American Journal of Infection Control 41 (2013) 997-1000

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Major article

Measuring hand hygiene compliance in a hematology-oncology unit: A comparative study of methodologies

Lidiane Soares Sodré da Costa RN [a], Vanessa Maia Neves RN [a], Alexandre R. Marra MD [b,*], Thiago Zinsly Sampaio Camargo MD [c], Maria Fátima dos Santos Cardoso RN [d], Elivane da Silva Victor PhD [b], Cristina Vogel RN [a], Fátima Araci Tahira Colman RN [a], Claudia Regina Laselva RN [a], Oscar Fernando Pavão dos Santos MD [e], Michael B. Edmond MD, MPH, MPA [f]

[a] *Onco-Hematology Unit, Hospital Israelita Albert Einstein, São Paulo, Brazil*
[b] *Instituto Israelita de Ensino e Pesquisa Albert Einstein, São Paulo, Brazil*
[c] *Intensive Care Unit, Hospital Israelita Albert Einstein, São Paulo, Brazil*
[d] *Infection Control Unit, Hospital Israelita Albert Einstein, São Paulo, Brazil*
[e] *Division of Medical Practice, Hospital Israelita Albert Einstein, São Paulo, Brazil*
[f] *Department of Internal Medicine, Virginia Commonwealth University School of Medicine, Richmond, VA*

Key Words:
Electronic handwash counters
Direct observation
Patient safety
Compliance

Background: In managing hematology-oncology patients, there is a great opportunity for performing hand hygiene (HH).

Methods: Over a 4-month period, we compared HH compliance measurement by 3 different methods: direct observation, electronic handwash counter for alcohol gel, and measuring the volume of product used (alcohol gel) in a 40-bed hematology-oncology unit at a tertiary care, private hospital.

Results: There were 388 directly observed opportunities for HH, and the overall HH compliance rate was 84.5%. A total of 235,923 HH episodes was recorded by the electronic devices. The mean HH episodes per patient-day was 77.7. There were 91.1 mL of alcohol gel used per patient-day in the unit. The correlation and *P* value between the percentage of HH compliance and HH episodes per 1,000 patient-days were $\rho = 0.442$ and $P = .076$, respectively. The correlation and *P* value between HH episodes per patient-days and alcohol gel consumption in milliliters per patient-days were $\rho = 0.142$ and $P = .586$.

Conclusion: HH compliance was high in this unit. Direct observation, although useful, has many drawbacks. Other measures must be considered, such as electronic devices and measurement of volume use per patient-day to stimulate health care workers to increase and sustain HH compliance.

Health care-associated infections are a major global concern regarding patient safety.[1,2] To prevent infections, the World Health Organization (WHO) has emphasized the importance of performing hand hygiene (HH) at specific times during patient care, and the Joint Commission includes HH in its patient safety goals.[1-4]

Strategies have been designed by many institutions to promote and assess compliance with HH, including ways to keep HH agents available and accessible, and changing behavior through training, education, audits, and campaigns.[2,4]

Hematology-oncology units house complex, critically ill patients, who are immunocompromised related to chemotherapy and have a high prevalence of central venous devices that are frequently accessed over prolonged periods. In managing these patients, there is a great opportunity for performing HH. International guidelines for preventing central line-associated bloodstream infection emphasize HH.[5-7] However, because patients remain hospitalized in closed rooms, it is difficult to quantify. Therefore, it is important to evaluate the accuracy and effectiveness of alternative methods for measuring compliance with HH.

The purpose of this study was to compare methods for assessing compliance with HH in a hematology-oncology unit. We used direct observation of practice, electronic counters for dispensers of alcohol-based hand rub (ABHR), and measurement of the volume of product used (ABHR).

* Address correspondence to Alexandre R. Marra, MD, Avenue Albert Einstein, 627/701, 1st floor, Room 108, Bloco A1, Morumbi, São Paulo 05651-901, Brazil.
E-mail address: alexandre.marra@einstein.br (A.R. Marra).

Conflicts of interest: None to report.

http://dx.doi.org/10.1016/j.ajic.2013.03.301

METHODS

This study was conducted in the hematology-oncology unit of a tertiary care, private hospital in São Paulo, Brazil. This is a 40-bed unit that houses hematology, oncology, and bone marrow transplantation patients. All of the patient rooms in this unit are single bed rooms. The study was approved by the facility's Institutional Review Board. Each room has dedicated noncritical devices for patient care (eg, stethoscopes and thermometers). There is 1 sink and 2 alcohol gel dispensers in different areas of each room. There is also 1 alcohol gel dispenser between each room in the corridor. The study was conducted over a 17-week period from July 15 to November 15, 2012. Comparison of HH compliance measurement was reported by 3 different methods: direct observation of practice, electronic handwashing counter for alcohol gel, and measuring the volume of alcohol used.

Direct observations

Prior to the beginning of the study, 2 nurses from this unit were trained by an infection control professional (ICP) on HH observation. In training observers, we first addressed the concept of the "Five moments for HH." To check the understanding of these concepts by the observers, we used videos from the WHO, available free on the Web site (http://www.who.int/gpsc/media/training_film/en/). These videos include scenarios in which personnel have opportunities for HH. Concordance of HH observations between the 2 nurses and the ICP was established in the hematology-oncology unit by having the 2 nurses and the ICP observe HH performance in the same unit, at the same time, and comparing their measured rates of compliance. Next, the nurses from hematology-oncology unit (not on clinical duty) were directed to perform HH observations in the study unit for a 20-minute period daily, which varied in the time of day (8 a.m. to 8 p.m.). The HH observations were done from Monday to Friday, except holidays, for 17 weeks. These nurse observers recorded the opportunities for HH and compliance on a handheld personal digital assistant (iPod; Apple, Cupertino, CA) using an application (iScrub).[8] During these audits, the 2 nurses counted only HH opportunities that represented the points in time within the care process when HH should be performed, as specified by predefined indications (the WHO's Five Moments for Hand Hygiene).[9] The observers did not evaluate the quality of HH performance. All health care workers (HCWs) (doctors, nurses, respiratory therapists, and other HCWs such as radiology technicians and laboratory technicians) who provided care in the unit were included in the HH observations. If questioned by a HCW, the nurse observers (not on clinical duty but dressed as if on clinical duty) explained that they were observing problems that needed to be corrected in the unit.

Electronic device and the measurement of products

HH episodes were recorded by electronic handwash counters for alcohol gel (PURELL Hand Instant Sanitizer [GOJO Industries, Akron, OH]: 62% ethyl alcohol + 4% isopropyl alcohol 1 L bag). The alcohol gel dispenser (NXT 1 L model; GOJO Industries) records only 1 episode in any 2-second period even if more than 1 aliquot of alcohol is dispensed. Alcohol gel dispensers dispensed approximately 1.3-mL volume of product per use and are located inside and outside the patient rooms. Each unit was checked twice weekly to ensure the nozzle was not obstructed. The total volume of product (alcohol gel) used in milliliters and the alcohol gel aliquots per patient-days were determined.

Statistical analyses were performed using SPSS 17.0 (SPSS Inc, Chicago, IL). The association between measures was evaluated by Spearman rank order correlation coefficient. All tests of statistical significance were 2-sided with a significance level set at .05.

Table 1
Hand hygiene compliance assessed by direct observation

	HH opportunities N (%)	HH compliance n	HH compliance %	*P* value
Hand hygiene compliance by HCW				<.001*
Nurse	224 (57.7)	206	92.0	
Respiratory therapist	59 (15.2)	53	89.8	
Physician	69 (17.8)	51	73.9	
Others	36 (9.3)	18	50.0	
Total	388 (100)	328	84.5	
Hand hygiene compliance by indication				.832
After body fluid exposure/risk	38 (9.8)	31	81.6	
After touching a patient	96 (24.7)	80	83.3	
After touching patient surroundings	95 (24.5)	79	83.2	
Before clean/aseptic procedures	51 (13.1)	43	84.3	
Before touching a patient	108 (27.8)	95	88.0	
Total	388 (100)	328	84.5	
Time of day				.411
Morning	73 (18.8)	64	87.7	
Afternoon	315 (81.2)	264	83.8	
Total	388 (100)	328	84.5	

*Nurses and respiratory therapists differ from physician and others. Physicians differ from others too.

RESULTS

During the 17-week study, there was a total of 3,037 patient-days in the study unit. There were 388 opportunities for HH by direct observation (Table 1), and the overall rate of HH compliance was 84.5% (328/388). Alcohol gel was used in 95.4% (313/328) of episodes, and liquid soap was used in 4.6% (15/328). The observed average number of HH opportunities per day was 22.8.

Via electronic counters, a total of 235,923 HH episodes was recorded in the unit. There were 194,467 HH episodes (82.4%) inside the patient room and 41,456 (17.6%) outside the patient room in the unit. The mean number of HH episodes per patient-day was 77.7. There were 91.1 mL of alcohol gel used per patient-day in the unit (Table 2).

The best observed compliance for HH was 100% (week 17), and the worst observed compliance was 69.6% (week 7). The highest mean weekly frequency of HH episodes per patient-days was 125.2 (week 3; the respective HH compliance was 80.0%), and the lowest mean frequency of HH episodes per patient-days was 48.5 (week 7; the respective HH compliance was 69.6%). The highest mean consumption of alcohol gel use in milliliters per patient-day was 146.9 (week 14), and the smallest mean consumption was 42.7 (week 7) as seen in Table 2. The correlation (ρ) and *P* value between the percentage of HH compliance and HH episodes per patient-day were $\rho = 0.442$ and $P = .076$ respectively (Fig 1). The correlation and *P* value between HH episodes per patient-day and alcohol gel consumption in milliliters per patient-day were $\rho = 0.142$ and $P = .586$ (Fig 2). The correlation and *P* value between the percentage of HH compliance and alcohol gel consumption in milliliters per patient-day were $\rho = 0.271$ and $P = .293$ (Fig 3).

DISCUSSION

Improving HH adherence is one of the key performance improvement objectives in our institution. To that end, our infection control unit has been measuring HH compliance using the alcohol gel consumption in milliliters per patient-day as a quality indicator since 2009 (since the H1N1 pandemic). Measuring product use (ABHR) is less resource intensive and less expensive,