

Hand Hygiene

Introduction

Hand hygiene is one of the most important procedures for preventing the transmission of hospital-acquired infections.³⁷ Hand hygiene is a general term that encompasses handwashing, antiseptic hand wash, antiseptic handrub or surgical hand antisepsis. The importance of hand hygiene in preventing transmission of Hospital-acquired infections has been demonstrated in numerous studies. The challenge, however, is to improve adherence with appropriate hand hygiene on the part of health care personnel (HCP). Studies have shown that an average of only 40% of HCP adhere to handwashing policies in their institutions.

Risk factors for poor adherence to recommended hand hygiene include:

- Physician status (versus nurse)
- Nursing assistant status
- Males show less commitment than females
- Working in an Intensive Care Unit
- Wearing gowns/gloves
- Activities with high risk of cross-transmission
- High number of opportunities for hand hygiene per hour of patient care

Self-reported factors for poor adherence with hand hygiene include:

- Handwashing agents cause skin irritation or dryness
- Inconvenient or no sinks
- Lack of soap or paper towels
- Too busy/insufficient time
- Understaffing/overcrowding
- Perception of low risk of acquiring infection from patients
- Beliefs that glove use obviates the need for hand hygiene
- No role model from colleagues or superiors
- Skepticism about the value of hand hygiene
- Lack of appreciation for its importance or lack of knowledge of guidelines/protocols

Improving adherence with hand hygiene requires considerable effort to ensure HCP have access to appropriate equipment and supplies and have sufficient knowledge about the importance of handwashing.³⁸ This chapter will focus primarily on handwashing and on antiseptic hand wash/handrub. Refer to the chapter on “Operating Theater” in Part II of these guidelines: Infection Control in Specialty Settings for additional information on surgical hand antisepsis.

Microbial Flora of the Skin

The microbial flora of the skin can be divided into two categories:

- Resident microorganisms (colonizing or endogenous flora) include *Staphylococcus* species and diptheroids. These microorganisms are considered permanent residents of the skin and are not readily removed by mechanical friction. Resident microorganisms in the deep layers may not be removed by handwashing with plain soaps and detergents, but they can usually be killed or inhibited by hand hygiene with products that contain antimicrobial ingredients.
- Transient microorganisms (non-colonizing or exogenous flora) include microorganisms that come into contact with skin through interactions with patients, with equipment, or with the environment. Non-colonizing flora are not consistently present in the majority of persons and survive only a limited period of time. These organisms are most frequently associated with Hospital-acquired infections and are often acquired through activities that involve close contact with a patient’s secretions or excreta. Non-colonizing flora are easily removed by routine handwashing.³⁸

Table 6: Types of Hand Hygiene

Technique	Main purpose	Influence on hand flora	Agents	Speed of antimicrobial action	Residual effect
Routine Hand wash	Cleansing after patient contact & contamination	Partly removes transient flora	Plain non-antimicrobial soap	Slow	Short
Antiseptic Hand wash or alcohol-based handrub	Hand antiseptics prior to invasive procedures, or to remove pathogens (e.g., antimicrobial resistant strains)	Kills transient and reduces resident flora	-Chlorhexidine; Hexachlorophene, Iodine; Iodophors; Para-chloro-meta-xyleneol -Alcohol-based waterless antiseptic;	Varies by type of agent. Fastest for alcohol.	Can be sustained for agents such as Chlorhexidine; less so for alcohol and iodophors
Surgical Hand Antiseptics	Preoperative antiseptics	Kills transient flora and reduces resident flora	-Chlorhexidine; Hexachlorophene, Iodine; Iodophors; Para-chloro-meta-xyleneol (PCMX) -Alcohol-based waterless antiseptic (after washing hands by soap and water, see chapter on Operating theatre)	Varies by type of agent. Fastest for alcohol	Can be sustained for agents such as Chlorhexidine; less so for alcohol and iodophors

Routine Hand Wash

Routine handwashing is the removal of dirt, organic material, and transient microorganisms.³⁸ For most routine activities washing with plain soap is sufficient, since soap will remove most transient microorganisms.⁴⁰ Routine handwashing is an essential step before surgical scrub and it is preferably done before aseptic handwash or alcohol rub if the hands are visibly contaminated.

Indications

The purpose of handwashing for routine patient care is to remove microbial contamination acquired by recent contact with infected or colonized patients or with environmental sources and to remove contamination with organic matter from the hands.

In the absence of a true emergency, personnel should always wash their hands:

- AFTER completing invasive procedures.
- AFTER taking care of particularly susceptible patients, such as those who are severely immunocompromised and newborns.
- AFTER dealing with wounds, whether surgical, traumatic, or associated with an invasive device.
- AFTER situations during which microbial contamination of hands is likely to occur, especially those involving contact with mucous membranes, blood or body fluids, secretions, or excretions.
- AFTER touching inanimate sources that are likely to be contaminated with virulent or epidemiologically important microorganisms; these sources include urine-measuring devices or secretions collection apparatuses.
- BEFORE and AFTER contact with patients.
- AFTER using the toilet or latrine.
- AFTER removing gloves.
- BEFORE serving meals or drinks.
- BEFORE leaving work.

Fig. 13: Steps for Routine Hand Wash

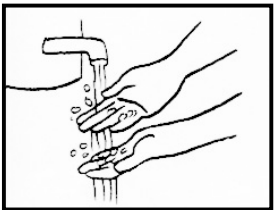
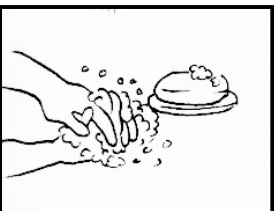
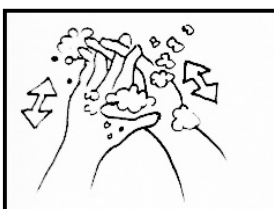
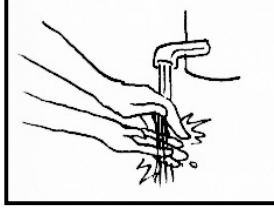
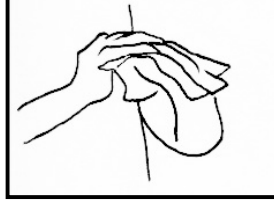
<ol style="list-style-type: none">1. Remove all jewelry.2. Turn on tap with elbow or hands.3. Wet hands with running water that is as warm as tolerable.	
<ol style="list-style-type: none">4. Apply soap agent and thoroughly distribute over hands. Make sure to rub all parts of your hand.	
<ol style="list-style-type: none">5. Rub fingers together back and forth for 15-30 seconds (longer if hands are visibly soiled). Wash area around the nails and remove debris under the fingernails because the subungual area has higher microbial counts. Rub all parts of the hands paying attention to the frequently missed areas.	
<ol style="list-style-type: none">6. Rinse hands under a stream of running water until all soap is gone. Never dip hands into a basin or standing pool of water.	
<ol style="list-style-type: none">7. Dry hands with a clean single use towel	
<ol style="list-style-type: none">8. If possible, turn tap with elbows, or with a paper towel after drying of the hands.^{38, 42}	

Fig. 14: Handwashing Technique

Repeat each movement 5 times

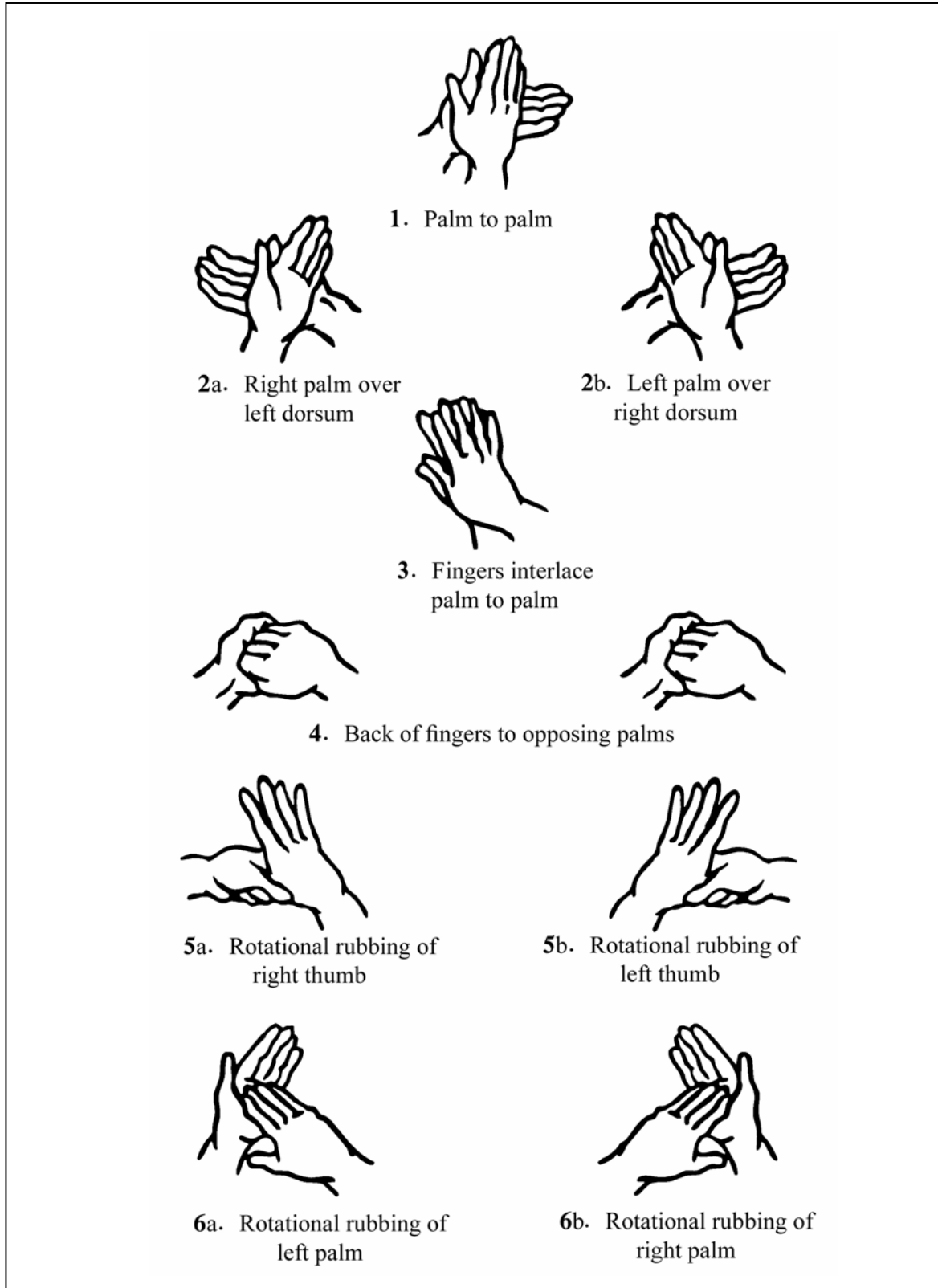
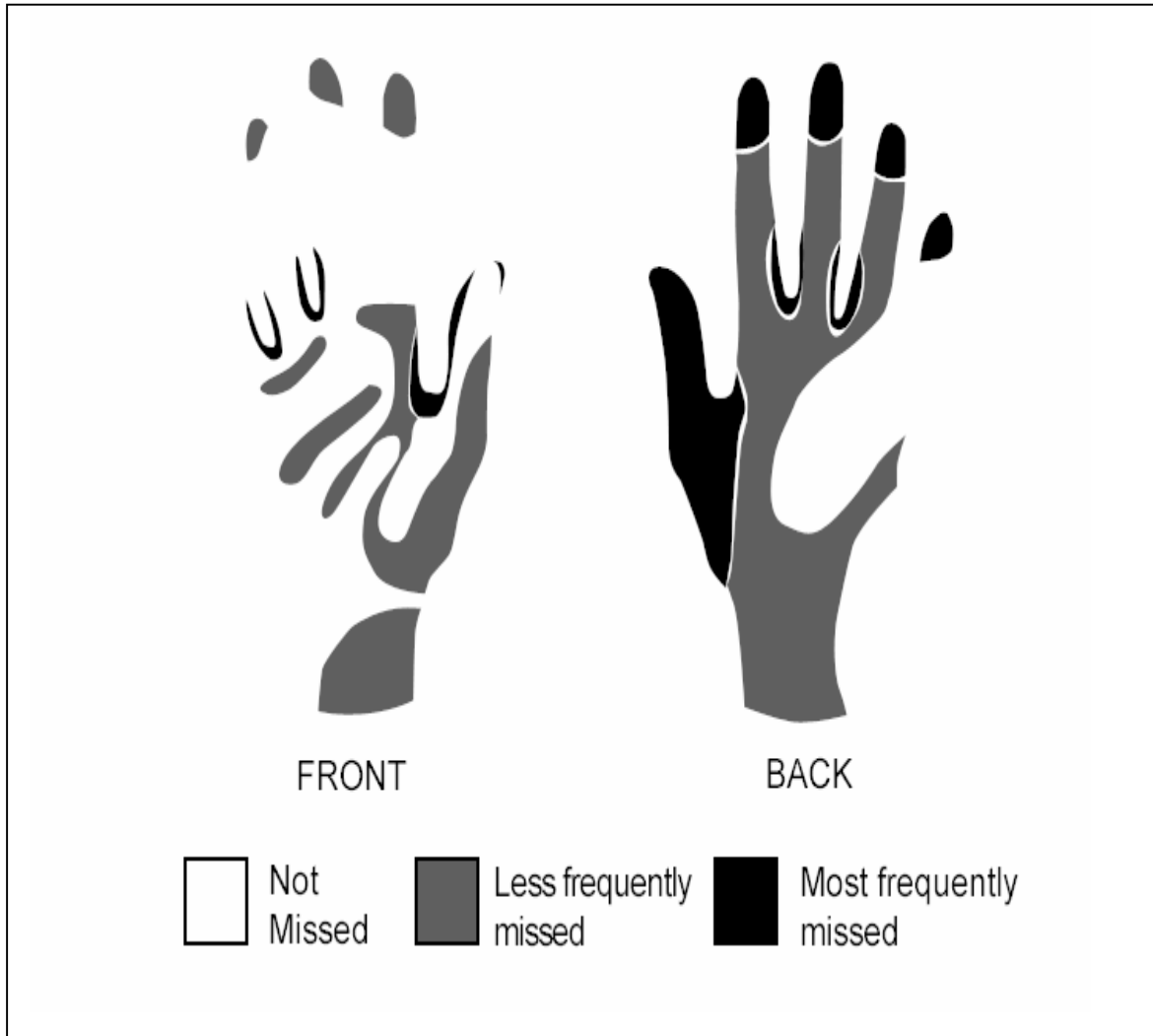


Fig. 15: Frequently Missed Areas When Handwashing



Routine handwashing tips

Jewelry

- Rings should either be removed or moved to ensure washing underneath them.
- Rings can make donning gloves more difficult and may cause gloves to tear more readily.

Condition of nails and of hands

- Nails should be kept short, rounded, and unvarnished, and the routine use of nail brushes should be avoided.
- The hands, including the nails, should be inflammation free.
- Artificial nails should be avoided.

Drying hands. A variety of methods are used for drying hands:

- Paper towels are the best method to dry hands.
- Cloth towels could be used if appropriately recycled.
- Warm air dryers shorten the time for hands to dry, however, they can only be used by one person at a time and are noisy and have the evidence of infection.
- Hand-drying materials should be placed near the sink in an area that will not become contaminated by splashing.

Soap. Plain (non-antimicrobial) soap comes in several forms

- If bar soap is used, small bars (that can be changed frequently) are preferred.
- Soap should have drainage and should be kept on racks.
- Liquid soap containers should be cleaned when empty and refilled with fresh soap; liquids should not be added to a partially full dispenser;

Water. Always use running water. If running water is not available consider using:

- Containers with a tap that can be turned on and off;
- Containers and pitchers; or
- Alcohol handrubs. ⁴²

Provision for Handwashing

The hand wash basin should be close to the clinical care area. There should be at least one dedicated hand wash basin per 4-bedded bay area, treatment room, sluice, and toilet area. This basin should be used for no other purpose, including tipping fluids or solutions, washing patient articles, or washing instruments.

- Handwashing material such as plain soap or antiseptic soap must be provided.
- There should be no topping off of liquid soap or antiseptic soap containers. All containers must be washed thoroughly and disinfected then dried before refilling.
- There should be an ample supply of hand drying material.
- Forced air driers are not recommended in clinical areas.

Antiseptic Hand Wash or Alcohol Based Handrub

An antiseptic hand wash or alcohol based handrub is one that will reduce concentration of resident flora as well as inactivate transient microorganisms from hands. Hand antisepsis is achieved by handwashing with antiseptic preparations (iodophors or chlorhexidine) or by use of alcohol-based antiseptic handrubs.⁴²

Indications for hand antisepsis:

Hand antisepsis is recommended in the following instances:

- BEFORE the performance of invasive procedures (e.g., placement of intravascular catheters, indwelling urinary catheters, or other invasive devices).
- BEFORE dressing wounds.
- BEFORE patient care at high risk of infection (e.g. newborns, immunocompromised patients).
- BEFORE preparation of intravenous fluids and medication.
- When persistent antimicrobial activity on the hands is desired. When it is important to reduce numbers of resident skin flora in addition to transient microorganisms.

In settings where hand washing facilities are inadequate and where hands are not soiled with dirt or heavily contaminated with blood or other organic material, alcohol-based hand rubs are recommended for use.⁴² In case the hands are soiled with dirt, it is necessary to wash hands routinely before the alcohol-based hand rub. Because using alcohol alone tends to dry the skin, it is best to use an

alcohol hand rub solution by adding 2 ml of glycerine, propylene glycol, or sorbitol and 100 ml of 60%-90% alcohol.⁴²

Antiseptic handwashing tips

Products: Most antimicrobial products have a dose response effect and a minimum of 3 to 5 ml is recommended. Betadine™ (Iodophor) or a 70-90% ethyl alcohol + 0.5% glycerine solution (alcohol handrub) are highly effective.

Duration:

The duration of antiseptic handwashing is important not only for mechanical action to be effective, but also to allow antimicrobial products sufficient time to be effective. Minimal time required for handrub before rinsing is 2 minutes or according to manufacturer's instructions.

Antiseptic handwash technique

- Wet hands and forearms till 2.5 cm below the elbow.
- Use an antiseptic hand wash preparation (e.g. Chlorhexidine gluconate 4% or betadine (Iodophor)).
- Apply the selected product to palm of one hand and rub hands and fingers together, covering all surfaces of hands and forearm (as described in the routine hand washing steps) till 2.5 cm below the elbow for at least 2 minutes.
- Follow the manufacturer's recommendations on volume and duration of use of the antiseptic used.
- Dry the hands using sterile towels before wearing sterile gloves.

Alcohol handrub technique

- Make sure that your hands are clean and have no visible dirt or blood.
- If hands are visibly dirty, wash your hands by routine hand wash.
- Pour 3-5 ml of an alcohol hand rub (70-90% ethyl alcohol + 0.5% glycerine solution) into the palm of your hand and rub hands together using the same technique of hand antisepsis until they are completely dry.

Other Aspects Related to Hand Hygiene

Fingernails and artificial nails: Numerous studies have documented that subungual (under the nail) area of the hand harbor high concentrations of microorganisms. In addition, long, natural and artificial nails have been associated with several outbreaks of Hospital-acquired infections.⁴³⁻⁴⁵ For prevention, do not wear artificial nails or extenders when providing patient care and keep natural nails less than ¼ inch long.

Irritant contact dermatitis: Frequent exposure of skin to soap and water can result in irritation and damage to skin. In some surveys as many as 25% of nurses have

signs and symptoms of dermatitis. Further, HCP may wash their hands as many as 30 times in an eight hours shift. Waterless alcohol hand antiseptics that contain emollients can actually improve skin condition with repeated use.

Hand washing Facilities

- Hand washing facilities should be conveniently located throughout the hospital.
- A sink should be located in or just outside every patient room. More than one sink per room may be necessary if a large room is used for several patients.
- Hand washing facilities should be located in or adjacent to rooms where diagnostic or invasive procedures that require hand washing are performed (e.g., cardiac catheterization, bronchoscopy, sigmoidoscopy, etc.).

Recommended reading:

Pratt RJ, et al. Standard principles for preventing hospital-acquired infections. J Hosp Infect 2001;47(Suppl): S21-S37