

Reference Manual for
Health Care Facilities with Limited Resources

Infection Prevention and Control.

Module 2. Hand Hygiene

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- Each drug, to verify the recommended dose, method of administration, and precautions for use
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Chapter 1. Hand Hygiene

Key Topics

- Importance of hand hygiene
- When to perform hand hygiene—the World Health Organization’s (WHO’s) “5 Moments for Hand Hygiene”
- Proper technique for washing hands with soap and water
- Proper technique for use of alcohol-based handrub
- Issues and considerations related to hand hygiene
- Monitoring hand hygiene
- WHO’s strategy for improving hand hygiene programs

Key Terms

- **Alcohol-based handrub (ABHR)** is a fast-acting, antiseptic handrub that does not require water to reduce resident flora, kills transient flora on the hands, and has the potential to protect the skin (depending on the ingredients).
- **Antiseptic agents or antimicrobial soap (terms used interchangeably)** are chemicals applied to the skin or other living tissue to inhibit or kill microorganisms (both transient and resident). These agents, which include alcohol (ethyl or isopropyl), dilute iodine solutions, iodophors, chlorhexidine, and triclosan, are used to reduce the total bacterial count.
- **Antiseptic handwashing** is washing hands with soap and water or with products containing an antiseptic agent.
- **Clean water** is natural or chemically treated or filtered water that is safe to drink and use for other purposes (e.g., handwashing and general medical use) because it meets national public health standards and the WHO guidelines for drinking-water quality.
- **Emollient** is an organic agent (e.g., glycerol, propylene glycol, or sorbitol) that is added to ABHR to soften the skin and help prevent skin damage (e.g., cracking, drying, irritation, and dermatitis) that is often caused by frequent hand hygiene.
- **Hand disinfection** is a term that WHO does not recommend using because disinfection normally refers to the decontamination of non-living surfaces and objects.
- **Hand hygiene** is the process of removing soil, debris, and microbes by cleansing hands using soap and water, ABHR, antiseptic agents, or antimicrobial soap.
- **Handwashing** is the process of mechanically removing soil, debris, and transient flora from hands using soap and clean water.
- **Health care-associated infection (HAI)** is an infection that occurs in a patient as a result of care at a health care facility and was not present at the time of arrival at the facility. To be considered an HAI, the infection must begin on or after the third day of admission to the health care facility (the day of admission is Day 1) or on the day of or the day after discharge from the facility. The term “health care-associated infection” replaces the formerly used “nosocomial” or “hospital” infection because evidence has shown that these infections can affect patients in any setting where they receive health care.

- **Microorganisms** are causative agents of infection, and include bacteria, viruses, fungi, and parasites. Some bacteria can exist in a vegetative state (during which the organism is active and infective) and as endospores (in which a tough, dormant, non-reproductive structure protects the cell). Endospores are more difficult to kill due to their protective coating.
- **Persistent activity** is prolonged or extended protective activity that prevents the growth or survival of microorganisms after application of an antiseptic; it is also called “residual” activity.
- **Point of care** is the place where three elements come together: the patient, the health care worker (HCW), and the care or treatment involving contact with the patient or the surrounding environment. For this chapter, the concept embraces the need to perform hand hygiene at recommended moments exactly where care delivery takes place. This requires that a hand hygiene product (e.g., ABHR) be easily accessible and as close as possible—within arm’s reach—to where patient care or treatment is provided.
- **Resident flora** are microorganisms that live in the deeper layers of the skin and within hair follicles and cannot be completely removed, even by vigorous washing and rinsing with plain soap and clean water. In most cases, resident flora are not likely to be associated with infections; however, the hands or fingernails of some HCWs can become colonized by microorganisms that do cause infection (e.g., *Staphylococcus aureus*, gram-negative bacilli, or yeast), which can be transmitted to patients.
- **Soap** (term is used interchangeably with detergent) is a cleaning product (e.g., bar, liquid, leaflet, or powder) that lowers surface tension of water, thereby helping to remove dirt and debris. Plain soaps do not claim to be antimicrobial on their labels and require friction (i.e., scrubbing) to mechanically remove microorganisms. Antiseptic (antimicrobial) soaps kill or inhibit growth of most microorganisms.
- **Standard Precautions** are a set of infection control practices used for every patient encounter to reduce the risk of transmission of bloodborne and other pathogens from both recognized and unrecognized sources. They are the basic level of infection control practices to be used, at a minimum, in preventing the spread of infectious agents to all individuals in the health care facility (see Module 1, Chapter 2, Standard and Transmission-Based Precautions).
- **Surgical hand preparation** refers to the protocol used preoperatively by surgical teams to eliminate transient flora and reduce resident skin flora. The process involves an antiseptic handwash or antiseptic handrub and rubbing/scrubbing for specific amounts of times using specific techniques prior to donning gloves. Antiseptics used for surgical hand preparation often have persistent antimicrobial activity (for details, see Module 7, Chapter 2, Use of Antiseptics in Health Care Facilities):
 - **Surgical handrub** refers to surgical hand preparation with a waterless ABHR.
 - **Surgical hand scrub** refers to surgical hand preparation with antimicrobial soap and water.
- **Transient flora** are microorganisms acquired through contact with individuals or contaminated surfaces during the course of normal, daily activities. They live in the upper layers of the skin and are more amenable to removal by hand hygiene. They are the microorganisms most likely to cause HAIs.

“The hands of healthcare workers are a major source of transmission of nosocomial pathogens.”

—Bhalla et al. 2004

Background

Hand hygiene is the single most important measure to prevent transmission of infection and is the cornerstone of infection prevention and control (IPC). The original study in this field was conducted at a maternity hospital in Vienna, Austria, in 1847. This study demonstrated that the mortality rate among mothers was significantly lower when the HCWs cleaned their hands with an antiseptic agent (Semmelweiss 1861). Numerous other studies since then have demonstrated that HCWs' hands become contaminated during routine care of patients and can transmit infectious diseases from patient to patient (AORN Recommended Practices Committee 2004; Duckro et al. 2005; Ojajarvi 1980; Pittet et al. 1999; Riggs et al. 2007; Sanderson and Weisler 1992). Proper hand hygiene can prevent transmission of microorganisms and decrease the frequency of HAIs. Despite evidence that hand hygiene prevents transmission of infections, compliance with hand hygiene recommendations during patient care continues to present ongoing challenges in all settings. Methods used to improve compliance with hand hygiene are addressed later in this chapter.

The goal of hand hygiene is to remove soil, dirt, and debris and reduce both transient and resident flora. Hand hygiene can be performed using ABHR or by washing hands with water and plain or antimicrobial soap (bar or liquid) that contains an antiseptic agent such as chlorhexidine, iodophors, or triclosan. (WHO 2009a)

Traditionally, handwashing with soap and water has been the primary method of hand hygiene; however, ABHR has been shown to be more effective for standard hand hygiene than plain or antimicrobial soaps. (CDC 2002)

Recommendations for when and how to perform hand hygiene are described in this chapter. For information and instructions about surgical hand scrub and surgical hand rub, see Module 7, Chapter 2, Use of Antiseptics in Health Care Facilities.

“Failure to perform appropriate hand hygiene is considered to be the leading cause of healthcare associated infections (HAIs) and the spread of multidrug resistant microorganisms, and has been recognized as a significant contributor to outbreaks.”

–Boyce et al. 2002

Hand Hygiene Opportunities

The World Health Organization has five recommended points in time when hand hygiene should occur in order to prevent transmission of HAIs. These recommendations are called the “My 5 Moments for Hand Hygiene” and focus on the following times:

1. Before making contact with a patient
2. Before performing a clean/aseptic task, including touching invasive devices
3. After performing a task involving the risk of exposure to a body fluid, including touching invasive devices
4. After patient contact
5. After touching equipment in the patient's surrounding areas (WHO 2006a)

The “5 Moments” are numbered according to health care workflow in an attempt to ease recall for HCWs (see Figure 1-1).

Figure 1-1. WHO’s Five Recommended Moments for Hand Hygiene



Reprinted from: The “My 5 Moments for Hand Hygiene,” © World Health Organization (2009): <http://www.who.int/gpsc/5may/background/5moments/en/>. Accessed June 28, 2016.

Hand Hygiene Methods

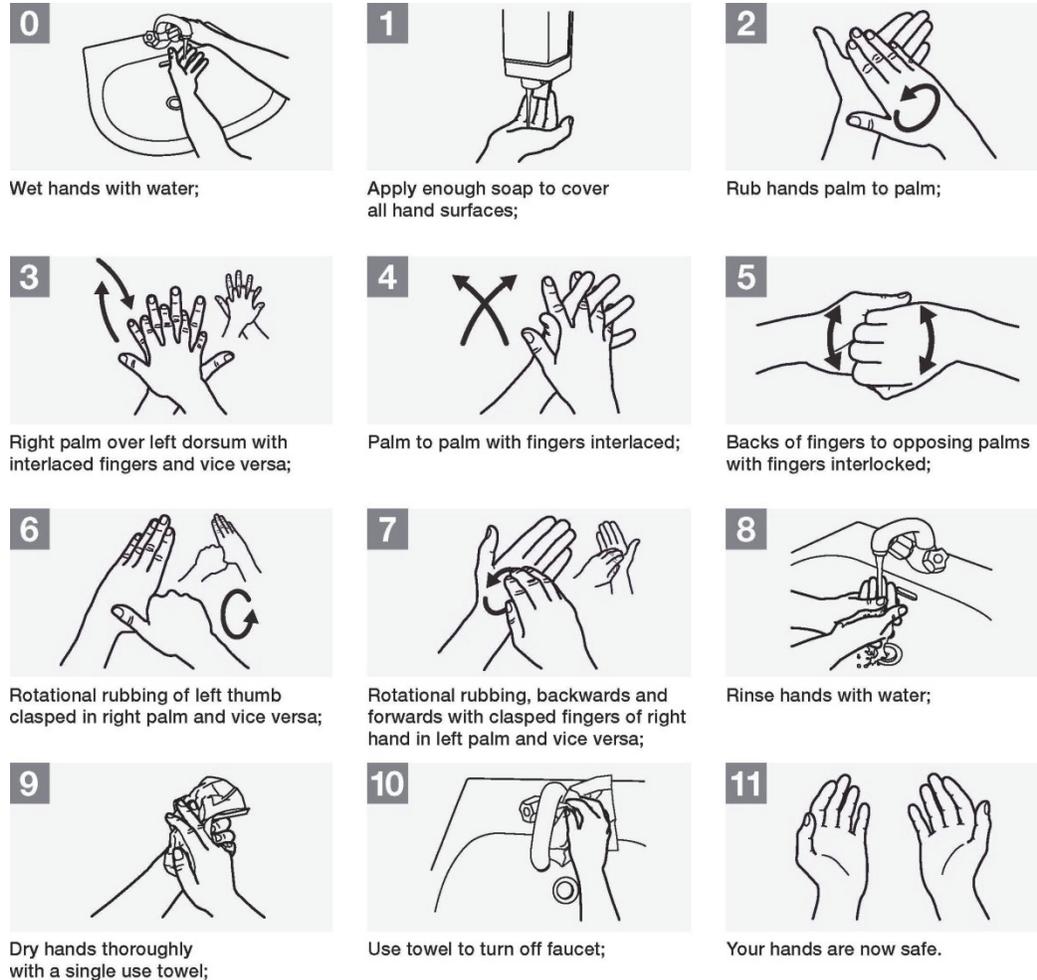
Handwashing with Soap and Water

The purpose of routine handwashing in health care is to remove dirt and organic material, as well as microbial contaminants, from the hands. Clean water must be used to prevent microorganisms in the water from contaminating the hands. However, water alone is not effective at removing substances containing fats and oils, which are often present on soiled hands. Proper handwashing also requires soap, which is rubbed on all hand surfaces, followed by thorough rinsing and drying.

The cleansing activity of handwashing is achieved by both friction and the detergent properties of the soap. Plain soap has minimal antimicrobial properties, but assists with the mechanical removal of debris and loosely adherent microbes, while the mechanical action removes some bacteria from hands. Time is also an important factor—handwashing for 30 seconds has been shown to remove 10 times the amount of bacteria as handwashing for 15 seconds. The entire handwashing procedure, if completed properly, as described step by step in Figure 1-2, should take 40–60 seconds. (CDC 2002; WHO 2009a)

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Figure 1-2. The Steps for Routine Handwashing (How to Properly Wash Your Hands)



Reprinted from: "How to Handwash," © World Health Organization (2009).

http://www.who.int/gpsc/5may/How_To_HandWash_Poster.pdf. Accessed May 6, 2016.

Handwashing with soap and water is recommended (rather than using ABHR) in the following situations:

- If hands are visibly soiled or contaminated with blood or body fluids
- After using the toilet
- Before eating
- To remove the buildup of emollients (e.g., glycerol) on hands after repeated use of ABHR
- In outbreaks of *C. difficile*, but not in health care settings with only a few cases of *C. difficile*. (Cohen et al. 2010; Siegel et al. 2007) *C. difficile* is a bacterial infection that causes severe diarrhea and is common in some settings.

Avoiding contamination of hands during handwashing

Since microorganisms grow and multiply in moisture and in standing water, the following are recommended to prevent contamination of hands during handwashing:

- Avoid bar soaps when possible because they can become contaminated, leading to colonization of microorganisms on hands. There is some evidence, however, that the actual hazard of transmitting microorganisms through handwashing with previously used bar soaps is negligible. If bar soap is used, provide small bars and use soap racks that drain the water after use. (WHO 2009a)
- Do not add liquid soap to a partially empty liquid soap dispenser. This is known as “topping off.” The practice of topping off dispensers may lead to bacterial contamination of the soap. Using refill packets avoids this problem but if they are not available, dispensers should be thoroughly cleaned and dried before refilling. (WHO 2009a)
- Filter and/or treat water if a health care facility’s water is suspected of being contaminated; this will make the water microbiologically safer. (WHO 2009a) (See Module 5, Chapter 3, Managing Food and Water Services for the Prevention of Health Care-Associated Infections, and Module 10, Chapter 6, Preventing Health Care-Associated Infectious Diarrhea.)
- Use running water for hand hygiene. In settings where no running water is available, water “flowing” from a pre-filled container with a tap is preferable to still-standing water in a basin. Use a container with a tap that can be turned off preferably with the back of the elbow (when hands are lathered) and turned on again with the back of the elbow for rinsing. As a last resort, use a bucket with a lid or a pitcher and a mug to draw water from the bucket, with the help of an assistant, if available. (WHO 2009a)
- Avoid dipping hands into basins of standing water. Even with the addition of an antiseptic agent (e.g., Dettol or Savlon), microorganisms can survive and multiply in these solutions. (Rutala 1996)
- If a drain is not available where hands are washed, collect water used from hand hygiene in a basin and discard it in a drain or in a latrine.
- Dry hands properly because wet hands can more readily acquire and spread microorganisms. Dry hands thoroughly with a method that does not recontaminate the hands. Paper towels or single-use clean cloths/towels are an option. Make sure that towels are not used multiple times or by multiple individuals because shared towels quickly become contaminated. (WHO 2009a)

Alcohol-Based Handrub (ABHR)

The antimicrobial activity of alcohol results from its ability to denature proteins (i.e., the ability to dissolve some microbe components) and kill microbes. Alcohol solutions containing 60–80% alcohol are most effective, with higher concentrations being **less** effective. This paradox results from the fact that proteins are not denatured easily in the absence of water; as a result, microorganisms are not killed as easily with higher alcohol-based solutions (> 80% alcohol). (WHO 2009a)

The use of an ABHR is more effective in killing transient and resident flora than handwashing with antimicrobial agents or plain soap and water. It also has persistent (long-lasting) activity. ABHR is quick and convenient to use and can easily be made available at the point of care. ABHR usually contains a small amount of an emollient (e.g., glycerol, propylene glycol, or sorbitol) that protects and softens skin. ABHR should be used at any of the “5 Moments” described earlier in this chapter, unless hands are visibly soiled. (CDC 2002; Girou et al. 2002; WHO 2009a)

To be effective, approximately 3–5 mL (i.e., 1 teaspoon) of ABHR should be used. The ideal volume of ABHR to apply to the hands varies according to different formulations of the product and hand size (refer to manufacturer’s instructions for use). ABHR should be used, following the steps shown in Figure 1-3, for approximately 20–30 seconds or until the solution has fully dried. Since ABHR does not remove soil or organic matter, if hands are visibly soiled or contaminated with blood or body fluids, handwash with soap

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and water. To reduce the buildup of emollients on hands after repeated use of ABHR, washing hands with soap and water after every 5–10 applications of ABHR is recommended.

In *C. difficile* outbreak settings, handwashing with soap and water is recommended over ABHR as it is more effective than ABHR in removing endospores. If there are only a few cases of *C. difficile*, normal use of ABHR is recommended (Cohen et al. 2010; Siegel et al. 2007; WHO 2009a). The need for using soap and water over ABHR during outbreaks of norovirus is an unresolved issue. (Siegel et al. 2007; WHO 2009a)

Figure 1-3. WHO Recommendation on How to Perform Hand Hygiene with ABHR



Reprinted from: "How to handrub," © World Health Organization (2009).
http://www.who.int/gpsc/5may/How_To_HandRub_Poster.pdf. Accessed May 6, 2016.

Producing alcohol-based handrub

An effective ABHR solution is inexpensive and simple to make, even in limited-resource settings. WHO provides procedures for making ABHR in health care facility pharmacies (see Figure 1-4).

Figure 1-4. Alcohol-Based Handrub Formulation

Formulation 1: To produce final concentrations of ethanol 80% v/v, glycerol 1.45% v/v, hydrogen peroxide (H₂O₂) 0.125% v/v:

Pour into a 1,000-mL graduated flask:

1. Ethanol 96% v/v, 833.0 mL
2. H₂O₂ 3%, 41.7 mL
3. Glycerol 98%, 14.5 mL

Top up the flask to 1,000 mL with distilled water or water that has been boiled and cooled; shake the flask gently to mix the contents.

Formulation 2: To produce final concentrations of isopropyl alcohol 75% v/v, glycerol 1.45 v/v, hydrogen peroxide 0.125% v/v:

Pour into a 1,000-mL graduated flask:

1. Isopropyl alcohol (with a purity of 99.8%), 751.5 mL
2. H₂O₂ 3%, 41.7 mL
3. Glycerol 98%, 14.5 mL

Top up the flask to 1,000 mL with distilled water or water that has been boiled and cooled; shake the flask gently to mix the contents.

v/v=volume percent, meaning 80 parts absolute alcohol in volume and 20 parts water measured as volume, not as weight

Adapted from: WHO Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge. Clean Care Is Safer Care, page 49. © World Health Organization (2009).

Do not add ABHR to a partially empty dispenser. This practice of “topping off” dispensers may lead to bacterial contamination. The use of refill packets avoids this problem but if they are not available, the dispensers should first be thoroughly cleaned and dried before refilling. (WHO 2009a)

Antiseptic Soaps

Antiseptic soaps may be used in place of plain soap during the “My 5 Moments for Hand Hygiene” described above but are not recommended for most settings. Handwashing with antiseptic soap is more irritating to the skin and more expensive than using ABHR. Therefore, if available, ABHR should be used under normal circumstances. (WHO 2009a)

Use of antiseptic soaps is recommended for surgical hand scrub and before entry into special areas of health care facilities (e.g., neonatal intensive care units).

Surgical Hand Scrub

The purpose of the surgical hand scrub is to mechanically remove soil, dirt, debris, and transient flora microorganisms and to reduce resident flora before and for the duration of the surgery. The goal is to prevent wound contamination by microorganisms from the hands and arms of the surgical team members (see Module 7, Chapter 2, Use of Antiseptics in Health Care Facilities, for more details).

Issues and Considerations Related to Hand Hygiene

Glove Use

While the effectiveness of gloves in preventing contamination of HCWs' hands has been confirmed, gloves do not provide complete protection against hand contamination. Contamination may occur as a result of small, undetected holes in gloves, as well as during glove removal. Thus, wearing gloves does not replace the need for proper hand hygiene. Hand hygiene should always be performed before putting on and after removing gloves (see Module 3, Chapter 1, Personal Protective Equipment, for details of correct glove use). (CDC 2002; WHO 2002)

Wearing the same pair of gloves and cleaning gloved hands between patients or between dirty and clean body sites is not a safe hand hygiene practice (Siegel et al. 2007; WHO 2009a; WHO 2009c; WHO 2009d). Not changing gloves between patients has been associated with transmission of microorganisms such as methicillin-resistant *S. aureus* (MRSA) and gram-negative bacilli. Reprocessing gloves is not recommended.

Every effort must be made to reinforce the message that gloves do not replace the use of hand hygiene and that when gloves are required, they should be used in addition to hand hygiene (see Module 3, Chapter 1, Personal Protective Equipment, for more information on glove use).

Hand Lotions and Hand Creams

In an effort to minimize hand hygiene-related contact dermatitis (a skin rash caused by irritation from a substance such as soap due to frequent hand hygiene), hand lotions, creams, barrier creams, and moisturizing skin care products are recommended. Hand lotions and creams often contain humectants (substances that help retain moisture) and various fats and oils. These humectants can increase hydration and replace altered or depleted skin lipids that can serve as a barrier to microorganisms on normal skin. Several studies have shown that regular use (i.e., at least twice per day) of such products can help prevent and treat contact dermatitis. There is also biologic evidence that emollients (e.g., glycerol and sorbitol) contained in ABHR, with or without antiseptics, may decrease cross-contamination because they reduce shedding of bacteria from skin for up to 4 hours. These products are absorbed into the superficial layers of the epidermis and are designed to form a protective layer that is not removed by standard handwashing. (Boyce et al. 2002; McCormick et al. 2000; WHO 2009a)

Therefore, while use of hand lotions, creams, and moisturizers by HCWs should be encouraged there are some considerations: First, to reduce the possibility of the products becoming contaminated, provide small, individual-use containers or pump dispensers, which are completely emptied and cleaned before being refilled. Refilling or topping off lotion containers may lead to contamination and proliferation of bacteria within the lotion. Second, to avoid confusion, hand lotion dispensers should not be located near dispensers of antiseptic solutions. Additionally, oil-based barrier products, such as those containing petroleum jelly (e.g., Vaseline® or lanolin), should not be used because they damage latex rubber gloves.

Resistance to Topical Antiseptic Agents

With the increasing use of topical antiseptics, particularly in home settings, concern has been raised regarding the development of resistance to these antiseptics by microorganisms. Although low-level bacterial tolerance to commonly used antiseptic agents has been observed, studies have shown no clinical evidence to date that supports the development of resistant microorganisms following use of any topical antiseptic agents. (WHO 2009a)

Lesions and Skin Breaks

Cuticles, hands, and forearms should be free of lesions (e.g., ulcers, abscesses, and tumors), dermatitis, eczema, and skin breaks (e.g., cuts, abrasions, and cracking). Broken skin should be covered with waterproof dressings. If covering is not possible, HCWs with active lesions should not perform clinical duties until the lesions are healed. In particular, surgical HCWs with skin lesions should not operate until the lesions are healed.

Religious and Cultural Considerations

It is clear that cultural and religious factors strongly influence attitudes toward handwashing. WHO's *Guidelines on Hand Hygiene in Health Care* provide information outlining these considerations. (WHO 2009a)

Fingernails

Research has shown that the area beneath the fingernails harbors the highest concentrations of bacteria on the hands. This area most frequently harbors coagulase-negative staphylococci (a bacterium normally found on the skin), gram-negative rods (bacteria known to cause infection), *Corynebacteria* (bacteria), and yeasts. Fingernails longer than 0.2 cm (0.08 inches) have been shown to increase carriage rates of *S. aureus*. Moreover, long nails, either natural or artificial, tend to puncture gloves more easily than short nails. Therefore, nails should be kept moderately short—not extend more than 0.5 cm (0.2 inches) beyond the fingertip. (CDC 2002; Fagernes and Lingaas 2011; McGinley et al. 1988; Olsen et al. 1993; WHO 2009a)

Artificial nails

Individuals with artificial nails have been shown to harbor more pathogenic organisms (i.e., disease-causing microorganisms), especially gram-negative bacilli and yeast, on the nails and in the area beneath the fingernails. Studies have demonstrated that the longer the artificial nail is, the more likely that a pathogen can be isolated. Thus, artificial nails (e.g., nail wraps, nail tips, acrylic lengtheners) should not be worn in clinical areas because they constitute an infection risk in high-risk areas. (Hedderwick et al. 2000; Jumma 2005; Siegel et al. 2007)

Nail polish

Although there is no restriction on wearing nail polish, it is suggested that surgical HCWs and HCWs working in specialty areas who want to use nail polish wear freshly applied, clear nail polish. There is concern that individuals with fresh manicures may be hesitant to perform rigorous hand hygiene in an effort to protect their nails, although no studies have demonstrated a relationship between freshly applied nail polish and infection. But, compromises in hand hygiene technique may lead to transmission of infection. Chipped nail polish supports the growth of larger numbers of organisms on fingernails compared to freshly polished or natural nails. Also, dark-colored nail polish may prevent dirt and debris under fingernails from being seen and removed. If nail polish is used, it should not be worn for more than 4 days. At the end of 4 days, the nail polish should be removed and freshly reapplied, if necessary. (Baumgardner et al. 1993; CDC 2002; Rothrock 2006)

Jewelry

Although current evidence demonstrates that wearing rings increases hand contamination, no studies have related this to HCW-to-patient transmission of pathogens. Literature has shown that HCWs wearing wristwatches had a higher total bacterial count on their hands compared to HCWs without wristwatches. Surgical team members should not wear rings because it may be more difficult for them to put on surgical gloves without tearing them. (Fagernes and Lingaas 2011; Siegel et al. 2007; Trick et al. 2003)

Monitoring Hand Hygiene

The *WHO Guidelines on Hand Hygiene in Health Care* encourage providers in all health care settings to evaluate, improve, and monitor the reliability of hand hygiene practices with the aim of changing the behavior of HCWs. Optimizing hand hygiene compliance at the 5 recommended moments for hand hygiene increases patient safety. (WHO 2009a; WHO 2009e)

Hand hygiene compliance can be monitored both directly and indirectly (see Table 1-1) (WHO 2009a). Each method of monitoring hand hygiene has its own advantages and disadvantages (see Table 1-2 for advantages and disadvantages of each of the monitoring techniques). The direct observation of hand hygiene compliance by a validated observer,¹ however, is considered the “gold standard” in hand hygiene monitoring. It is often valuable to utilize more than one method of monitoring at the same time. (The Joint Commission 2009; WHO 2009a)

Table 1-1. Hand Hygiene Observation Methods

Direct Methods of Hand Hygiene Observation	Indirect Methods of Hand Hygiene Observation
Direct observation	Monitoring consumption of products (soap or ABHR)
Patient assessment	Automated monitoring of use of sinks or ABHR dispensers

In the implementation of a hand hygiene monitoring program, expectations for performing hand hygiene should be clearly defined and made known within the health care facility. Policies detailing these expectations should also be in place. Monitoring should occur on a regular, routine basis and a set minimum number of observations should be collected in a given monitoring period.

¹ Validated observers are observers with excellent skills in monitoring hand hygiene during health care practices. Validation includes training according to the principles behind the “5 Moments,” training on facility policies related to hand hygiene expectations, and being monitored and confirmed for correct techniques by senior observers. (WHO 2009a)

Table 1-2. Advantages and Disadvantages of Various Hand Hygiene Monitoring Approaches

Monitoring Approach	Advantages	Disadvantages
Direct observations by expert observers	<ul style="list-style-type: none"> • Only way to reliably capture all hand hygiene opportunities • Details can be observed • Unforeseen qualitative issues can be detected while observing hand hygiene 	<ul style="list-style-type: none"> • Time-consuming • Skilled and validated observers required • Prone to observation, observer, and selection bias
Self-reports by HCWs	<ul style="list-style-type: none"> • Inexpensive 	<ul style="list-style-type: none"> • Overestimate of true compliance • Not reliable
Direct observations by patients	<ul style="list-style-type: none"> • Inexpensive 	<ul style="list-style-type: none"> • Potential negative impact on patient-HCW relationship • Reliability and validity required and remain to be demonstrated
Consumption of hygiene products (e.g., towels, soap, and ABHR)	<ul style="list-style-type: none"> • Inexpensive • Reflects overall hand hygiene activity (selection biased) • Validity may be improved by using indirect denominators (e.g., patient-days or workload that is converted into total hand hygiene opportunities) 	<ul style="list-style-type: none"> • Does not reliably measure the need for hand hygiene (denominator) • No information about the appropriate timing of hand hygiene actions • Prolonged stocking of products at ward level complicates and might jeopardize the validity • Validity threatened by increased patient and visitor usage • Not able to discriminate between individual or professional group usage

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Direct Monitoring

The goal of the direct hand hygiene observers is to observe HCWs during their usual patient care activities. The observers should assess the HCWs' compliance with indications for hand hygiene and with facility policies on hand hygiene practices. It is preferable that observers have training and experience as patient care professionals but this is not necessary.

Validity and reliability² are important aspects of direct hand hygiene monitoring. The validity of a new observer should be confirmed by either joint observations with another confirmed observer or by being tested through the WHO Training Film, which is available online. Results should be compared and any discrepancies should be discussed. This process should be repeated until the HCW is fully competent. (WHO 2009a)

² Validity—doing a procedure technically correctly following the “gold standard” for that procedure. Reliability—completing a procedure technically correctly at all times following the “gold standard” for that procedure.

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Hand hygiene observations should focus on the two essential parameters for determining hand hygiene compliance:

1. The indication for hand hygiene
2. The observed hand hygiene action related to the indication

When the HCW is observed, the action is considered to have been either “performed” or “not performed.” (WHO 2006b)

WHO recommends that the “5 Moments” be utilized as a framework for observing opportunities for hand hygiene. It is possible, however, to simplify which moments are observed, based on the objectives of the period of observation and/or the resources available. Observation can be limited to certain professional role categories or disciplines or certain indications within the “5 Moments” (e.g., in some settings it may be appropriate to observe the action of hand hygiene only before and after contact with the patient or the patient environment). (WHO 2006b; WHO 2009a)

Observations should be collected in a standard way, such as on a form (see Appendix 1-A) with each hand hygiene observation session on a separate form. A standard form should have three main sections:

1. A header containing information about the health care facility and the location within the facility where the session was completed
2. A second header containing information on the session observed
3. Columns below the headers representing the sequence of actions for different HCWs observed during the same session, with each column representing one HCW (See Appendix 1-A for the WHO Observation Form – Short Description of Items on the Form.) (WHO 2009a; WHO 2009e)

Content can be adapted to suit the needs of the facility. Appendix 1-B is a sample observation form for hand hygiene data collection. This form reflects a modified approach that looks at hand hygiene compliance at room entry and room exit only (useful for areas with single-patient rooms).

Hand hygiene compliance (%) is the simplest way to analyze the hand hygiene data collected. Hand hygiene compliance is the ratio of the number of actions to the number of opportunities:

Compliance (%) = (# of Hand Hygiene Actions/Total # of Opportunities) x 100

Compliance data can be summarized based on total compliance by HCW, by role or discipline (e.g., doctors, nurses), or by location (e.g., ward A, ward B), depending on the objectives of the monitoring program. It is important to provide feedback and disseminate compliance data to the HCWs and leaders after the observation session/assessments are completed. Minimizing the delay between observation and reporting of results may help increase the effects of the monitoring. (WHO 2009a)

There are some limitations with direct monitoring of hand hygiene. For example, HCWs may improve or modify their behavior in response to being observed or studied, resulting in an overestimate of compliance. Thus, it is important to be aware of this effect when evaluating compliance rates.

Indirect Monitoring

Indirect hand hygiene monitoring, such as monitoring the consumption of hand hygiene products (e.g., soap, ABHR, paper towels) to estimate the number of hand hygiene actions, is a less expensive monitoring approach and can be useful in settings where resources for direct monitoring are limited. However, this

methodology requires validation to be most effective. One of the major limitations to this type of indirect monitoring is that it is impossible to determine if the hand hygiene actions were performed at the proper moment. (WHO 2009a)

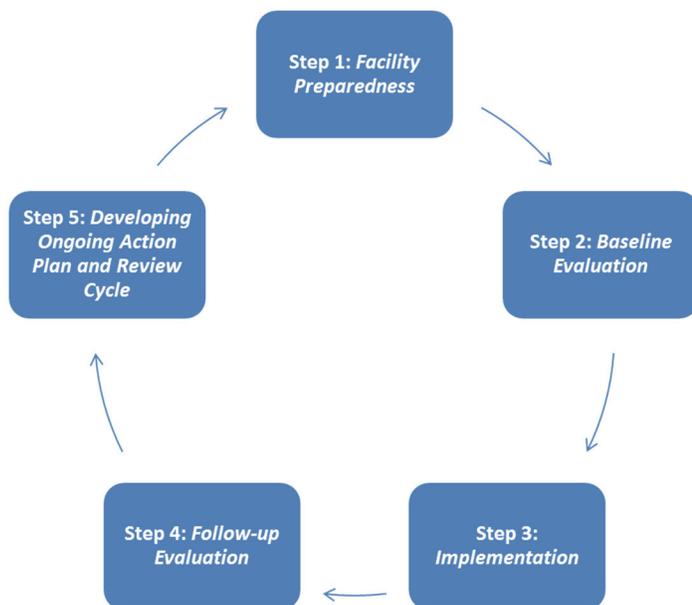
Implementation of a Multimodal Hand Hygiene Improvement Strategy

The WHO *Multimodal Hand Hygiene Improvement Strategy* identifies key components to address during the implementation of a hand hygiene improvement strategy. (WHO 2009a; WHO 2009e) (See Appendix 1-C.) The components are:

- System change to ensure that infrastructure is in place, including availability of ABHR and access to a safe and continuous supply of water, soap, and towels—to allow HCWs to practice hand hygiene
- Training and education of HCWs
- Monitoring of hand hygiene practices and provision of feedback
- Reminders in the workplace
- Creation of a safety culture

In order to implement these components, the guidelines detail five sequential steps, listed below, with each step building on the activities and actions in the previous steps (see Figure 1-5). Rather than a linear process, the five steps should be considered a cyclical process, with each cycle being repeated, refined, and enhanced at least every 5 years. It is imperative to evaluate success factors and areas of weakness within the program in order to achieve long-term sustainability and process improvement. (WHO 2009a)

Figure 1-5. Five Steps of the Hand Hygiene Improvement Strategy



Adapted from: WHO Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge: Clean Care Is Safer Care. The WHO Multimodal Hand Hygiene Improvement Strategy, page 99. © World Health Organization (2009).

Although complex, the hand hygiene improvement strategy lays the groundwork for the implementation of a sustainable hand hygiene monitoring program. It is aimed at improving hand hygiene compliance and

Hand Hygiene

increasing patient safety in the health care facility. The basic elements of each step are listed below. (WHO 2009a; WHO 2009e)

Step 1: Facility Preparedness

Assess and ensure the preparedness of the health care facility. Consider the following:

- Identify a person or team to coordinate the program.
- Identify HCWs and facility leadership who will play a major role in program implementation.
- Obtain raw materials to produce ABHR at the health care facility's pharmacy (if necessary).
- Train observers on how to monitor hand hygiene practices.
- Train identified persons on how to calculate hand hygiene compliance.

Step 2: Baseline Evaluation

Include a baseline evaluation of hand hygiene practices, facility infrastructure, HCW knowledge, and current beliefs about hand hygiene. Consider the following:

- Survey HCWs on their perceptions of hand hygiene (e.g., do they think hand hygiene is important, and/or effective, and/or necessary?).
- Survey HCWs on their knowledge of hand hygiene (e.g., do they know how and when to perform proper hand hygiene?).
- Look for details in the health care facility's structure that may help explain current hand hygiene compliance (e.g., is there easy access to running water, sinks, and/or ABHR?).
- Monitor use of soap and ABHR, if applicable.
- Collect baseline data on hand hygiene compliance.
- Make sure that ABHR and dispensers are available in time for the start of Step 3.
- Compile data on hand hygiene practices.

Step 3: Implementation

Implement the planned program. Consider the following:

- Share baseline data with HCWs.
- Distribute educational materials, hand hygiene guidelines, and/or policies to HCWs.
- Distribute ABHR to HCWs.
- Measure how much ABHR is used each month.
- Hold education and training sessions.
- Survey HCWs on their opinion of the ABHR (e.g., do they find it acceptable?).
- Continue to monitor hand hygiene compliance observations, if possible.
- Meet monthly with key HCWs involved with the hand hygiene program.

Step 4: Follow-Up Evaluation

Evaluate the short-term impact of the implemented hand hygiene program. Considered the following:

- Survey HCWs and health care facility leadership on their perceptions of hand hygiene (e.g., do they think hand hygiene is important and/or effective and/or necessary?).
- Survey HCWs on their knowledge of hand hygiene (e.g., do they know how and when to perform proper hand hygiene?).
- Inspect the health care facility structure to determine if there are still any barriers to hand hygiene compliance related to structural issues.
- Collect data on soap and ABHR use.
- Collect data on hand hygiene compliance.
- Complete data entry.

Step 5: Development of an Ongoing Action Plan and Review Cycle

Develop an ongoing action plan and review cycle. Consider the following:

- Review collected data and results carefully.
- Prepare a report of the findings of the entire program.
- Share information about the findings of the program with leadership and HCWs.
- Create a 5-year plan of action to continue to improve and promote hand hygiene compliance.

Modifying a Hand Hygiene Program

In situations where the complete implementation of the WHO hand hygiene improvement strategy is not possible, due to either limited resources or time, a hand hygiene improvement team should focus on the minimum criteria listed below (see Table 1-3). These criteria ensure achievement of each component of the multimodal strategy and include the most pertinent steps of the program. (WHO 2009a)

Table 1-3. Minimum Criteria for Implementation

Multimodal Component	Minimum Criteria for Implementation
1a. System change: ABHR	Bottles of ABHR are positioned at the point of care in each ward or given to HCWs.
1b. System change: Access to safe, continuous water supply and towels	There is one sink for at least every 10 beds; soap; running water; and clean, dry towels available at every sink.
2. Training and education	A program to update training over the short, medium, and long term is established.
3. Observation and feedback	Two periods of observational monitoring are undertaken, the baseline evaluation and the follow-up evaluation.
4. Reminders in the workplace	“How to” and “5 Moments” posters are displayed in all wards (e.g., patient rooms, health facility staff areas, outpatient areas, ambulatory departments).
5. Institutional safety climate	The chief executive, chief medical officer/medical superintendent, and chief nurse all make a visible commitment to support hand hygiene improvement during

program implementation (e.g., verbal announcements and/or formal letters to health facility staff).

Reprinted from: Guide to Implementation: A Guide to the Implementation of the WHO Multimodal Hand Hygiene Improvement Strategy, page 39. © World Health Organization (2009).

Summary

Hand hygiene is the single most important measure to prevent transmission of infection and is the cornerstone of IPC. The goal of hand hygiene in health care is to prevent transmission of infections through removing bacteria from hands at strategic “moments” during the care of patients. Hand hygiene can be performed using ABHR or by washing hands with water and soap. ABHR has been shown to be more effective for standard hand hygiene than plain or antimicrobial soaps and more easily available at the point of care. Despite evidence proving that hand hygiene prevents transmission of infections, compliance with hand hygiene recommendations during patient care continues to be challenging in all settings and requires constant and ongoing efforts from IPC staff. The *WHO Multimodal Hand Hygiene Improvement Strategy* provides a guide for implementation of a sustainable hand hygiene program at health care facilities.

Appendix 1-A. Sample Hand Hygiene Observation Form: World Health Organization



Observation Form

Facility:		Period Number*:		Session Number*:	
Service:		Date: (dd/mm/yy)	/ /	Observer: (initials)	
Ward:		Start/End time: (hh:mm)	: / :	Page N°:	
Department:		Session duration: (mm)		City**:	
Country**:					

Prof.cat Code N°	Indication	HH Action	Prof.cat Code N°	Indication	HH Action	Prof.cat Code N°	Indication	HH Action	Prof.cat Code N°	Indication	HH Action
1	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	1	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	1	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	1	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves
2	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	2	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	2	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	2	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves
3	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	3	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	3	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	3	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves
4	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	4	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	4	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	4	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves
5	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	5	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	5	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	5	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves
6	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	6	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	6	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	6	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves
7	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	7	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	7	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	7	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves
8	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	8	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	8	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves	8	<input type="checkbox"/> bef-pat. <input type="checkbox"/> bef-asept. <input type="checkbox"/> aft-b.f. <input type="checkbox"/> aft-pat. <input type="checkbox"/> aft.p.surr.	<input type="checkbox"/> HR <input type="checkbox"/> HW <input type="radio"/> missed <input type="checkbox"/> gloves

* To be completed by the data manager.
** Optional, to be used if appropriate, according to the local needs and regulations.

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Source: WHO 2009e.



General Recommendations

(refer to the Hand Hygiene Technical Reference Manual)

1. In the context of open and direct observations, the observer introduces him/herself to the health-care worker and to the patient when appropriate, explains his/her task and proposes immediate informal feedback.
2. The health-care worker, belonging to one of the main four following professional categories (see below), is observed during the delivery of health-care activities to patients.
3. Detected and observed data should be recorded with a pencil in order to be immediately corrected if needed.
4. The top of the form (header) is completed before starting data collection (excepted end time and session duration).
5. The session should last no more than 20 minutes (\pm 10 minutes according to the observed activity); the end time and the session duration are to be completed at the end of the observation session.
6. The observer may observe up to three health-care workers simultaneously, if the density of hand hygiene opportunities permits.
7. Each column of the grid to record hand hygiene practices is intended to be dedicated to a specific professional category. Therefore numerous health-care workers may be sequentially included during one session in the column dedicated to their category. Alternatively each column may be dedicated to a single health-care worker only of whom the professional category should be indicated.
8. As soon as you detect an indication for hand hygiene, count an opportunity in the appropriate column and cross the square corresponding to the indication(s) you detected. Then complete all the indications that apply and the related hand hygiene actions observed or missed.
9. Each opportunity refers to one line in each column; each line is independent from one column to another.
10. Cross items in squares (several may apply for one opportunity) or circles (only a single item may apply at one moment).
11. When several indications fall in one opportunity, each one must be recorded by crossing the squares.
12. Performed or missed actions must always be registered within the context of an opportunity.
13. Glove use may be recorded only when the hand hygiene action is missed while the health-care worker is wearing gloves.

Short description of items

Facility:	to complete according to the local nomenclature	
Service:	to complete according to the local nomenclature	
Ward:	to complete according to the local nomenclature	
Department:	to complete according to the following standardized nomenclature:	
	medical, including dermatology, neurology, haematology, oncology, etc.	surgery, including neurosurgery, urology, EENT, ophthalmology, etc.
	mixed (medical & surgical), including gynaecology	obstetrics, including related surgery
	paediatrics, including related surgery	intensive care & resuscitation
	emergency unit	long term care & rehabilitation
	ambulatory care, including related surgery	other (to specify)
Period N°:	1) pre- / 2) post-intervention; and then according to the institutional counter.	
Date:	day (dd) / month (mm) / year (yy)	
Start/end time:	hour (hh) / minute (mm).	
Session duration:	difference between start and end time, resulting in minutes of observation.	
Session N°:	attributed at the moment of data entry for analysis.	
Observer:	observer's initials (the observer is responsible for the data collection and for checking their accuracy before submitting the form for analysis).	
Page N°:	to write only when more than one form is used for one session.	
Prof.cat:	according to the following classification:	
	1. nurse / midwife	1.1 nurse, 1.2 midwife, 1.3 student.
	2. auxiliary	
	3. medical doctor	3.1 in internal medicine, 3.2 surgeon, 3.3 anaesthetist / resuscitator / emergency physician, 3.4 paediatrician, 3.5 gynaecologist, 3.6 consultant, 3.7 medical student.
	4. other health-care worker	4.1 therapist (physiotherapist, occupational therapist, audiologist, speech therapist), 4.2 technician (radiologist, cardiology technician, operating room technician, laboratory technician, etc), 4.3 other (dietician, dentist, social worker and any other health-related professional involved in patient care), 4.4 student.
Number:	number of observed health-care workers belonging to the same professional category (same code) as they enter the field of observation and you detect opportunities.	
Opp(ortunity):	defined by one indication at least	
Indication:	reason(s) that motivate(s) hand hygiene action; all indications that apply at one moment must be recorded	
	bef.pat: before touching a patient	aft.b.f: after body fluid exposure risk
	bef.asept: before clean/aseptic procedure	aft.pat: after touching a patient
		aft.p.surr: after touching patient surroundings
HH action:	response to the hand hygiene indication(s); it can be either a positive action by performing handrub or handwash, or a negative action by missing handrub or handwash	
	HR: hand hygiene action by handrubbing with an alcohol-based formula	Missed: no hand hygiene action performed
	HW: hand hygiene action by handwashing with soap and water	

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WHO acknowledges the H&HC Universities de Coimbra (H&HC) in particular the members of the Infection Control Programme, for their active participation in developing this material.

Source: WHO 2009e.



Observation Form – Basic Compliance Calculation

Session N°	Facility:			Period:			Setting:			Total per session					
	Prof.cat.	Opp (n)	HW (n)	HR (n)	Opp (n)	HW (n)	HR (n)								
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
Total															
Calculation	Act (n) =			Act (n) =			Act (n) =			Act (n) =			Act (n) =		
	Opp (n) =			Opp (n) =			Opp (n) =			Opp (n) =			Opp (n) =		
Compliance															

$$\text{Compliance (\%)} = \frac{\text{Actions}}{\text{Opportunities}} \times 100$$

Instructions for use

1. Define the setting outlining the scope for analysis and report related data according to the chosen setting.
2. Check data in the observation form. Hand hygiene actions not related to an indication should not be taken into account and vice versa.
3. Report the session number and the related observation data in the same line. This attribution of session number validates the fact that data has been taken into count for compliance calculation.
4. Results per professional category and per session (vertical):
 - 4.1 Sum up recorded opportunities (opp) in the case report form per professional category: report the sum in the corresponding cell in the calculation form.
 - 4.2 Sum up the positive hand hygiene actions related to the total of opportunities above, making difference between handwash (HW) and handrub (HR): report the sum in the corresponding cell in the calculation form.
 - 4.3 Proceed in the same way for each session (data record form).
 - 4.4 Add up all sums per each professional category and put the calculation to calculate the compliance rate (given in percent)
5. The addition of results of each line permits to get the global compliance at the end of the last right column.

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WHO acknowledges the Hôpital-Université de Québec (HUC) in particular the members of the Infection Control Programme, for their active participation in developing this material.

Source: WHO 2009e.

Appendix 1-B. Sample Hand Hygiene Observation Form Modified for Room Entry and Exit

FOUR rules for conducting Hand Hygiene Observations

1. Observe for hand hygiene upon ENTRY and EXIT from *Patient Environment*
Patient Environment definition:
Private or semi-private room: Crossing room door
Between patients and multi-patient rooms setting: Crossing the “curtain line”
2. A provider may use the alcohol-based handrub (ABHR) dispenser just outside the room door, inside the room, at the sink, or the health care worker’s personal ABHR bottle.
3. DO NOT GUESS. If your view is blocked and you cannot confirm if provider performed hand hygiene, simply check “Unsure” box.
4. Do not exceed 3 observations per provider in one session.

UNIT: _____ DATE: ___/___/___ DAY OF WEEK: _____
TIME: _____ TO _____ OBSERVER NAME: _____

Obs #	Role of Observed Person							Hand Hygiene	Observed Behavior					
	Nurse*	Midwife	Physicians (all doctors)	CO/PA/Dentist**	Pharmacist/Laboratory Technician	Support Staff	Other Providers (nursing, medical and other students, and residents)	Other 1=Unknown 2=Clinical procedure 3=Transport 4=Nursing care 5=Blood sample collection 6= Nutrition 7= Admin	Circle ONE	Not observed	Hand cleaning with ABHR	Hand wash with soap and water	No hand hygiene	Area location
									ENTRY EXIT					
									ENTRY EXIT					
									ENTRY EXIT					
									ENTRY EXIT					
									ENTRY EXIT					
									ENTRY EXIT					
									ENTRY EXIT					

* All types of nursing staff including diploma, degree, post-graduate, supervisor, and assistant.

** CO=Clinical Officer, PA=Physician Assistant.

Adapted from: Johns Hopkins Medicine. Hospital Epidemiology and Infection Control. JHH Hand Hygiene Compliance Data Collection Form. http://www.hopkinsmedicine.org/heic/docs/HH_observation_form.pdf.

Appendix 1-C. Implementation of a Multimodal Hand Hygiene Improvement Strategy

As discussed in this Hand Hygiene chapter, the WHO Multimodal Hand Hygiene Improvement Strategy identifies five key steps to implement a hand hygiene improvement strategy (see Steps 1–5 below). The implementation strategy was developed based on a literature review of the implementation science, behavioral change, spread methodology, diffusion of innovation, and impact evaluation (WHO 2009a). For detailed information on assessing the economic impact of hand hygiene promotion, refer to *WHO Guidelines on Hand Hygiene in Health Care*, page 168.

It is important to note that although each step within the process builds upon activities occurring in previous steps, it should be considered a cyclical process rather than a linear one. Each step of the cycle should be repeated, refined, and enhanced at least every 5 years in order to maximize the impact of the hand hygiene program. (WHO 2009a; WHO 2009f)

Step 1: Facility Preparedness

Suggested duration: 3 months

Step 1 in the hand hygiene improvement strategy is to evaluate and prepare the facility for the program. To have a successful hand hygiene program, careful planning is required from the start of the program. During Step 1, it is imperative to map out a clear strategy for the entire program.

Step 1: Key Activities in Facility Preparedness

Key Activities
Identify coordinator.
Identify key individuals/groups.
Undertake a situation analysis of hand hygiene practices at the facility. ³
Complete ABHR production, planning, and costing tool.
Train observers/trainers.
Procure raw materials for ABHR (if necessary).
Collect data on costs/benefits of hand hygiene improvement program: costs of program versus reductions in costs of managing hospital acquired infections.
Undertake training on data entry and analysis.

Steps 1–5 Reproduced from: WHO. 2009. *WHO Guidelines on Hand Hygiene in Health Care*, page 119. © World Health Organization (2009): http://apps.who.int/iris/bitstream/10665/44102/1/9789241597906_eng.pdf. Accessed May 6, 2016.

³ See as an example: WHO. 2010. *WHO Hand Hygiene Self-Assessment Framework 2010*. http://www.who.int/gpsc/country_work/hhsa_framework_October_2010.pdf?ua=1.

Step 2: Baseline Evaluation

Suggested duration: 2–3 months

Step 2 includes the baseline evaluation of hand hygiene practices, perceptions, knowledge, and available infrastructure within the health care facility.

Hand hygiene is the most effective way of preventing the transmission of infections and it is imperative to collect data on HCWs' perception on the importance of hand hygiene. These perceptions, as well as other factors influencing compliance, will provide valuable information for strategy development. Changing perceptions can be the means by which improvements in hand hygiene practices are achieved. Similarly, assessing the infrastructure of the health care facility may help explain current hand hygiene practices and will guide improvement efforts. Lack of access to sinks, running water, and ABHR may all contribute to low hand hygiene compliance and should be addressed during the implementation planning step.

Step 2: Key Activities in Baseline Evaluation

Key Activities

Undertake baseline assessments:

- Senior manager perception survey
- HCW perceptions survey
- Ward structure survey
- HCW knowledge survey

Begin local production or market procurement of ABHR.

Conduct hand hygiene observations.

Monitor use of soap and ABHR.

Perform data entry and analysis.

Step 3: Implementation

Suggested duration: 3–4 months

Step 3 is implementation of the planned program. Availability of ABHR at the point of care and education and training for HCWs are crucial to the success of this step. Health care facilities may choose to hold a high-profile launch event to coincide with the start of the program's implementation. Publicizing leadership endorsement and support also helps foster a successful implementation stage (WHO 2009a). During implementation, it is also important to evaluate HCWs' tolerance and acceptance of ABHR. Monthly collection of hand hygiene observations should continue during implementation, if possible. If time and resources are limited, observations should occur only during Step 2 and Step 4.

Step 3: Key Activities in Implementation

Key Activities
Launch the strategy.
Provide feedback on baseline data.
Distribute posters.
Distribute ABHR.
Distribute other WHO materials from the Pilot Implementation Pack.
Educate HCWs.
Undertake practical training of HCWs.
Undertake ABHR tolerance tests.
Complete monthly monitoring of usage of products.

Step 4: Follow-Up Evaluation

Suggested duration: 2–3 months

Step 4 is the evaluation of the short-term impact of the hand hygiene improvement strategy. By performing a follow-up evaluation, facilities will gain information they can use to make future decisions and take actions related to the hand hygiene program. Compliance with hand hygiene practices among HCWs is the main indicator that should be evaluated. It is important to note that hand hygiene improvement activities should continue in the health care facility according to the local action plan, even during this evaluation step.

WHO has identified the following as key success indicators in the evaluation of the short-term impact of a hand hygiene program:

- Increase in hand hygiene compliance
- Improvement in infection control/hand hygiene structures
- Increase in usage of hand hygiene products
- Improved perception of hand hygiene
- Improved knowledge of hand hygiene

The data collected during this evaluation will help shape future actions and the steps the health care facility may take to maintain high hand hygiene compliance rates over time.

Step 4: Key Activities in Follow-Up Evaluation

Key Activities

Undertake follow-up assessments:

- HCW knowledge survey
- Senior executive manager perception survey
- HCW perception and campaign evaluation survey
- Facility situation analysis

Conduct data entry and analysis.

Conduct hand hygiene observations.

Continue monthly monitoring of use of products.

Step 5: Developing Ongoing Action Plan and Review Cycle

Suggested duration: 2–3 months

Step 5 is to develop an ongoing action plan and review cycle. The goal of the hand hygiene program is to create an environment in which performing appropriate hand hygiene is central to the facility's culture. Reviewing the results of the data and creating a final report detailing the results of the improvement program will help condense the findings and will aid in creating a future action plan. Enthusiasm and motivation for the program must remain high in order to have long-term impacts.

Step 5: Key Activities in Developing an Ongoing Action Plan and Review Cycle

Key Activities

Study all results carefully.

Provide follow-up data.

Develop a 5-year action plan.

Consider scale-up of the strategy.

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