Monitoring Hand Hygiene via Human Observers: How Should We Be Sampling?

J. Fries, S.L. Tolentino, G. Thomas, T. Herman, A.M. Segre, P.M. Polgreen
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Abstract

Background: Most healthcare organizations rely on human observers to monitor hand hygiene compliance. Given limited observation time, what is the best methodology for sampling hand hygiene opportunities? When should observations be conducted? Should observers stand at fixed locations? If not, how often should they move? Increasing both the number of events seen and the number of observed individuals reduces sampling error, but in practice a trade off exists between these two factors.

Objective: We conduct computer simulations using real world healthcare worker (HCW) movement data to explore how observer movement influences the number of events and variety of individuals captured.

Methods: We deployed a mobile sensor network to capture detailed movement data for 6 classes of HCWs over 2 weeks at the University of Iowa Hospital and Clinic’s (UIHC) Medical Intensive Care Unit (MICU). We recorded 33721 consecutive timestamped events of HCWs entering and leaving patient rooms. These “In Room” and “Out of Room” events are widely recognized as opportunities for hand hygiene. Architectural drawings were used to derive 4 optimal line-of-sight placements for observers. We ran computer simulations for different observer movement schedules, all with a budget of 1 hour total observation time. We considered observation times of 1–15, 15–30, 30 and 60 minutes per station, with the last corresponding to a static observation model. We stochastically generated HCW hand hygiene compliance and recorded the total unit compliance as it would be reported by such an observer.

Results: All observation schedules capture at best 3.5% and at worst 1.2% of all daily opportunities. The 1–15 minute schedule captures on average 16% fewer events than the 60 minute (i.e., static) schedule, but 17% more unique individuals. The 1–15 minute schedule provides the best estimator of compliance, with an average standard deviation of 17% vs. 23% for the 60 minute schedule. The best times to conduct observations appears to occur during the first hour of each shift.
Fig. 1) The relationship between opportunities seen and the percentage of total HCWs seen for each observation schedule.

**Conclusions:** Our results indicate that observation schedules affect the quality of the results recorded. In our simulations, observers who move frequently capture a more representative sample of the HCW population, at a small cost in terms of total events observed. HCWs tend to work within a small cluster of rooms in our MICU; schedules that limit the number of visited locations bias the sample by capturing too few distinct individuals. Our results suggest that frequent observer placement change is a better methodology for sampling a diversity of job types and individuals in a MICU setting.