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Letter to the Editor

Letter in response to “Automated and electronically assisted hand hygiene monitoring systems: A systematic review”

To the Editor:

I am pleased to see that emerging research and news around electronic monitoring of hand hygiene compliance is growing. In reviewing the Ward et al¹ article, I noted some important research and learning that was not included. I would like to take the opportunity to point out recent reports and studies regarding the following:

- Research supporting electronic monitoring of hand hygiene
- Studies validating the group monitoring approach
- The significance of adhering to the My 5 Moments for Hand Hygiene guidelines from the World Health Organization (WHO)

It may be soon realized that electronic hand hygiene compliance monitoring systems represent the next major disruptive technology in hand hygiene, following the introduction and widespread global acceptance of alcohol-based hand sanitizers. Clearly an option other than direct observation is needed if we want accurate, reliable, and timely data, which is essential for real improvement. With the compliance rate of hand hygiene for health care workers still estimated by the WHO at <40%, there is much work to be done.

RESEARCH SUPPORTING ELECTRONIC MONITORING

There is a sound body of published evidence that direct observation can overstate hand hygiene compliance rates significantly. This is likely caused by the Hawthorne effect, lack of interrater reliability, and the typically small, if not statistically insignificant, sample size. In addition to the Morgan et al² and Cheng et al³ in addition to articles cited by the authors, the 2009 study by Scheithauer et al⁴ demonstrated a 275% overstatement of hand hygiene compliance rates reported by direct observation versus product utilization. Data presented at the 2013 International Consortium on Prevention and Infection Control in Geneva, Switzerland, demonstrated an average overstatement of hand hygiene compliance based on the WHO's My 5 Moments for Hand Hygiene of 33% when direct observation was compared with 24 h/d, 7 d/wk video monitoring of patient stays over a 15-month period.⁵

Conflicts of interest: The author receives a salary from DebMed USA, LLC.

As more research into this new patient safety technology is published, we will quickly realize that having accurate, reliable, and timely data on virtually 100% of hand hygiene events (as opposed to the typical >1% that can be achieved by direct observation) from an electronic system is only part of the equation and that sustained improvement will likely come from behavior change models that are integrated with the use of such data.

CLOSER LOOK AT GROUP MONITORING

Although direct observation was used as the measurement methodology by Son et al,⁶ teams (consisting of a representative from quality assessment, an infection prevention practitioner, and staff from a particular unit) at Memorial Sloan Kettering Cancer Center began by discussing the current barriers to hand hygiene success. They then set their own goals for hand hygiene compliance.

- Staff learned the WHO's hand hygiene guidelines, which had recently been adopted as part of the hospital's infection prevention policy.
- Staff members were trained to observe each other and began officially collecting and submitting data to infection prevention.

The results are as follows: “Between 2006 and 2008, average institutional hand hygiene compliance held steady at 60 percent to 70 percent. After the new program was launched in 2008, compliance reached 97% and has been maintained at this level ever since.” In this case, monitoring compliance at the group level versus an individual tagging and tracking approach using badges and sensors drove sustainable improvement and culture change.

Therefore, to meet the challenges of implementing an electronic system, a framework for how hospitals should use and share the data will likely be essential. A study by Conway et al⁷ further points out how to meet these challenges.

CASE FOR COMBINING ELECTRONIC MONITORING WITH GROUP MONITORING

In a predecessor abstract and poster of this study outlining a framework for how hospitals should best use hand hygiene compliance data, Conway et al presented the study findings at The Association for Professionals in Infection Control and Epidemiology (APIC) Conference held June 2013 in Ft. Lauderdale, FL.⁸ In the abstract, an electronic group monitoring system was installed in a 150-bed community hospital. Staff feedback on hand hygiene compliance performance was provided based on how the staff stated they preferred to receive the reports. The results were positive. “Overall, the hand hygiene compliance index for five medical-surgical units, the critical care unit, and the emergency room

combined was significantly higher after the GMS (Group Monitoring System) feedback compared to before.”

As expected, several challenges were encountered, but as pointed out in the results, “the staff, research team and vendor worked collaboratively to find workable solutions to the challenges.” Therefore, it is evident that successful implementation will take collaborative effort, but statistically significant improvement can be achieved when such collaboration is in place.

ROLE OF THE WHO'S MY 5 MOMENTS FOR HAND HYGIENE

Ward et al point out that while the use of the WHO's My 5 Moments for Hand Hygiene standard is widespread among hospitals, most electronic monitoring systems on the market only capture hand hygiene activity related to moments 1 and 4 (before and after touching a patient). However, this only applies to the badge-based systems in which health care workers have to wear badges or sensors integrated with soap and sanitizer dispensers to detect whether or not compliance occurred at moments 1 and 4. Steed et al⁹ in the HOW2 Benchmark Study used the WHO's My 5 Moments for Hand Hygiene data collection methodology to estimate hand hygiene opportunities in general medical wards, intensive care units, and emergency departments.

According to the study's conclusion, “these data can be used as denominator estimates to calculate hand hygiene compliance when product utilization data are available.” There are group-based electronic hand hygiene monitoring systems on the market today that use this method of predetermining evidence-based denominators and therefore calculate compliance based on the WHO's My 5 Moments for Hand Hygiene standard. This study and these types of systems were not mentioned by Ward et al in their review.

Further, a follow-up validation study used video monitoring to validate the HOW2 Benchmark Study results. In their study, Diller et al¹⁰ demonstrated the accuracy and reliability of the HOW2 benchmarks. Their conclusion states the following: “This study validates the HOW2 Benchmark Study and confirms that expected numbers of HHOs can be estimated from the unit's patient census and patient-to-nurse ratio.” These data can be used as denominators in calculations of hand hygiene compliance rates from electronic monitoring using the My 5 Moments for Hand Hygiene methodology. Taken together, the HOW2 Benchmark Study and the video validation study demonstrate the accuracy and predictive values of a group-based monitoring system that uses denominators based on these studies. Additionally, Ward et al point out potential issues with hard-wired systems, but they do not take into account that there are systems on the market that are totally stand alone and do not require either hard wiring or integration with real-time locating systems or hospital Wi-Fi.

CONCLUSION

Contrary to the authors' statements about the ability to calculate compliance rates based on the WHO's My 5 Moments for Hand

Hygiene, with the publication of the video validation study it has been demonstrated that accurate, reliable, and validated hand hygiene compliance rates based on the WHO's My 5 Moments for Hand Hygiene can be achieved with commercially available electronic monitoring systems using software that calculates predetermined denominators based on the 2 studies.

Therefore, when all of the most recent research is considered, it is possible to select and implement an electronic hand hygiene compliance monitoring system that uses evidence-based algorithms to provide compliance rates based on the WHO's My 5 Moments for Hand Hygiene. Further, when used in conjunction with proven behavior change models, such systems can help drive sustainable improvement. Clearly more research is needed, and it will likely be undertaken at an accelerating rate.

Regardless of which method a hospital chooses, at the end of the day it will take accurate data plus high engagement on the part of hospital and unit leadership and frontline staff to see improvement in hand hygiene compliance. Similar to a gym membership, there is no quick solution. It only works if you consistently use the tools provided: you will get out what you put in.

References

1. Ward MA, Schweizer ML, Polgreen PM, Gupta K, Reisinger HS, Perencevich EN. Automated and electronically assisted hand hygiene monitoring systems: a systematic review. *Am J Infect Control* 2014;42:472-8.
2. Morgan DJ, Pineles L, Shardell M, Young A, Ellingson K, Jernigan JA, et al. Automated hand hygiene count devices may better measure compliance than human observation. *Am J Infect Control* 2012;40:955-9.
3. Cheng VC, Tai JW, Ho SK, Chan JF, Hung KN, Ho PL, et al. Introduction of an electronic monitoring system for monitoring compliance with Moments 1 and 4 of the WHO “My 5 Moments for Hand Hygiene” methodology. *BMC Infect Dis* 2011;11:151.
4. Scheithauer S, Haefner H, Schwanz T, Schulze-Steinen H, Schiefer J, Koch A, et al. Compliance with hand hygiene on surgical, medical, and neurologic intensive care units: direct observation versus calculated disinfectant usage. *Am J Infect Control* 2009;37:835-41.
5. Diller T, Kelly JW, Steed C, Blackhurst D, Boeker S, Alper P. Electronic hand hygiene monitoring for the WHO 5-moments method. *Antimicrob Resist Infect Control* 2013;2(Suppl):O16.
6. Son C, Chuck T, Childers T, Usiak S, Dowling M, Andiel C, et al. Practically speaking: rethinking hand hygiene improvement programs in health care settings. *Am J Infect Control* 2011;39:716-24.
7. Conway LJ, Riley L, Saiman L, Cohen B, Alper P, Larson EL. Implementation and impact of an automated group monitoring and feedback system to promote hand hygiene among health care personnel. *Jt Comm J Qual Patient Saf* 2014;40:408-17.
8. Conway LJ. Implementing an electronic hand hygiene group monitoring system: meeting the challenges. Abstract presented at: Association for Professionals in Infection Control and Epidemiology (APIC) June 2013 Ft. Lauderdale, FL.
9. Steed C, Kelly JW, Blackhurst D, Boeker S, Diller T, Alper P, et al. Hospital hand hygiene opportunities: where and when (HOW2)? The HOW2 Benchmark Study. *Am J Infect Control* 2011;39:19-26.
10. Diller T, Kelly JW, Blackhurst D, Steed C, Boeker S, McElveen DC. Estimation of hand hygiene opportunities on an adult medical ward using 24-hour camera surveillance: validation of the HOW2 Benchmark Study. *Am J Infect Control* 2014;42:602-7.

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