

How should hands be washed?

Most people are aware that hands should be washed thoroughly before and after preparing food, after going to the toilet, and after performing tasks where they have become soiled. However, good hand hygiene is more than just a matter of washing at the appropriate times – the actual way in which you wash your hands is just as important.

Studies comparing plain soap with antibacterial soap have given conflicting results in terms of which type eliminates contaminating microbes from the skin more effectively. A key point seems to be how long you actually spend spreading the soap over your hands – the special chemicals in antibacterial soaps take time to kill the microbes. Thus, if you rinse your hands almost immediately after applying the soap, you will not get the full benefit of the product. Many people spend less than 10 seconds for the whole process of washing and rinsing their hands. This is not enough. Hands should be washed for at least 20-30 seconds. Where there has been a significant amount of soil, this time period needs to be extended.

The next time you wash your hands, slowly count out: 1, 2, 4, 5, 6.....20. Twenty seconds might be a lot longer than you think!

To view the handwashing technique recommend by the World Health Organisation's '[Clean Care is Safer Care](#)' campaign, click [here](#). Whilst this is aimed at healthcare professionals, you can use the sequence of hand movements yourself, to ensure the soap is well distributed over the skin surface, including between the fingers and over the back of the hand and fingers.

Rinse both hands thoroughly under running water – if possible, keep your hands upright at this stage, so that any contamination and soap residue is readily washed away with the stream of water. Finally, dry your hands thoroughly using paper towels, a cloth towel or a hot air dryer. As explained in the next section, the importance of this final step should not be overlooked.

Hand Drying – a key part of good hand hygiene

Human skin is a relatively dry environment, and this helps to limit the types and numbers of bacteria that can survive on it. Members of the normal skin microflora are

specially adapted to live in this environment, but other bacteria struggle to cope, and die within a matter of minutes to hours of contaminating the skin. If the bacteria are suspended in some sort of fluid (e.g. blood, saliva, milk) at the time they come into contact with the skin, it can affect the rate at which drying-out occurs. This in turn can greatly extend the time bacteria survive on the skin, plus make it harder to remove the contamination by handwashing.

People are usually surprised to learn that after washing their hands with soap and water there can be **higher** numbers of bacteria on the surface of their palms and fingers, than before they washed. This effect is due in part to the act of rubbing the hands together during the washing or subsequent drying steps, since bacteria living within skin pores or under the fingernails can be forced to the skin surface. Another factor that contributes to this phenomenon is the detergent action of soap. Many of the bacteria that live on our skin exist as clumps of cells, the soap can break these clumps up into smaller ones, thereby increasing the overall numbers of clumps and helping to disperse them. Approximately 10,000,000 particles are shed from the skin of a healthy person each day, most of these are dead skin cells. Many of the dead skin cells that we lose will still have living bacteria attached to them. It has been shown that washing with plain soap may actually increase the shedding of particles carrying bacteria from the hands by a factor of up to 17-fold (Meers and Yeo 1978).

Bacteria and other types of microbe on the surface of our hands can be transferred to other surfaces that we touch. Such transmission is more likely to occur from wet than dry skin (Gould 1994; Merry *et al.*, 2001). Bacteria caught within droplets of moisture may be afforded a degree of protection from dying on a dry surface, and the longer they can survive there, the greater the chance of them being picked up by someone else.

By drying the hands thoroughly, the numbers of bacteria transferring to skin, food or objects can be reduced by the order of 99% (Patrick *et al.*, 1997). If hands repeatedly remain damp because of ineffective hand drying, it can also lead to a deterioration in the skin's condition and integrity, which in turn can lead to altered and higher numbers of bacteria colonising it. This has been found to be a particular problem amongst some nurses, where their routine work requires many cycles of hand washing per hour. Worryingly, the pathogen *Staph aureus* can become established as part of their normal skin microflora (Larson *et al.*, 1998). Hand drying to decrease microbial counts at the skin surface is now recognised as an essential part of hand hygiene techniques aimed at reducing the spread of pathogens such as methicillin resistant *S. aureus* (MRSA) in hospitals.

There are four main methods that people can use to dry their hands: cloth towels, paper towels, warm air driers, or to let the skin dry by evaporation. Since the wetness of hands greatly influences bacterial transfer, and hence spread to and from the next surfaces / objects that you will touch, these methods should be applied with care. The sight of people in washrooms walking away with still damp hands after only being prepared to use the warm air driers for a few seconds is all too familiar.....

So which method works best? As with hand cleansing products, the results depend on how you actually use it, and for how long. Some studies have shown that warm air hand driers are not as efficient as paper towels at drying hands - since they take

much longer to achieve the same effect (Blackmore 1989, Redway *et al.* 1994, Patrick *et al.* 1997, Taylor *et al.* 2000). When tests have involved hands being under warm air driers for short periods, these units have performed poorly compared to use of paper towels. However, when the air driers are used for much longer periods (in excess of 45 seconds) to dry the hands, they can be just as effective as paper towels at reducing transfer of bacteria to the next surfaces touched (Matthews & Newsom 1987).

Considering skin dryness and bacterial transfer from the hands, Patrick *et al.* (1997) found that it took about 45 seconds for an air drier to achieve the same results as those achieved after just 20 seconds with a cloth. Given that many people do not take the time to use the devices for this long, they are not gaining the hygiene benefit of leaving the washroom with completely dry hands, that they could be.

Whether using a warm air drier, or some type of towel, attention should be paid to ensuring the skin between the fingers is dried. This is often a site that people fail to wash properly with soap too. Long or artificial nails are also a problem area – moisture left here can help to support the growth of microbes that would not normally live on the skin, so extra attention should be paid to drying these areas. In a study investigating microbes on the underside of the fingernails of healthcare workers, potential pathogens were isolated from 92% of samples from artificial nails, compared to 62% of real ones (Hedderwick *et al.*, 2000). Many hospitals are now trying to stop staff from having long or artificial nails, because of fears that they could be contributing to the spread of health care associated infections.

Overall, there are significant benefits to be had in terms of reducing the spread of infections by the application of good hand hygiene. The latter is not just about remembering to wash after certain activities, but requires people to commit *time* to the process. A thorough wash should be followed by a thorough drying step. This will also have benefits for the actual condition of your skin. The next time you dash away from the sink with hands still damp, spare a thought for what you might be passing on to or picking up from the next surface you touch. It maybe that you can then find those few extra seconds after all.....

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References and recommended reading relating to hand drying

Blackmore MA. A comparison of hand drying methods. *Catering and Health*. 1989; 1; 189-198

Gould D. The significance of hand-drying in the prevention of infection. *Nursing Times*. 1994; 47; 33-35

Hedderwick,S.A., McNeil,S.A., Lyons,M.J. and Kauffman,C.A. Pathogenic organisms associated with artificial fingernails worn by healthcare workers. *Infect Control Hosp. Epidemiol.* 2000; **21**, 505-509.

Larson EL, Hughes CA, Pyrek JD, Sparks SM, Cagatay EU, Bartkus JM: Changes in bacterial flora associated with skin damage on hands of health care personnel. *Am.J.Infect.Control* 1998, 26:513-521.

Matthews JA, Newsom SW. Hot air electric hand driers compared with paper towels for potential spread of airborne bacteria. *J Hosp Infect.* 1987 Jan;9(1):85-8

Meers PD, Leong KY. Hot-air hand driers. *Journal of Hospital Infection.* 1989; 14; 169-181

Meers, PD, and Yeo, GA. Shedding of bacteria and skin squames after handwashing. *J.Hyg.(Lond)* 1978; 81 (1):99-105.

[Merry AF, Miller TE, Findon G, Webster CS, Neff SP. Touch contamination levels during anaesthetic procedures and their relationship to hand hygiene procedures: a clinical audit. *Br J Anaesth.* 2001 Aug;87\(2\):291-4.](#)

Patrick DR, Findon G, Miller TE. Residual moisture determines the level of touch-contact-associated bacterial transfer following hand washing. *Epidemiology and Infection.* 1997; 119; 319-325

Redway K, *et al.* Hand Drying: a study of bacterial types associated with different hand drying methods and with hot air dryers. University of Westminster, Report for *The Association of Makers of Soft Tissue papers.* March 1994.

Snelling, A.M., Saville, T., Stevens, D.G., Beggs C.B. Evaluation of a new ultra-rapid hand drier in relation to hand hygiene. *Clinical Microbiology and Infection* 2007, 13 (Suppl 1) p. S486

Taylor JH, *et al.* A microbial evaluation of warm air hand driers with respect to hand hygiene and the washroom environment. *Journal of Applied Microbiology.* 2000; 89; 910-919