Brief Report

Comparing brief, covert, directly observed hand hygiene compliance monitoring to standard methods: A multicenter cohort study

Alissa Werzen MD [a], Kerri A. Thom MD [a*], Gwen L. Robinson MPH [a], Shanshan Li PhD [b], Clare Rock MD, MS [c], Loreen A. Herwaldt MD [d], Daniel J. Diekema MD, MS [d], Heather S. Reisinger PhD [d], Eli N. Perencevich MD, MS [d]

[a] Department of Epidemiology, University of Maryland School of Medicine, Baltimore, MD
[b] MassMutual Data Science, Springfield, MA
[c] Division of Infectious Diseases, Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, MD
[d] University of Iowa Carver College of Medicine, Iowa City, Iowa

Key words:
Infection prevention
Hand Hygiene
Compliance monitoring

Hand hygiene compliance is subject to the Hawthorne effect, which may be attenuated by covert observers and brief observation periods. This study demonstrated that hand hygiene compliance rates were between 8% and 29% greater when reported by infection prevention programs than when reported by covert observers over brief observation periods.
© 2018 Association for Professionals in Infection Control and Epidemiology, Inc. Published by Elsevier Inc. All rights reserved.

Hand hygiene (HH) is the cornerstone of infection prevention. Compliance monitoring and feedback are essential tools for hospital infection prevention programs. Direct observation remains the benchmark for assessing compliance, although it is subject to the Hawthorne effect.[1,2] Prior studies have shown that HH compliance collected by use of covert observers and brief observation periods may reduce this bias.[3] The primary aim of this study was to compare rates of HH compliance obtained by covert observers as part of a research study using brief observation periods (ie, <15 minutes) with rates obtained by hospital infection prevention programs using standard methods.

METHODS

As part of an ongoing, unpublished, multicenter, cluster-randomized trial to assess the efficacy of a direct-gloving strategy (a similar strategy previously outlined by Rock et al[4]), we collected data on HH and glove use for a cohort of health care workers (HCWs) in adult intensive care units and general pediatric units at 3 academic medical centers. For the ongoing trial, study units were randomized to a direct gloving policy in which HH before nonsterile glove use (eg, for entry into contact precaution [CP] rooms) was not required (intervention) or a policy requiring HH before donning gloves (comparator). Trial outcomes included compliance with expected practices at entry to CP rooms on the basis of the policy associated with study assignment, compliance with HH at room entry for non-CP rooms, and compliance with HH at exit from any room type. All observations from the trial were collected by covert research team members who observed in 1 location for a maximum of 15 minutes.[3] Data collected as part of the clinical trial were compared with compliance data collected by hospital infection prevention programs at each facility. Hospital infection prevention program HH compliance was collected on entry and exit by covert, non−infection prevention, non−unit-based hospital staff observers, who did not limit observations to 15-minute periods and reported as overall compliance (entry/exit combined).

With a random effects Poisson regression model, compliance rates were compared by collection method (study data collected by study personnel during brief observation periods vs data collected for hospital infection prevention programs) after adjusting for study month.
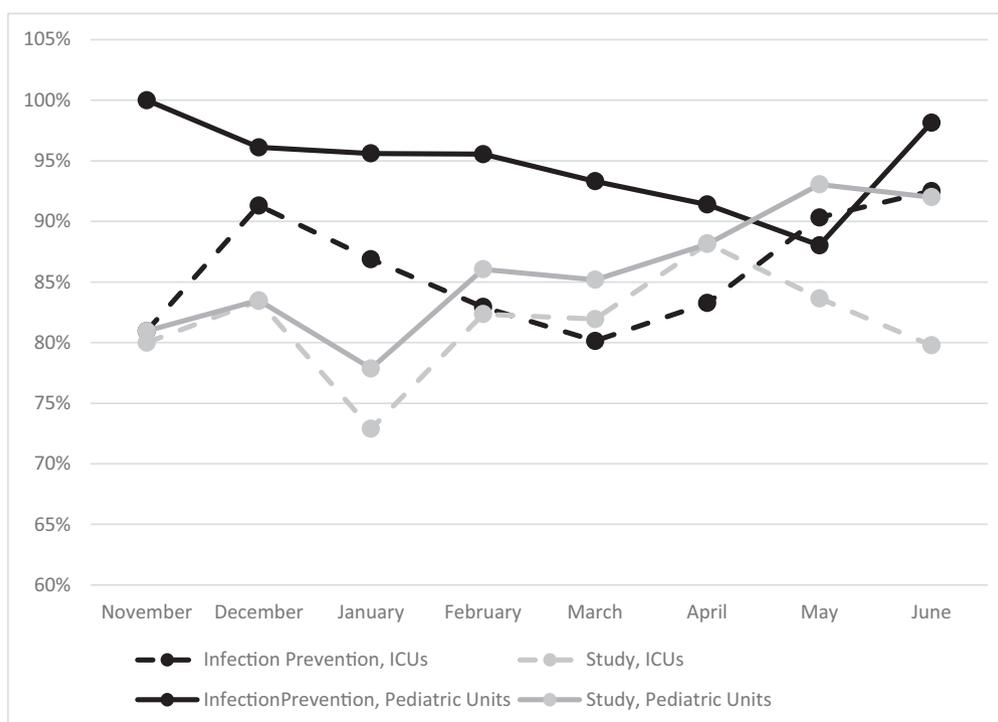
RESULTS

Over the 6-month study period, the research team observed 3,243 HH opportunities in 8 units at the 3 participating institutions, with an overall HH compliance rate of 69% for entry to and exit from all rooms combined (2,266 episodes/3,243 opportunities). HH compliance

Fig 1. Hand hygiene compliance at room entry and exit: comparison of infection prevention data and study data.

reported to hospital infection prevention programs for the same units during the same period was 89% (2,530/2,845).

When controlling for study month, combined HH compliance on entry and exit for all rooms reported by infection prevention programs was 29% higher than that reported by the study's observers (risk ratio, 1.29; 95% confidence interval, 1.21 to 1.36). When controlling for study month, combined HH compliance on entry and exit of all rooms reported by infection prevention programs was 8% higher than that reported by the study's observers on entry into non-CP rooms and exit from all rooms (risk ratio, 1.08; 95% confidence interval, 1.01 to 1.14).

DISCUSSION

We compared rates of HH compliance as reported by hospital infection prevention programs with that obtained by research study personnel limiting observations to a maximum of 15 minutes and found higher rates of HH compliance observed by infection prevention programs than among the research team in the same units during the same time period.

Depending on when HH compliance was measured (all rooms or entry into non-CP rooms and exit from all rooms), HH compliance was between 8% and 29% greater when reported by hospital infection prevention programs. We present comparisons of compliance 2 ways for the following reasons. The study data included oversampling of CP rooms by design to address the primary study outcome of HH and glove use compliance on entry into CP rooms, whereas the sampling from infection prevention was more likely to reflect the natural proportions of CP rooms within the study units. Because prior studies have observed lower compliance with HH before glove use,[5] study data (HH compliance on entry into all rooms) may have underestimated the true unit compliance for all rooms and therefore overestimated the difference between research and hospital infection prevention observations. To account for this, we also reported compliance on entry into non-CP rooms (may have overestimated compliance and thus underestimated the difference seen). We suspect the

true difference lies between 8% and 29%; in either case, rates of HH compliance reported by hospital infection prevention programs are consistently higher than that reported by the research team. The results of this study are in accordance with results of prior studies by Kohli et al[6] and Pan et al,[7] who found higher rates of HH compliance as assessed by infection prevention programs than by covert observers. Srigley et al[2] set out to quantify the Hawthorne effect in HH compliance and reported 3-fold high compliance in locations within eyesight of an auditor.

As illustrated by Figure 1, the magnitude of the difference between the HH compliance rates reported by infection prevention programs and research personnel decreased over the study period. Our study was not designed to explore the reasons for such change; however, we speculate that HCWs may have recognized study personnel over time and adjusted their behavior. Similarly, Chen et al[8] found that rates of HH compliance measured by covert observers increased with study duration.

The discrepancy in HH compliance revealed by our study confirms previously published reports of an observation bias when HH observers are known to the HCWs they are observing. Thus the accuracy and validity of relying on infection prevention program data to evaluate rates of HH compliance must be carefully considered with respect to who, what, when, and how measurements are made, particularly when HH compliance rates may be used as incentives for HCWs and for accountability purposes.

This study has several limitations. Study data were extracted from an ongoing clinical trial that was not specifically designed to assess the aforementioned differences in HH compliance. In addition, the study data included oversampling of entry into CP rooms. To account for this, data were presented with CP rooms included and excluded. Finally, infection prevention program data were presented to us in aggregate and did not allow for further breakdown at various opportunities such as room entry and exit.

We found that HH compliance rates reported by infection prevention programs were consistently higher than those reported by research personnel, suggesting overestimation of compliance by

infection prevention, which may have resulted from a difference in duration of observation or some other unmeasured factor. Because infection prevention HH data are increasingly used, the results of this study urge caution in overrelying on data derived solely from traditional methods of direct observation, because HH compliance rates acquired from brief observation periods by non−infection prevention staff may be more accurate, particularly when limited to brief observation periods lasting no more than 15 minutes.[3]

Acknowledgments

The authors would like to acknowledge the Infection Prevention departments at the University of Iowa, University of Maryland, and Johns Hopkins Hospitals for their assistance with data collection.

References

1. Hagel S, Reischke J, Kesselmeier M, Winning J, Gastmeier P, Brunkhorst FM, et al. Quantifying the Hawthorne effect in hand hygiene compliance through comparing direct observation with automated hand hygiene monitoring. Infect Control Hosp Epidemiol 2015;36:957-62.
2. Srigley JA, Furness CD, Baker GR, Gardam M. Quantification of the Hawthorne effect in hand hygiene compliance monitoring using an electronic monitoring system: a retrospective cohort study. BMJ Qual Saf 2014;23:974-80.
3. Yin J, Reisinger HS, Vander Weg M, Schweizer ML, Jesson A, Morgan DJ, et al. Establishing evidence-based criteria for directly observed hand hygiene compliance monitoring programs: a prospective, multicenter cohort study. Infect Control Hosp Epidemiol 2014;35:1163-8.
4. Rock C, Harris AD, Reich NG, Johnson JK, Thom KA. Is hand hygiene before putting on nonsterile gloves in the intensive care unit a waste of health care worker time? — a randomized controlled trial. Am J Infect Control 2013;41:994-6.
5. Fuller C, Savage J, Besser S, Hayward A, Cookson B, Cooper B, et al. The dirty hand in the latex glove": a study of hand hygiene compliance when gloves are worn. Infect Control Hosp Epidemiol 2011;32:1194-9.
6. Kohli E, Ptak J, Smith R, Taylor E, Talbot EA, Kirkland KB. Variability in the Hawthorne effect with regard to hand hygiene performance in high- and low-performing inpatient care units. Infect Control Hosp Epidemiol 2009;30:222-5.
7. Pan SC, Tien KL, Hung IC, Lin YJ, Sheng WH, Wang MJ, et al. Compliance of health care workers with hand hygiene practices: independent advantages of overt and covert observers. PLoS One 2013;8:e53746.
8. Chen LF, Carriker C, Staheli R, Isaacs P, Elliott B, Miller BA, et al. Observing and improving hand hygiene compliance: implementation and refinement of an electronic-assisted direct-observer hand hygiene audit program. Infect Control Hosp Epidemiol 2013;34:207-10.