Bianchi J. Maintaining skin integrity. In Flanagan M, ed. Wound healing and skin integrity: principles and practice. Chichester: Wiley, 2013

- Loveday HP, Wilson JA, Pratt RJ et al. epic3: national evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. *J Hosp Infect* 2014; 86(Suppl 1):S1-S70. [https://doi.org/10.1016/S0195-6701\(13\)60012-2](https://doi.org/10.1016/S0195-6701(13)60012-2)
- National Institute for Health and Care Excellence. Healthcare-associated infections: prevention and control in primary and community care—1.1: standard principles. Clinical guideline CG139. 2017 (updated version of guideline published in 2012). <https://tinyurl.com/gmpl8k2> (accessed 17 October 2018)
- Patton KT, Thibodeau GA. The human body in health and disease. 7th edn. St Louis MI: Elsevier; 2018
- Weston D. Fundamentals of infection prevention and control: theory and practice. 2nd edn. Chichester: Wiley; 2013
- World Health Organization. WHO guidelines on hand hygiene in health care. Geneva: WHO. 2009a. <https://tinyurl.com/bqad6ev> (accessed 17 October 2018)
- World Health Organization. Hand hygiene: why, how & when? 2009b. <https://tinyurl.com/yawwjp6> (accessed 17 October 2018)

### LEARNING OUTCOMES

- Understand the structure of skin and its role in protecting the body against harmful microorganisms
- Increased awareness of environments in which harmful pathogens can flourish and in which the transfer of these microorganisms can occur
- Understand the importance of maintaining good hand health and hygiene
- Ensure use of appropriate handwashing technique to minimise risk of infection



## Step-by-step guide to handwashing using liquid soap



1. Ensure that you are bare below the elbow

2. Turn on the taps and adjust the water temperature, so the water is tepid
3. Wet your hands thoroughly with water before applying the liquid soap



4. Rub your hands palm to palm (left) then place your right hand over the left with fingers interlaced, then reverse the procedure for the other hand (right)



5. Rub your hands palm to palm with fingers interlaced



6. Rub the back of your fingers with the opposing palm



7. Rub each thumb with the opposite hand



8. With clasped fingers, rub your palm in a circular motion



9. Finally, rub your wrists

10. Rinse your hands thoroughly without touching the sink, and turn off the tap with your elbows

11. Dry your hands carefully and thoroughly from fingertips to wrist

**Figure 3. How to decontaminate hands using liquid soap**

Copyright of British Journal of Nursing is the property of Mark Allen Publishing Ltd and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.