INTERNATIONAL SOCIETY FOR INFECTIOUS DISEASES

GUIDE TO INFECTION CONTROL IN THE HOSPITAL

CHAPTER 6:

Hand Hygiene

Authors

A. J. Stewardson, MBBS, PhD
D. Pittet, MD, MS

Chapter Editor

Shaheen Mehtar, MD, MBBS, FRC Path, FCPath (Micro)

Topic Outline

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KEY ISSUES

- Hand hygiene is the cornerstone of infection prevention.
- Multimodal promotion can improve healthcare worker hand hygiene compliance.
- Enhanced compliance is associated with decreased cross-transmission and reduced infection rates.

KNOWN FACTS

- Appropriate hand hygiene is considered the leading measure to reduce the transmission of nosocomial pathogens in healthcare settings. Its impact on the risk of transmission of infectious and resistant organisms is recognized in hospitals, as well as in community settings such as, households, schools, and daycare centers.
- Inappropriate hand hygiene practice has been identified as a significant contributor to numerous outbreaks.
- Several studies have shown the impact of improved hand hygiene on the risk of nosocomial infection and transmission of multiresistant pathogens. To date, most studies have focused on methicillin-resistant *Staphylococcus aureus,* but now evidence is accumulating for transmission of Gram-negative pathogens over recent years.
- Bacteria present on human skin can be considered as belonging to one of two groups: transient and resident flora:
    1. Transient flora colonizes the superficial layers of the skin. It has a short-term persistence on skin, but a high pathogenic potential. It is usually acquired by healthcare workers during direct contact with patients, contaminated environmental surfaces adjacent to the patient, or medical devices, and is responsible for most nosocomial infections and spread of antimicrobial resistance resulting from transmission. Hand hygiene decreases colonization with transient

flora and can be achieved either through handwashing or hand antisepsis (*see below*).
2. Resident flora is attached to deeper skin layers and has a low pathogenic potential unless introduced into the body by invasive devices. It is also more difficult to remove mechanically.

Hand Hygiene

Hand hygiene is a general term that includes the appropriate use of handwashing, antiseptic handwashing, and antiseptic handrubbing.

1. Handwashing refers to the action of washing hands with plain (non-antimicrobial) soap and water.
2. Antiseptic handwashing refers to washing hands with water and soap or other detergents containing an antiseptic agent.
3. Antiseptic handrubbing refers to the application of an antiseptic handrub (usually an alcohol-based formulation) to the hands to reduce or inhibit the growth of microorganisms.

Hand Antisepsis

Hand antisepsis refers to either antiseptic handwashing or antiseptic handrubbing.

Hand Disinfection

Hand disinfection is a similar concept, but may cause confusion because disinfection usually refers to environmental decontamination; therefore hand antisepsis is preferred.

Surgical hand preparation refers to the procedure recommended to clean hands before performing surgery; it is, however, not discussed in this chapter.

Compliance

- The WHO 'My Five Moments for Hand Hygiene' is based on a conceptual model of microbial transmission and can be used for teaching, monitoring, and reporting hand hygiene compliance. It defines five indications for hand hygiene in healthcare (see Table 6.1). A period of time during which one or more of these indications for hand hygiene exists is called an opportunity. Hand hygiene compliance is calculated by dividing the number of hand hygiene actions performed when an opportunity exists by the total number of hand hygiene opportunities.
- Major risk factors for noncompliance are healthcare worker profession (physicians are usually less compliant than nurses), workload (compliance is inversely related to workload), indication (compliance is worse before patient contact than after), poor access to hand hygiene materials (sinks, dispensers), and the absence of multimodal hand hygiene promotion (see below).
- Among all identified risk factors for noncompliance, time constraint is the most important. In other words, the higher the demand for hand hygiene, the lower the compliance. Thus, access to hand hygiene products at the point of care and the use of a fast-acting agent both facilitate improved compliance.

Technique and Products

- The ideal technique for hand hygiene should be quick to perform at the point of care, reduce hand contamination to the lowest possible level, and be free from significant side effects on the healthcare worker's skin.

- Alcohols are currently the preferred agent for routine hand hygiene. They have excellent activity and the most rapid bactericidal action of all antiseptics. Of importance from a workflow perspective, alcohols dry very rapidly, allowing for fast antisepsis at the point of care. In addition, alcohols are more convenient for hygienic handrub than aqueous solutions given their excellent spreading quality and rapid evaporation. Furthermore, currently there is no antibacterial resistance to alcohols, with the exception of Clostridium difficile and other spore-bearing pathogens. Importantly, however, visibly soiled hands should be washed with soap and water.
- When evaluating hand hygiene products for use in the healthcare setting, important factors include their relative efficacy against pathogens, rapidity of action, acceptance and tolerance by healthcare workers, convenience of use, accessibility, and cost. With alcohol-based agents, the time required for drying may affect efficacy and user acceptance. Alcohol-based antiseptics intended for hand hygiene in healthcare are available in rinse, gel, and foam formulations. At equal concentrations, n-propanol is the most effective alcohol and ethanol the least.
- Alcohol-based handrubs (whether isopropyl, ethyl, or n-propanol, in 60-90% vol/vol), when containing appropriate emollients such as glycerol (1-3%) or other skin-conditioning agents, are less irritant to healthcare worker's hands than soap and water. Soaps and detergents are damaging substances when applied to the skin on a regular basis by increasing skin pH, reducing lipid content, increasing transepidermal water loss, and even enhancing microbial shedding. Another disadvantage of handwashing is the requirement to dry hands thoroughly using paper towels — this takes time and money.

WHO Multimodal Hand Hygiene Strategy

- Multimodal promotion strategies are the most effective means of improving hand hygiene compliance. The WHO multimodal hand hygiene strategy includes:
    1. System change, including alcohol-based handrub at the point of care.
    2. Education and training.
    3. Observation and performance feedback.
    4. Reminders in the workplace.
    5. Patient safety climate (an implementation guide and suite of tools are available at http://www.who.int/gpsc/5may/en/).
- The WHO Hand Hygiene Self-Assessment Framework is a self-administered questionnaire that can be used to provide a situation analysis of hand hygiene resources, promotion, and practices within healthcare facilities, and to develop an action plan for future interventions.
- Observation and performance feedback of hand hygiene behavior is an important component of multimodal promotion. Direct observation using the WHO 'My Five Moments for Hand Hygiene' technique is currently considered the optimal method to monitor hand hygiene compliance. Advantages include provision of a meaningful denominator (e.g. when hand hygiene is indicated), capacity to stratify results (e.g. by profession or indication), and the behavior change benefit of immediate performance feedback. Key limitations, however, are the relatively small proportion of total actions that are monitored, and the resource-intensive nature of this activity. Other options include monitoring product consumption (such as alcohol-based handrub), self-reporting, patient observers, and automated systems.
- The cost-effectiveness of hand hygiene promotion has been demonstrated in several studies.

SUGGESTED PRACTICE

In 2009, WHO released guidelines for hand hygiene in healthcare settings (available at http://www.who.int/gpsc/5may/tools/9789241597906/en/). The guidelines are accompanied by an implementation guide and a suite of resources and tools to facilitate translation of recommendations into practice. The guidelines contain a series of recommendations, each of which is classified into four categories. The guidelines include indications for hand hygiene (see Table 6.1), surgical hand preparation, selection of hand hygiene agents, healthcare worker skin care and education, strategies for motivational programs, administrative measures, and recommended outcome or process measurements.

Table 6.1 Indications for Hand Hygiene Actions
A. Wash hands with soap and water when hands are visibly dirty or visibly soiled with blood or other body fluids (IB) or after using the toilet (II).
B. If exposure to potential spore-forming pathogens is strongly suspected or proven, including outbreaks of *Clostridium difficile*, handwashing with soap and water is the preferred means (IB).
C. Use an alcohol-based handrub as the preferred means for routine hand antisepsis in all other clinical situations described below, if hands are not visibly soiled (IA). If an alcohol-based handrub is not available, wash hands with soap and water (IB).
D. Perform hand hygiene: - **Before** touching a patient. - **Before** aseptic/clean procedure. - **After** body fluid exposure risk. - **After** touching a patient - **After** touching patient surroundings (without touching the patient during the same care sequence).

Footnote to Table 6.1

The system for categorizing recommendations is adapted from the CDC/HICPAC system as follows:

- ***Category IA.*** *Strongly recommended for implementation and strongly supported by well-designed experimental, clinical, or epidemiologic studies.*
- ***Category IB.*** *Strongly recommended for implementation and supported by some experimental, clinical, or epidemiologic studies and a strong theoretical rationale.*
- ***Category IC.*** *Required for implementation, as mandated by federal and/or state regulation or standard.*
- ***Category II.*** *Suggested for implementation and supported by suggestive clinical or epidemiologic studies or a theoretical rationale.*

SUGGESTED PRACTICE IN UNDER-RESOURCED SETTINGS:

The practices listed above apply to under-resourced settings.

SUMMARY

Hand hygiene is the cornerstone of infection prevention. However, healthcare worker compliance is typically low in the absence of structured behavior change strategies. Improving hand hygiene practices constitutes one of the major challenges of infection control; it is, however, associated with decreased transmission and reduced infection rates and antimicrobial resistance transfer. Factors adversely affecting healthcare worker compliance with recommended practices include poor access to sinks and hand hygiene materials, time required to perform conventional handwashing with soap and water, time constraint associated with a high

intensity of patient care, and a high number of opportunities for hand hygiene per hour of care on a single patient in critical care.

Availability of an alcohol-based handrub at the point of care is recommended to improve compliance. Alcohol-based handrubbing is currently recommended as the primary tool for hand hygiene action and promotion because it reduces bacterial counts on hands more effectively than plain or antimicrobial soaps, can be made more accessible than sinks and other handwashing facilities, requires less time to use, and causes less skin irritation and dryness than washing hands with soap and water. Rubbing the hands together until the agent has dried is the essential part of the technique. Both easy access to hand hygiene facilities and the availability of skin care lotion appear to be necessary prerequisites for appropriate hand hygiene behavior. The promotion of alcohol-based handrubs at the point of care contributed significantly to an increase in compliance both in several clinical studies and in nationwide hand hygiene promotion campaigns. The availability of a handrub alone however, is insufficient to obtain sustained improvement in hand hygiene practices. Multimodal strategies are indicated and include: 1) system change, including alcohol-based handrub at the point of care; 2) education and training; 3) observation and performance feedback; 4) reminders in the workplace; and 5) patient safety climate. This approach involves a system change to make hand hygiene a priority, with alcohol-based hand rub as standard of care.

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