ARE WE TREATING OR TRANSMITTING INFECTION??

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Introduction

The term 'hand hygiene' not only refers to the process of keeping the hands clean; it includes the attitudes that arise from a deep understanding of the importance of preventing the transmission of bacteria. On a practical level, hand hygiene is aimed at reducing the bacterial contamination of the hands and, by extension, that of the objects into which they come in contact. This includes hand washing with soap or cleanser and the use of antimicrobials.

Handwashing is emphasized as the single most important measure to prevent cross transmission of micro-organisms and thus to prevent nosocomial infections.[1] However, under routine hospital practice compliance with this measure is still unacceptably low, less than 50% in most studies published in the past 20 years. This constant finding is worrying because recent studies have shown that this level of compliance will not reduce the risk of transmission of multiresistant bacteria in hospital.

Success of prevention & control of infection in health care areas is largely dependent on: -

- Aseptic technique of all personnel who perform invasive procedures
- Sterility of all items directly concerned in such procedures
- Disinfection of all surfaces & items in immediate vicinity
- Subsequent correct disposal of all contaminated disposables and other bio-waste

Definition of terms[1]

Hand antisepsis: Refers to either antiseptic handwash or antiseptic hand rub.

Hand hygiene: A general term that applies to either hand washing, antiseptic handwash, antiseptic hand rub, or surgical hand antisepsis.

Hand disinfection is extensively used as a term in some parts of the world and can refer to antiseptic handwash, antiseptic handrubbing, hand antisepsis/ decontamination/ degerming, handwashing with an antimicrobial soap and water, hygienic hand antisepsis, or hygienic handrub. Since disinfection refers normally to the decontamination of inanimate surfaces and objects, this term is not used in these Guidelines.

Hygienic hand antisepsis: Treatment of hands with either an antiseptic handrub or antiseptic handwash to reduce the transient microbial flora without necessarily affecting the resident skin flora.

Historical background

In the mid-1800s, studies by Ignaz Semmelweis in Vienna, Austria, and Oliver Wendell Holmes in Boston, USA, established that hospital-acquired diseases were transmitted via the hands of Health Care Workers. In 1847, Semmelweiss was appointed as a house officer in one of the two obstetric clinics at the University of Vienna Allgemeine Krankenhaus (General Hospital). He observed that maternal mortality rates, mostly attributable to puerperal fever, were substantially higher in one clinic compared with the other (16% versus 7%). He also noted that doctors and medical students often went directly to the delivery suite after performing autopsies and had a disagreeable odour on their hands despite handwashing with soap and water before entering the clinic[2].

The 1980s represented a landmark in the evolution of concepts of hand hygiene in health care. The first national hand hygiene guidelines were published in the 1980s, followed by several others in more recent years in different countries. In 1995 and 1996, the CDC/Healthcare Infection Control Practices Advisory Committee (HICPAC) in the USA recommended that either antimicrobial soap or a waterless antiseptic agent be used for cleansing hands upon leaving the rooms of patients with multidrug-resistant pathogens. More recently, the HICPAC guidelines issued in 2002, defined alcohol-based handrubbing, where available, as the standard of care for hand hygiene practices in health-care settings, whereas handwashing is reserved for particular situations only.[2]

Clinical implications

CDC estimates that each year nearly 2 million patients in the United States acquire infections in hospitals, and about 90,000 of these patients die as a result. Many studies have shown that the bacteria that cause hospital-acquired infections are most frequently spread from one patient to another on the hands of healthcare workers [3]

The Centers for Disease Control and Prevention (CDC) and other healthcare-related organizations believe that cleaning your hands before and after having contact with patients is one of the most important measures for preventing the spread of bacteria in healthcare settings [3]

- Most common mode of pathogen transmission
- Prevent nosocomial infections
- Reduce spread of antimicrobial resistance
- Acquisition of multi-resistant bacteria
- Prevent health care-associated infections

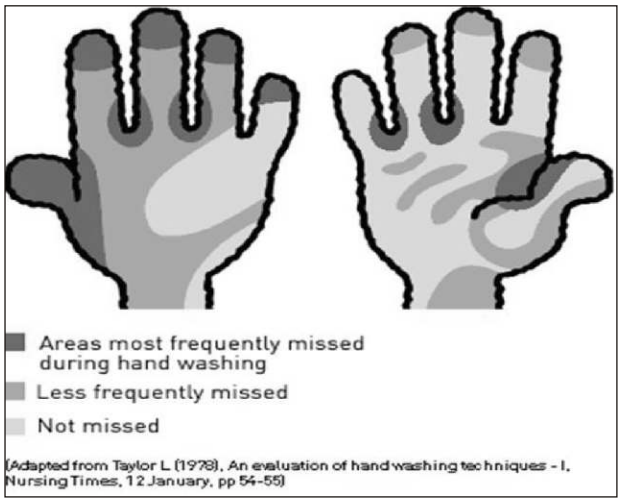
Floras of hand

In 1938, bacteria recovered from the hands were divided into two categories-

Resident flora and Transient flora[4]

Transient flora, which colonize the superficial layers of the skin, are more amenable to removal by routine handwashing. They are often acquired by health Care Workers during direct contact with patients or contact with contaminated environmental surfaces within close proximity of the patient. Transient flora are the organisms most frequently associated with health-careassociated infections.

Transient flora presents the greater danger to patients. They are generally acquired through contact with a contaminated area either on the individual, other people or animals, or the environment. They are relatively easy to remove from the skin through hand washing.[4]



(Adapted from Taylor L (1978), An evaluation of hand washing techniques - I, Nursing Times, 12 January, pp 54-55)

Resident Flora: Resident flora, which are attached to deeper layers of the skin, are more resistant to removal. In addition, resident flora (e.g., coagulase-negative staphylococci and diphtheroids) are less likely to be associated with such infections. The hands of HCWs may become persistently colonized with pathogenic flora (e.g., S. aureus), gram negative bacilli, or yeast .Resident flora are the body's first line of defense. [5]

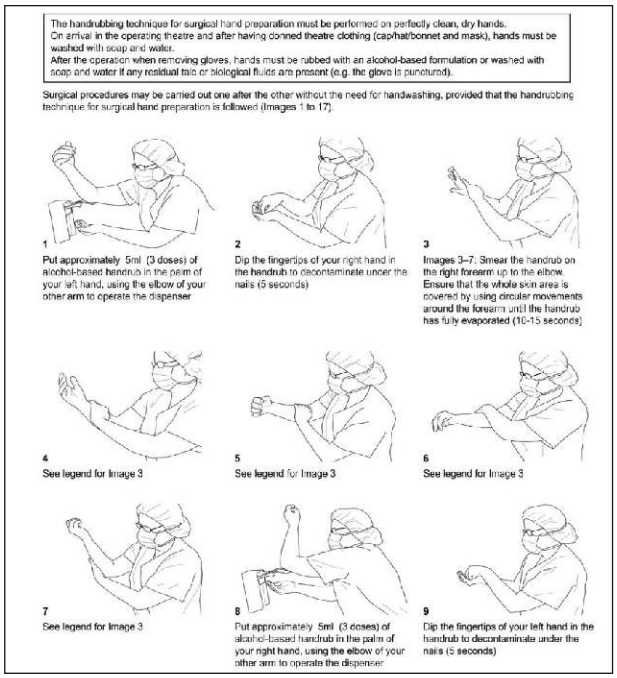
Ways of hand hygiene

Hand hygiene can be achieved in three ways: through a plain hand wash, an antiseptic hand wash or a surgical scrub; each achieves a different level of freedom from bacteria.

Plain hand washing is a process that uses water and soap to remove debris from the surface of the skin along with some of the naturally produced oil that keeps the skin supple and which also traps microorganisms. The soap effectively breaks up this layer of oil which is then removed, along with debris and bacteria, by the rinse, but does not, in itself, aim to kill bacteria. Optimum duration 30sec to 1 min.[6]

An antiseptic hand wash uses antiseptic solution and water. This method will actively kill both resident and transient microorganisms and, if the antiseptic is residual, will tend to slow the rate at which bacteria re-colonizes the skin.

The surgical scrub procedure is used when a very high level of antisepsis is required, such as for surgical procedures. It takes much longer than the other types of hand wash and involves a more thorough process in order to remove all possible microorganisms from the skin. 30 seconds is the recommended time sufficient for hand scrubbing with alcohol based solutions.[7]

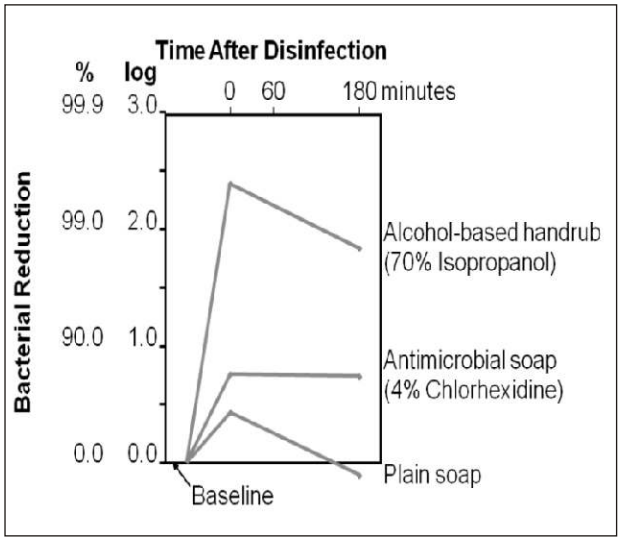


The antiseptic solutions most commonly used for hand hygiene are chlorhexidine, triclosan and iodophors. The characteristics of the three most commonly used antiseptic solutions are summarized below-

Chlorhexidine	Iodophors	Triclosan
Intermediate range of microbial activity	Wide range of microbial activity	Intermediate range of microbial activity
Persistent chemical activity (up to 6 hours)	Persistent chemical activity	Persistent chemical activity
Minimally affected by organic matter	Neutralized in presence of organic material	Minimally affected by organic matter
Less irritating than iodophors	Most frequently used for surgical scrubbing	Commonly used in commercial hygiene products

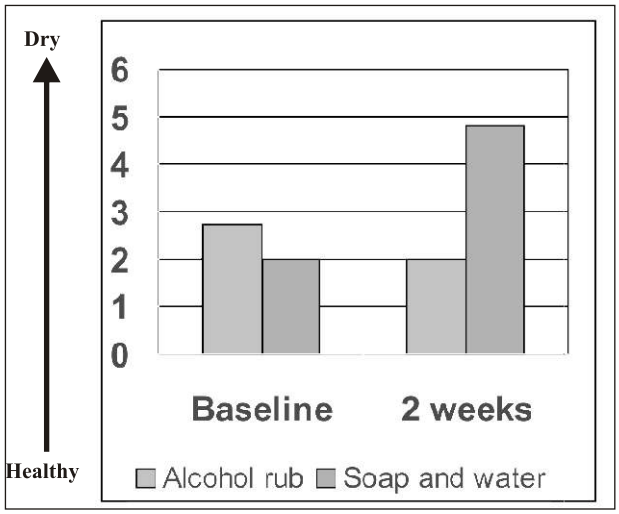
Alcoholic hand rubs are an alternative to hygienic hand washing provided the hands are not dirty.It is available in liquid or gel form. The composition of an alcoholic hand rub is alcohol (typically 60-95% ethanol or isopropanol), an antiseptic agent such as chlorhexidine, an emollient. Various advantages associated with these are, that it not only requires less time for the application and is more accessible than sinks but it also acts against both Gram + ve and ve bacteria , yeast, fungi, multiresistant pathogens and viruses like HIV, HSV and Hepatitis B and C.

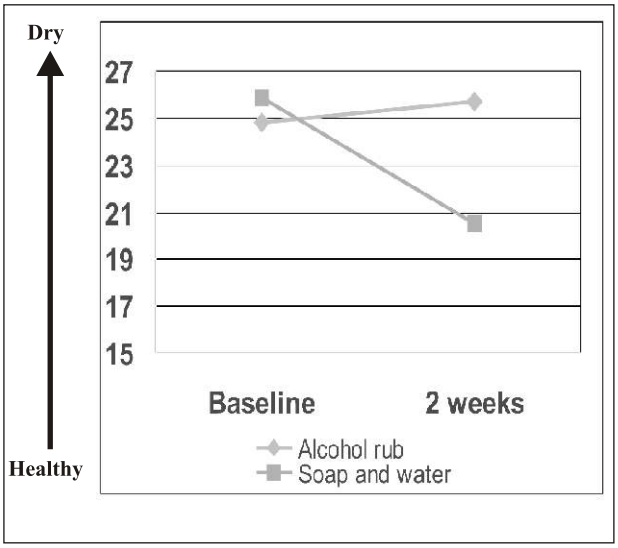
Most alcohol-based hand antiseptics contain either ethanol, isopropanol or n-propanol, or a combination of two of these products. Concentrations are given as either percentage of volume (= ml/100 ml, abbreviated % v/v), percentage of weight (= g/100 g, abbreviated % m/m), or percentage of weight/volume (= g/100 ml, abbreviated % m/v). Studies of alcohols have evaluated either individual alcohols in varying concentrations (most studies), combinations of two alcohols, or alcohol solutions containing small amounts of hexachlorophene, quaternary ammonium compounds (QAC), povidone-iodine, triclosan or CHG. The antimicrobial activity of alcohols results from their ability to denature proteins. Alcohol solutions containing 6080% alcohol are most effective, with higher concentrations being less potent. This paradox results from the fact that proteins are not denatured easily in the absence of water. [7]



[8](Adapted from: Hosp Epidemiol Infect Control, 2nd Edition, 1999)

Boyce J. in 2000 conducted a research which proved that alcohol based rub is less damaging to the skin and more preferred by health care workers [10]



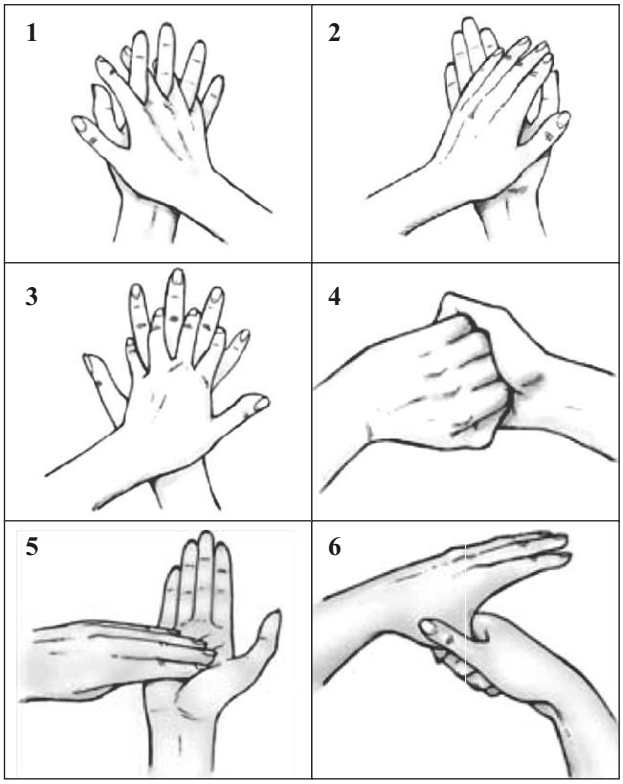


Hand rubbing with an alcohol based, waterless hand antiseptic seems to be the best method of increasing compliance with hand hygiene. A study conducted by BMJ showed that handrubbing with an alcohol based solution is more effective than handwashing with an antiseptic soap in reducing bacterial contamination of healthcare workers' hands during routine patient care. This was due in part to the inadequate time spent washing hands conventionally. [9]

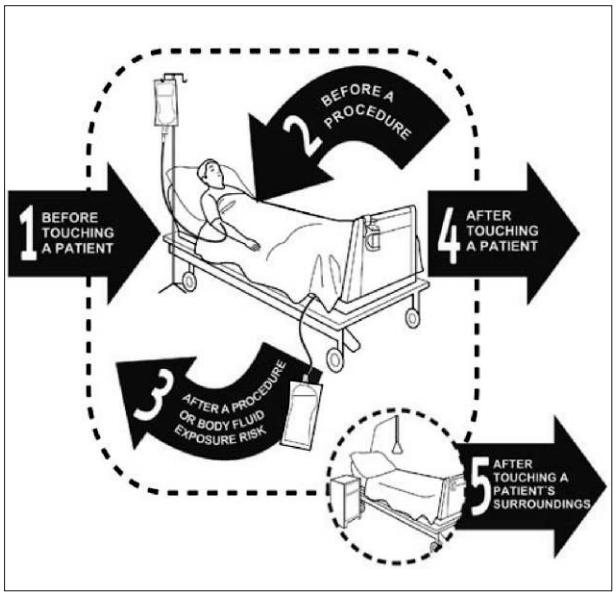
How to perform a hygienic hand wash [11]-

1. Palm to palm
2. Right palm over left dorsum and left palm over right dorsum
3. Palm to palm fingers interlaced
4. Backs of fingers to opposing palms with fingers interlocked

5. Rotational rubbing of right thumb & hand in left palm and vice versa
6. Rotational rubbing, backwards forwards with clasped fingers of right clasped in left palm and vice versa



The patient zone, health-care area, and critical sites with inserted time-space representation of "My five moments for hand hygiene" [12]



Conclusion

Despite the fact that it is readily acknowledged that hand washing is the single most important means of preventing hospital acquired infections, there are major problems regarding compliance and many human hospital care workers fail to perform hand hygiene at appropriate times. The reasons for this have been the subject of much research and many reasons for poor compliance have been identified. These include:

- Being too busy and not thinking about it
- Skin irritation
- Washing facilities not being readily available
- Wearing gloves
- Lack of guidance/protocols
- Absence of an appropriate role-model from colleagues/superiors
- Skepticism about the effectiveness of hand hygiene

Good hand hygiene is fundamental to effective prevention of cross-infection and should be adopted by all those working in clinical practice. It is easy to perform and good compliance will result in a reduction in hospital acquired infections.

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