Hand Hygiene Compliance Measurement

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Forward

As far back as Semmelweis's hand hygiene interventions,[1] the importance of hand hygiene in healthcare settings has been clearly established. Several studies have demonstrated the association of reduced healthcare-associated infections (HAIs) when hand hygiene compliance rates were increased.[2-4] For nearly a decade, hospitals have been measuring hand hygiene compliance among healthcare workers. In spite of the time and resources required to measure hand hygiene compliance using the direct observation method, hand hygiene compliance remains unsatisfactory with national averages below 50%.[5] This publication will review some of the different types of electronic hand hygiene compliance monitoring systems available today, different technologies available, pros and cons, and provide some suggestions when shopping for a system for a healthcare facility.

For the purposes of this whitepaper, compliance can be defined as leveraging technology, products and clinical interventions to drive sustained improvements in hand hygiene compliance, thereby reducing the incidence of HAIs, reducing the cost of healthcare and improving patient outcomes. These three features (technology, products and clinical interventions) work synergistically to create a hand hygiene program with the ultimate goal of sustained improvement in hand hygiene. A healthcare facility could purchase the most technologically advanced hand hygiene measurement system, but if the hand hygiene products are not accepted by the staff, and there are no interventions to address trends found in the data, the goals will not be achieved.

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The Background on Observation: the Current "Gold Standard"

The most commonly used method to measure hand hygiene compliance today in healthcare settings is direct observation, sometimes referred to as the "gold standard" for compliance measurement.[6] Direct observation involves watching hand hygiene practices and proactively recording hand hygiene events (opportunities and activities) based upon the recommendations as described in the CDC Hand Hygiene Guideline[7] and also in the WHO Guidelines on Hand Hygiene in Health Care.[8] Direct observation provides the observer with an opportunity to not only determine if hand hygiene took place at the appropriate times, but it also provides the observer with the ability to coach and teach the healthcare worker on technique, duration of hand hygiene events, exactly when hands should be cleaned in a healthcare setting and potentially provide the context to help identify root causes of failure. While there are some advantages to direct observation noted above, it is difficult to rely on this method for accurate compliance metrics due to selection bias, The Hawthorne Effect, limited visibility behind the door/curtain, the inability to get objective data from all units/shifts interrater reliability and the statistical significance of a small sample size, each of which will be explored below. In addition, this method often requires a significant amount of time to collect, enter and/or manipulate and format the data for presentation. This added work can become a drain on limited Infection Prevention resources that could be better utilized identifying the root causes of non-compliance and providing meaningful interventions.

The first of the challenges of observation noted above is selection bias, or the observer's natural tendency to capture and record what they see (i.e., a hand hygiene event that occurred) versus something they didn't see (a missed hand hygiene event). This phenomenon can artificially inflate the compliance rate reported. In addition, some hospitals utilize Infection Preventionists and other staff to do the observations, but this method often leads to The Hawthorne Effect. The Hawthorne Effect is defined as the tendency of some people who know they are being observed in a research context to behave differently than from the way they would otherwise behave, thereby impacting the results.[9] Some hospitals hire "secret shoppers" to observe hand hygiene compliance discreetly which can be costly and may not always be as

discreet as intended. Another challenge of observation is ensuring interrater reliability when there are several people observing hand hygiene. Interrater reliability is described as two or more observers observing the same event and then comparing the amount of agreement (or disagreement) between the observers.

> **To ensure interrater reliability, healthcare facilities must implement ongoing and robust training programs to ensure that all observers remain consistent in determining if hand hygiene took place at the recommended moments.**

Many discussions have taken place in the clinical arena to determine how many observations would produce statistically significant data. Although the benefits of assessing the qualitative nature of hand hygiene and the ability to address missed opportunities in a timely manner through direct observation cannot be minimized, providing a hospital hand hygiene compliance rate based upon a small sample size does not accurately reflect all the hand hygiene opportunities healthcare workers encounter during a work shift. In a large hospital study of HCWs hand hygiene practices, it was estimated that HCWs could clean their hands in an ICU setting approximately 20 times per patient hour.[10] Based upon that calculation, consider that during one 12-hour shift, an ICU nurse could have as many as 240 opportunities to perform hand hygiene. Many Infection Control programs are challenged to achieve that many observations in a month.

Technology can be used to both streamline/improve the current process of observation and to provide an automated method for capturing hand hygiene opportunities and events to approximate a hand hygiene compliance rate and trends. Both will be discussed below.

Technology-Enabled Observation

Technology can accompany hand hygiene observations to make the process easier. One example is using a downloadable application to count and record hand hygiene observations and to create reports. A touch screen interface allows one to record observations, and when finished, e-mails the resulting comma-separated value file for easy analysis.[11] These applications can be downloaded on an iPhone® or iPad,® and the hand held device can be carried by the observer. An ongoing report

of compliance rates is generated by the application, and this reduces the time spent tallying and creating a hand hygiene report.

Electronic Compliance Monitoring

Electronic compliance monitoring is a technological consideration for measuring hand hygiene practices in healthcare. Most of these systems were designed to collect data in an unbiased way 24/7, format and provide real-time dashboards. This emerging method has been acknowledged by the Joint Commission and others as an acceptable approach to hand hygiene measurement.[13]

There are several types of electronic compliance monitoring systems available. While there are a variety of technologies used in these systems, many of them perform similar functions—they generate a numerator (hand hygiene events), denominator (opportunities) and then interpret and display the "compliance" in a series of dashboards. Understanding the technology is essential when selecting a system for a healthcare facility. Most systems are designed to detect hand hygiene product dispenser usage after sensing a person near or using the dispenser. Some systems record events at the dispenser and some also detect the individual by reading a badge the HCW is wearing.

An activity based or community based system functions so that all who enter or exit a patient room are monitored for hand hygiene compliance. A sensor identifies movement (activity) upon entry into the room, and compliance is determined when the person who enters activates either the soap or sanitizer dispenser. A compliance rate is calculated based upon the number of room entries (the denominator) and activations of the dispenser (the numerator). This system is not person specific, and therefore, anyone who enters the room will be counted as an opportunity. This includes patients and visitors and provides a valuable opportunity to educate and engage patients and visitors about the importance of their hand hygiene and invite them to help fight infection. A recent study performed cultures of patients' hands 48 hours after admission to an acute care hospital.

39% of these patients cultured positive for C. diff, VRE, MRSA, or Acinetobacter, demonstrating the importance of patient hand hygiene.[14]

This type of system may be preferred by some hospitals that have sensitivity to identifying individual staff who are non-compliant. Depending on the technical capabilities of the system for data feedback, a system could also identify the room and shift for tracking compliance. The data should provide a representation of hand hygiene trends and patterns on the particular unit or in a particular room, and provide the Infection Preventionist with reliable data to investigate the aberrancies in trends and patterns. It is worth noting that not all activity based systems have the capability of capturing actual traffic patterns and require theoretical inputs for the denominator.

Another compliance monitoring system offers a module that attaches to the hospital Real Time Locator System (RTLS). Using the existing IT infrastructure, caregivers wear an RTLS badge that is monitored by proprietary radio frequency or WiFi networks in real time. As caregivers enter/exit the patient room and wash, the RTLS system records "wash-in/wash-out" opportunities and wash events. These systems know who entered a room, how long they were there and that rules have been established to accommodate for common clinical workflow.

Collected data points are reported to sophisticated software packages that are available to analyze and report compliance/quality metrics in standard as well as advanced dashboard formats.

Developers of these systems have been working to write the algorithms over the past few years to more accurately reflect and report hand hygiene compliance. As background, RTLS is often used in healthcare facilities for asset tracking, temperature monitoring for refrigerators storing medications and vaccines, and nurse or patient locators. The pre-existing system could add the hand hygiene module as another application if hand hygiene dispensers are enabled to "talk" to the RTLS network. Because the HCWs are wearing badges, these types of systems can track hand hygiene compliance rates of a specific person or possibly discipline level. For example, the badges of all physicians could identify the specific

physician or could account for all physicians' compliance rate. A challenge for healthcare facilities to acknowledge before implementing such a system would be to determine what the consequences are for non-compliance. Hospitals need to determine how they will use the data; will it be at the role or unit level, or will the data be presented and used at the individual level at the outset. In addition, a plan of action for non-compliance is essential.

Some systems use radio frequency identification (RFID) to sense room entry and exit. RFID was originally used for inventory and asset management. RFID uses tags to identify an object (HCW) uniquely. Badge-based systems designed specifically for hand hygiene monitoring use RFID and infrared (IR) to record caregiver workflow and hand hygiene activity based on a body-worn device (smart badge) capturing and transmitting hand hygiene events and opportunities to software with reporting features and capabilities similar to activity monitoring. RFID provides functionality in terms of issuing reminders and indicators of hand hygiene adherence at the point of care (e.g., could flash a red light indicating that staff have not washed hands).

These different systems have different ways of capturing and recording hand hygiene events (the numerator). One method is to attach a "motion detector" to the outside of the dispenser which captures movement under the dispenser and assumes hand hygiene occurred. Another method is to integrate the measurement into the dispenser design in order to capture the actual dispenser actuation and product dispense. Integrated components tend to run on the same power source and are generally engineered to work together. External devices generally require a separate power source. There are also systems that "sniff" alcohol when a healthcare worker presents their hands and the product to a wall-mounted or individually worn "sniffer." Once the hand hygiene event is recorded, it is transmitted wirelessly via RFID or IR to other components in the "network," databased and then displayed on the dashboard within a few minutes.

Another method of measuring compliance electronically is video. Video, combined with advanced software algorithms, detects whether appropriate hand hygiene compliance

occurred via facial and gesture recognition. Sometimes referred to as the "all-seeing eye," video monitoring offers the deployment of a full-time observer that can capture all aspects of hand hygiene including a better way to delineate whether patient or surroundings contact was made. This system requires that someone is watching and reading the videos to provide feedback. Video leaves little question as to which HCW complies with hand hygiene policies and which one does not. Again, a hospital would have to develop a plan of action for accountability for the non-compliant.

Keep in mind, a recent study demonstrated that there was no correlation between hand hygiene observations and electronically monitored hand hygiene compliance,[12] but there is value in observation as noted above. While it is not completely clear how observation and electronic methods will coexist, they each have their strengths and potential roles. It is possible that the objective and quantitative measure for hand hygiene compliance rates will be based on electronic compliance measurement.

> **These electronic methods will generate unbiased 24/7 data to identify both low and high compliers (units, roles and individuals) and potential trends that need to be investigated.**

Staff could then be deployed to do the qualitative assessment through observation. This would allow a facility to quickly review hand hygiene data and trends and effectively target the limited observation resources to better understand the root causes of non-compliance instead of collecting, entering and formatting data.

Other Considerations

What level type integration with other hospital systems does the electronic hand hygiene compliance monitoring system have? Is it a stand-alone system or is it/can it be integrated into other hospital systems.

There are many variations of electronic compliance monitoring systems emerging daily, yielding many factors to consider when testing or purchasing a system.

> **Healthcare facilities should consider the purpose of the system is not only to measure hand hygiene compliance, but also to act to the trends seen in the data and ultimately provide better patient outcomes.**

What kind of follow-up customer service comes with the system? Studies have shown that there is no correlation between observed and electronically monitored data, and therefore compliance rates will be much lower than anticipated,[15] so be prepared for this, don't worry about a new and likely lower number, but instead focus on the trends and improvement. Will the facility be prepared to learn that although observations have been reporting 97% compliance, the electronically measured data is much lower? Does the vendor who installs the compliance measuring system offer clinical support to help the facility achieve improved performance? What type of involvement is required of the IT department to implement the system? Can the hospital infrastructure support this? Is the system compatible with pre-existing monitoring such as telemetry?

Multimodal hand hygiene programs acknowledge the importance of feedback when attempting to improve compliance.[16] A healthcare facility considering an electronic hand hygiene monitoring system should consider the feedback provided by the system. Are there printable reports? Does the staff receive performance feedback? Is there a way to look at trends and patterns over time? How will the organization react to non-compliance?

Other questions to ask before selecting an electronic compliance monitoring system include inquiring about the installation process. Who does the installation? Speaking with a previous customer could give insights into their satisfaction with the process. Once installation is complete and before the vendors leave, it is important to ask for validation that the system is indeed capturing hand hygiene events as it claims to.

There should be a contact person in the healthcare facility and also one within the vendor's company to exchange questions and discuss any problems that are encountered.

A Multimodal Approach

Finally, it is important to remember that having data alone will not necessarily provide the clinical outcomes you are seeking. The WHO multimodal hand hygiene improvement strategy[17] consists of five key components that need to be integrated together for successful implementation, including:

- System change: alcohol-based handrub at the point of care; access to a safe, continuous water supply, soap and towels

- Training and education

- Evaluation and feedback

- Reminders in the workplace

- Institutional safety climate

By implementing an electronic compliance monitoring system, it is possible to move closer to this strategy to sustain improved hand hygiene compliance and decrease HAIs. Electronic hand hygiene compliance monitoring is a new frontier in Infection Control programs, and there is a call to action for more understanding of a system's capabilities, continued technological advances and ongoing support to sustain improved hand hygiene compliance rates.

Reference List

[1] Pittet, D. & Boyce J.M. (2001). Hand hygiene and patient care: Pursuing the Semmelweis legacy. *The Lancet Infectious Diseases*. 1(1)9–20

[2,4,12,13,15] Morgan, D.J. et al. (2012). Automated hand hygiene count devices may better measure compliance than human observation. *American Journal of Infection Control*. 40. 955–9.

[3] Kirkland, K.B. et al. (2012). Impact of a hospital-wide hand hygiene initiative on healthcare-associated infections: Results of an interrupted time series. *Quality Safety BMJ* 21; 1019–1026. Retrieved March 19, 2013 from http://www.qualitysafety.bmj.com

[4,7,10] Boyce, J.M. & Pittet, D. Centers for Disease Control and Prevention (2002). Guideline for Hand Hygiene in Healthcare Settings. *Morbidity and Mortality Weekly Reports* 51(RR-16) p1–45.

[5,6,9] The Joint Commission. (2009). *Measuring Hand Hygiene Adherence: Overcoming the Challenges.* Available at http://www.jointcommission.org/topics/monographs_and_white_papers.aspx

[8] World Health Organization. (2009). *WHO Guidelines on Hand Hygiene in Health Care.* Geneva, Switzerland.

[11] University of Iowa iScrub retrieved from http://compepi.cs.uiowa.edu/index.php/Research/IScrub

[14] Istenes, N. et al. (2013). Patient's potential role in the transmission of healthcare associated infections: Prevalence of contamination with bacterial pathogens and patient attitudes towards hand hygiene. *American Journal of Infection Control*, article in press. 1–6.

[16] Pittet, D. (2000). Improving compliance with hand hygiene in hospitals. *Infection Control and Hospital Epidemiology.* 21. 381–386.

[17] The World Health Organization. Testing the WHO Guidelines on Hand Hygiene in Healthcare on 8 pilot sites worldwide. Retrieved from http://www.who.int/gpsc/country_work/pilot_sites/introduction/en/

Biography

Jane Kirk is the Healthcare Clinical Manager for GOJO Industries, and is responsible for bringing the clinical perspective to our Acute Care and Long-Term Care businesses. Prior to joining GOJO in 2008, she was Director of Infection Control at a 600+ bed hospital in Northeast Ohio where she initiated a robust hand hygiene program. Jane's experience in nursing also includes Public Health, Emergency Nursing, Critical Care, Ambulatory Nursing, and Clinical Instructor at Walsh University in Canton, Ohio. Jane holds a Master of Science in Nursing degree from Walden University and an undergraduate degree from the University of Detroit Mercy.

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