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Original Research Article

Successful development of a direct observation program to measure health care worker hand hygiene using multiple trained volunteers

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Background: Direct observation of health care worker (HCW) hand hygiene (HH) remains the gold standard, but implementation is challenging. Our objective was to develop an accurate HH observation program using multiple HCW volunteers.

Methods: HH compliance was defined as correct HH performed before and after contact with a patient or a patient's environment. HCW volunteers from each unit at our children's hospital were trained by infection preventionists to covertly collect HH observations during routine care using an electronic tool. Questionnaires sent to observers in February and December 2014 recorded demographic characteristics, observation time, and scenarios assessing accuracy. HCWs were surveyed regarding their awareness that their HH behavior was being recorded.

Results: There were 146 HH observers. The majority of observers reported making 1-2 observations per shift (65%) and taking ≤10 minutes recording an observation (85%). Between January 2012 and December 2014 there were 22,484 HH observations (average, 622 per month), including nurses (46%), physicians (21%), and other HCWs (33%). Observers correctly recorded HH behavior more than 90% of the time in 5 of the 6 scenarios. Most HCWs (86%) were unaware they were being observed.

Conclusion: A direct observation program staffed by multiple HCW volunteers can inexpensively and accurately collect HCW HH data.

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Accurate measurement of hand hygiene behavior by health care workers (HCWs) is crucial to improvement efforts.^{1,2} Covert direct observation of hand hygiene practices during routine patient care remains the gold standard, but it presents a number of challenges, including significant cost and time investment.^{3,4} In addition, direct observation programs usually only capture a small sample of all hand hygiene opportunities, may not accurately measure the hand hygiene events, and may be biased due to Hawthorne effect.³⁻⁸

Despite these challenges, direct observation is currently the only strategy capable of measuring all 5 key indications for hand hygiene and evaluating technique. It is also among the few strategies that can differentiate compliance by HCW type.⁴ Electronic applications have been developed capable of assisting observers and reducing the time requirements of direct observation.^{9,10} Attempts to obtain a more representative sample of hand hygiene data and reduce observation bias have resulted in the development of a number of different automated hand hygiene monitoring systems.^{4,9} Unfortunately, these systems often require significant cost to install and maintain.^{4,9} In addition, because situational context is not accounted for, data may be biased toward lower compliance.¹¹ A direct observation program capable of inexpensively collecting a representative sample of HCW hand hygiene data and minimizing bias is needed.

Our objective was to develop a hand hygiene observation program using multiple trained HCW volunteers capable of accurately measuring hand hygiene behavior and minimizing Hawthorne effect.

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METHODS

This program was developed at Arkansas Children's Hospital, a 370-bed tertiary children's hospital. There are 14 inpatient units, including 4 critical care units and a hematology–oncology unit.

Appropriate hand hygiene practices of HCWs were defined based on published guidelines.^{1,2} Hand hygiene compliance was defined as correct hand hygiene performed before and after contact with a patient or a patient's care area. For patients on transmission-based isolation precautions, hand hygiene was required before donning and after doffing personal protective equipment.

HCW volunteers from day, night, and weekend shifts were recruited from each inpatient unit, with a goal of at least 4 observers on each unit. In general, the identities of the observers remained secret. Hand hygiene observers were trained by infection preventionists (IPs) before recording hand hygiene observations. A single hand hygiene observation required the ability to witness the hand hygiene practices of the HCW both before and after contact with a patient or a patient's care environment. Partial observations were aborted. Each observer was expected to make at least 10 observations each month. Observations were to be collected on a variety of HCW types. All observers were required to complete annual retraining and attend quarterly observer team meetings.

As part of the ongoing education and interrater reliability assessment, a 16-item electronic questionnaire was sent to each hand hygiene observer in February and December 2014. Questions included observer demographic characteristics and time spent making observations. The questionnaire also included 6 scenarios representing common observation situations and assessed the accuracy of their observations. Correct responses for the scenarios were compared by 2-sample proportion test (February vs December). *P* values < .05 were considered significant. All statistical analysis was performed using SAS 9.4 (SAS Institute Inc, Cary, NC), or R version 3.1.2 (R Foundation for Statistical Computing, Vienna, Austria).

A separate electronic questionnaire was sent to all HCWs during April and May 2014 to assess their level of awareness that their hand hygiene behavior was being recorded by observers. HCWs rated their awareness that their hand hygiene behavior was being recorded at the time it was being observed using a Likert scale (never aware, rarely aware, occasionally aware, frequently aware, always aware, or not sure). Data were summarized as frequencies and percentages.

Hand hygiene observations were recorded electronically on touch screens located throughout the units. Additional data collected included date, time and shift of the observation, unit location, HCW type, and patient's transmission-based isolation status. Observation data were transmitted real-time to an electronic data visualization program that was available to all staff and was capable of sorting the data in a variety of ways to better inform improvement efforts. A run chart was created using Microsoft Excel (Redmond, WA) to display monthly hand hygiene compliance over time and annotated to show the relationship between interventions and the monthly hand hygiene compliance. Because hand hygiene compliance has been shown to be higher when measured by unit-based observers compared with data from nonunit-based observers, we compared hand hygiene compliance data from unit-based and nonunit-based observers.¹²

RESULTS

Hand hygiene observers

Of the 146 hand hygiene observers, 101 (69%) completed the questionnaire during December 2014. The HCW hand hygiene observers were mostly nurses (90%) and represented all inpatient units. Most (65%) reported being hand hygiene observers for more than

12 months. The majority of observers reported making 1–2 observations (65%) or making 3–5 observations (30%) during a single shift. A single hand hygiene observation required 10 minutes or less for 85% of the observers. The remaining observers required 11–15 minutes. Eighty percent of the 102 observers in February completed the survey. Responses were similar.

Observer interrater reliability

Hand hygiene observer responses on the validation questionnaire in February and December 2014 are shown in Table 1. Observers recorded hand hygiene behavior correctly more than 90% of the time in 5 of the 6 hand hygiene scenarios. Scenario 6 had the fewest number of correct responses (36% in February and 47% in December). This scenario involved a HCW briefly entering a patient room without touching the patient or patient care environment. Although observers were asked to record this scenario in a specific way (abort the observation), depending on interpretation, any of the responses could be considered correct. Ongoing education resulted in an 11% improvement.

Hawthorne effect

There were 681 HCWs (63% nurses, 15% physicians, and 23% other HCW types) who completed the separate observation awareness questionnaire. Most (86%) were never aware or rarely aware that their hand hygiene practices were being observed at the time the observation was being made.

Hand hygiene observation data

Between January 1, 2012, and December 31, 2014, there were 22,484 complete hand hygiene observations recorded with an average of 622 observations per month. This included the observation of the hand hygiene behavior of 10,323 nurses (46%), 4,692 physicians (21%), and 7,469 observations (33%) of other HCW types (eg, patient care technicians, respiratory therapists, and various ancillary staff). Almost one-third (28%) of the hand hygiene observations were recorded for patients on transmission-based isolation precautions. Half the observations (53%) were recorded during day shifts and 24% of the observations were recorded during weekend shifts. The annotated run chart shows the change in hand hygiene compliance over time (Fig 1). Hand hygiene compliance gradually increased from a baseline of 75% to sustained compliance of 95%. Hand hygiene compliance averaged 9% higher for unit-based observers compared with nonunit-based observers (range by year, 4%–12%).

DISCUSSION

We successfully developed a program to directly measure HCW hand hygiene compliance using more than 100 trained HCW observers. Observations were collected on all units, shifts, and HCW types. In general, HCWs were not aware that they were being observed. Thus, Hawthorne effect was minimized.

Compared with other measurement strategies, direct observation of hand hygiene behavior provides the greatest detail regarding HCW hand hygiene, which allows tailoring of improvement efforts.^{3,4} Despite these benefits, there are important limitations. Direct observation programs reported in the literature rarely describe details of observer training and whether interrater reliability is assessed.^{4,13,14} The time and associated costs required for employees to monitor hand hygiene limit the number of observations that can be made. At best, direct observation programs only collect 1%–3% of hand hygiene opportunities.^{4,8,15,16} Unfortunately, this may not accurately

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