



INTERNATIONAL
SOCIETY
FOR INFECTIOUS
DISEASES

GUIDE TO INFECTION CONTROL IN THE HEALTHCARE SETTING

Hand Hygiene Monitoring

Author

Rekha Murthy, MD
Jonathan Grein, MD

Chapter Editor

Ziad A. Memish, MD, FRCPC, FACP

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Chapter last updated: April 2018

KEY ISSUES

Hand hygiene (HH) compliance by healthcare workers (HCWs) is an important quality measure in reducing healthcare associated infections, and monitoring compliance to provide feedback is critical to improving performance.

KNOWN FACTS

- HH remains the cornerstone of infection prevention, and improvements in compliance have been associated with reduction of hospital-acquired infections and pathogen transmission.
- Healthcare facilities should take a comprehensive, systematic approach to assessing HH performance and provide regular feedback to improve compliance based on established goals.
- The ideal approach to monitoring HH compliance should be free of bias, not interfere with HCW activities or behavior, assess the quality of each HH episode, and reliably capture each HH opportunity even during complex care activities. It should not require excessive staffing time or other resources and be able to provide real-time and specific feedback to improve performance.
- Bias plays a critical role in assessing compliance, and efforts should be taken to minimize its impact. The major types of bias are:
 1. Observation bias: The behavior of those being observed is changed by the knowledge that they are being observed. Otherwise referred to as the “Hawthorne” effect.
 2. Observer bias: The systematic error introduced by variations in the observation method. This bias can be minimized through the use of experienced observers that conduct observations with a consistent, validated approach.

3. Selection bias: The systematic error introduced through the selection of time and setting for which the observation occurs. This can be minimized by randomly choosing locations, time of day, and type of HCW to be observed.
- The CDC and WHO both provide a variety of educational material and tools to conduct HH surveillance. Additionally, free applications for smartphones and tablets are available (i.e., iScrub Lite).
 - A standardized approach to conducting HH surveillance has not been widely adopted across healthcare institutions, making inter-facility comparisons of compliance rates difficult. The WHO provides a standardized HH observation method, based on the 'My Five Moments for Hand Hygiene' model, to provide a consistent approach for trained observers. Moments 1 (before touching a patient), 4 (after touching a patient), and 5 (after touching patient surroundings) account for the majority of HH opportunities and may be a reliable indicator of overall compliance.
 - Multimodal interventions, including those that utilize HH compliance monitoring with feedback, have been shown to result in improved rates of HH compliance and reduce clinical infection and colonization rates.
 - Feedback of HH compliance is critical to improve performance, and should optimally include accurate real-time feedback specific to individual HCW.

Direct Observation

- This is the most common approach, and typically involves trained (and often covert) observers utilizing a standardized and validated observation tool. This is considered the gold standard for assessing HH compliance, and is the only approach that can assess all HH opportunities. This method can assess HH technique, provide immediate feedback, and can identify other infection control opportunities. It may also allow observers to troubleshoot and provide local solutions for

barriers to compliance. Importantly, this approach suffers from many limitations. It is a time-consuming and labor-intensive process that only captures a small proportion (<1-3%) of all HH opportunities. It frequently excludes nighttime and weekend shifts, can be limited by visibility or patient privacy issues, can suffer from poor inter-user reliability, and is subject to several types of bias (most notably observation bias).

Observation bias might be mitigated by limiting each observational session to short periods (i.e., <20 minutes).

- Self-reporting or peer-reporting of HH compliance will over-estimate compliance and is considered unreliable. Utilizing patients as observers may be useful in settings where visibility or patient privacy limit observation from trained observers (such as ambulatory clinics). Experience with this approach is limited, and it has suffered from poor response rates and inconsistency. Concerns regarding negative impacts on patient-provider relationships have not been demonstrated in studies. Though only a limited amount of information regarding HH compliance may be provided, it may be a useful strategy in some settings, and may help to further engage patients in their care. This approach may not be easily scalable or appropriate for inpatient settings.

Indirect Assessment of Product Consumption

- Monitoring product usage, such as soap, paper towels, or quantity of alcohol-based handrub (ABHR), has been used as a surrogate for HH compliance. This approach can assess trends in a large number of HH events, incorporates day and night shifts, requires less manpower than direct observation, and minimizes bias. Benchmarks have become available for ABHR usage (in liters per 1,000 patient days), stratified by unit type, which allow for trending and monitoring progress towards established goals. This method does not assess the number of HH opportunities, and can therefore only provide an estimation of compliance. Patient acuity and other factors will impact usage and must

be accounted for when estimating compliance. Studies correlating observed compliance with increased product utilization have been mixed, though a correlation between increased ABHR usage and reduced methicillin-resistant *Staphylococcus aureus* (MRSA) rates has been described. Other limitations include the lack of HCW specific information, inability to assess HH technique or provide immediate feedback, and inability to account for usage by patients or visitors.

- Electronic counting devices have been developed to offset some of the limitations above. These devices allow for collection of time- and date-specific information, and can provide dispenser-specific information helpful in assessing optimal dispenser type and placement. Usage data can be wirelessly downloaded to reduce manual data collection. Limiting factors include the inability to record compliance based on CDC- and WHO-defined opportunities, the need for significant technology support, cost of device installation, as well as maintenance and routine battery replacement.

Electronic HH Compliance Systems

- A wide variety of electronic devices have become available to assess HH compliance. These systems use a variety of sensors to detect HCW entry into a room or patient “zone,” and can prompt HCW if HH product is not dispensed within a certain time after entry or exit. Some systems can detect the presence of alcohol on HCW hands, and can allow HCW-specific tracking with special badges. Additionally, certain systems utilize wireless technology (including WiFi, RFID, or ultrasound) to track HCW location in real-time, which may offer other advantages such as tracking inventory or assessing workflow patterns. These systems capture a large number of HH opportunities, can provide specific real-time feedback, and have been shown to significantly improve HH compliance. However, published data is generally limited by small study size, poor

study quality, and lack of comparison to compliance by direct observation.

- Although advances in this technology appear promising, certain limitations remain. These approaches may be costly, require sensor installation and maintenance, and require significant technology support that may be limited by existing technology infrastructure. No electronic system is able to assess all HH opportunities, such as HH prior to aseptic procedures, following exposure to bodily fluids, or when patients are outside the hospital room. Although accuracy has been generally high when compared to direct observation, even small inaccuracies are significant if used to hold individual HCW accountable for non-compliance. These systems have variable ability to assess HH compliance during high frequency or complex care events. Ensuring HCW acceptance of these methods requires organizational planning and advanced preparation. Currently there is limited data to demonstrate cost-effectiveness or improved clinical outcomes with these approaches.
- Video monitoring to assess HH has been shown to improve HH compliance. This approach requires careful camera placement to limit patient privacy concerns, requires installation and hard-wiring, and utilizes external auditors to evaluate compliance.

Controversial Issues

- The ideal approach to monitoring HH compliance is not clear; each has numerous advantages and limitations. Although direct observation is considered the gold standard, it suffers from many important limitations that limit its generalizability. The accuracy and reliability of each approach is not well understood.
- There is variability in the assessment of “compliance.” Institution-specific approaches vary regarding their approach to measuring compliance, training observers, and in the volume or frequency of observations performed. This variability makes comparison of compliance rates

between institutions difficult. Although tools are available to provide a consistent approach, they are not yet widely adopted.

- Although general improvements in HH have been associated with reduced healthcare associated infections, the optimal “threshold” for HH compliance to improve clinical outcomes is not understood.
- Outpatient and ambulatory care areas provide unique challenges to monitoring HH compliance, are less studied, and optimal approaches in these areas are not well understood.
- Public reporting of HH compliance is controversial. Inconsistent HH monitoring approaches between institutions, resource constraints, and concerns that public reporting may drive artificial increases without improving performance are common arguments against public reporting.
- Optimal approaches to improving and sustaining HH compliance are not understood. Models utilizing HCW-specific accountability and consequences for non-compliance may be effective but remain poorly studied.
- There is limited data on the long-term impact of various approaches to sustaining HH compliance, including cost-effectiveness, HCW acceptance, or impact on healthcare-associated infections.
- There is insufficient data regarding improved clinical outcomes or cost-effectiveness associated with implementation of electronic HH monitoring systems.

SUGGESTED PRACTICE

The optimal approach to monitoring HH compliance is variable and depends on organizational goals and available resources. A high degree of institutional leadership support and visibility, coupled with allocation of resources for ongoing HH monitoring and feedback, is critical to any successful HH campaign. Healthcare institutions should develop a sustainable, credible, and reliable process to monitor HH that is accurate

and attempts to minimize bias. Most often, direct observation by trained observers utilizing a consistent approach with validated tools is the primary method of choice, though this may be done in conjunction with other methods. Utilizing a combination of direct observation coupled with methods for electronic surveillance may be an optimal strategy, though studies on how to combine these approaches within a healthcare facility are limited. Efforts to improve performance should utilize pre-existing quality-improvement structures and should emphasize a process for direct and timely feedback. If the performance improvement process relies on HCW-specific accountability and consequences for non-compliance, then a high degree of accuracy for each observation is essential, along with strong leadership support.

SUGGESTED PRACTICE IN UNDER-RESOURCED SETTINGS

Please see suggested practice.

SUMMARY

The growing recognition of the importance of HH monitoring as a component of infection prevention programs in healthcare facilities has led to advances in direct and indirect measurement approaches. Though limitations apply to all of these methods, tools are available to aid implementation of HH measurement and feedback to support these efforts in a variety of settings.

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