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Major Article

Monitoring the hand hygiene compliance of health care workers in a general intensive care unit: Use of continuous closed circle television versus overt observation

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Introduction: A variety of hand hygiene monitoring programs (HHMPs) have come into use in hospitals throughout the world. In the present study, we compare continuous closed circle television (CCTV) with overt observation for monitoring the hand hygiene compliance of health care workers (HCWs) in a general intensive care unit (GICU).

Methods: This is a cross-sectional and comparative study. In this study, we use a novel hand hygiene CCTV monitoring system for hand hygiene performance monitoring. The study population incorporated all the GICU HCWs, including registered nurses, staff physicians, and auxiliary workers.

Results: All HCWs of our GICU were observed, including ICU registered nurses, ICU staff physicians, and auxiliary workers participated in the present study. Overall, each observer team did 50 sessions in each arm of the study. Total number of hand hygiene opportunities was approaching 500 opportunities. The compliance rates when only overt observations were performed was higher than when only covert observations were performed with a delta of approximately 10% (209 out of 590 [35.43%] vs 130 out of 533 [24.39%]; $P < .001$). Both methods of observations (overt and covert [CCTV]) demonstrated excellent reliability (intraclass correlation coefficient [ICC], 0.96 [0.93-0.98] of overt and ICC, 0.81 [0.69-0.89] for covert, respectively). However, the correlation between both methods was found weak in simultaneous sessions (ICC, 0.40 [0.62-0.107]).

Conclusion: We demonstrated that CCTV is an appropriate, reliable, and neutral method for observation of hand hygiene. However, there is no clear basis for incorporating a CCTV observation modality into a health care system that already operates an overt observation program. We have shown that CCTV methodology records a different distribution of opportunities for performing hand hygiene and of actual performances of hand hygiene compared with overt observation.

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EB and ILR contributed equally to this work.

EB participated in study design, data collection, data analysis, data interpretation, and writing. ILR participated in the literature search, study design, data collection, data analysis, and data interpretation. AG participated in data collection, and performed the statistical analysis and data interpretation. LK participated in the design of the study, performed the statistical analysis, and helped to revise the manuscript. AE participated in the design of the study, performed the statistical analysis, and helped to revise the manuscript. TZ participated in the sequence alignment and drafted the manuscript. LS-O participated in the design of the study, performed the statistical analysis, and helped to revise the manuscript. MK participated in the design of the study, coordination, and helped to draft the manuscript. AB participated in the design of the study, performed the statistical analysis, and helped to revise the manuscript. All authors read and approved the manuscript.

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Health care-associated infections (HAIs) are major causes of morbidity and mortality, especially in intensive care units (ICUs) throughout the world.[1-3] HAIs in ICUs are reported to influence up to 37% of the critically ill population.[1-4] Contamination of the hands of health care workers (HCWs) engendered by touching the skin of patients during routine care or coming into contact with objects in the patient environment is considered to play a leading role in patient-to-patient transmission of pathogens and to be a main factor in the transmission of HAIs in ICUs.[5-9] Consequently, hand hygiene is an extremely important measure in the prevention of HAIs[3,4] and it is among the most effective intervention for reducing the incidence of HAIs in critically ill ICU patients.[5-9] Despite the evidence of its effectiveness, the overall hand hygiene compliance of HCWs remains low.[10] Ongoing education of HCWs and continuous monitoring of HCW hand hygiene performance have both been shown to be of primary importance in preventing the spread of HAIs.[3,4,10]

As a result, a variety of hand hygiene monitoring programs (HHMPs) have come into use in hospitals throughout the world.[1,10] HHMPs are of 2 types: direct overt observation programs carried out by trained infection control personnel or by students, family members, and patients and indirect monitoring programs using electronic hand-held devices, electronic monitoring systems, or apparatuses for measuring hand hygiene product consumption.[11-13]

The World Health Organization (WHO) published hand hygiene guidelines for HCWs in 2009 along with a multidimensional model for improving hand hygiene compliance in health care settings.[1] It also published a methodology manual for monitoring hand hygiene for use by workers, trainers, and observers of hand hygiene practices.[13] The guidelines focus on 5 "moments of opportunity" (henceforth also referred to as indications) for performing hand hygiene in routine patient care situations. The 5 indications are before patient contact, before an aseptic procedure, after suspected exposure to body fluids, after patient contact, and after touching objects in the environment surrounding a patient (ie, the patient zone). These guidelines were adopted by numerous health care \countries,[14] including the Israel Ministry of Health (MOH).[15]

The direct, overt observation method, performed by a by trained observer, is described in the WHO manual[13,14] and has been accepted by experts as the gold standard[16] for monitoring the hand hygiene compliance of HCWs. During the monitoring process the observer is required to stand in proximity to the HCWs under observation without interfering in their activity. Shortly after the WHO publication of the hand hygiene guidelines and its manual for observers, the Israel MOH distributed a circular instructing all health care facilities to initiate compliance with the 5 hand hygiene indications and to conduct overt observation processes to ensure compliance.[15]

In 1995 American College of Critical Care Medicine published guidelines for ICU design with recommendations of direct or indirect (eg, by video monitor) visualization by HCWs. In our ICU, a closed circle television (CCTV) patient monitoring system was recently installed. The CCTV system allows indirect remote observation of the ICU patients and their surrounding environment.

The present study compares the hand hygiene compliance rates of HCWs in a general ICU (GICU) using the standard direct observational method with those recorded using the new covert CCTV observation system.

METHODS

Study design

The study design was cross-sectional and comparative. It incorporates 3 arms: direct overt double appraisal simultaneous observational sessions, covert simultaneous double appraisal observations using CCTV, and overt versus covert simultaneous double appraisal observations.

Ethical approval

The Human Research and Ethics Committee at Soroka Medical Center, Beer-Sheva, Israel approved this study (0333-15-SOR).

Setting

Soroka Medical Center is a 1,000-bed tertiary-care university teaching hospital located in southern Israel and servicing a population of more than 500,000. Our GICU has 16 beds and is staffed by 6 physicians and 30 nurses and auxiliaries. Each patient's unit was a single occupant room and each was equipped with a CCTV camera located above the entrance that enabled observation on a remote screen of the events in each patient's room.

Participants

The study population incorporated all the GICU HCWs, including registered nurses, staff physicians, and auxiliary workers. The informed consent was accepted from all HCWs.

HCWs who were not involved in the daily management of critically ill GICU patients were excluded.

Observation methods

All observation sessions were conducted by a trained observer during morning or evening shifts using the hand hygiene compliance form recommended by the WHO[1] and mandated by the Israel MOH.[2,15] The observation sessions lasted 10-30 minutes. During each observation session, the number of "moments of opportunity" and the number of actual hand hygiene performances were recorded on the designated form.[15] Subsequently, the hand hygiene compliance rates were calculated for each observer in each observational session.

Observers

The observation team consisted of 2 nurses experienced in infection control, an intensive care nurse, an intensive care specialist physician, and 4 students employed as hand hygiene observers by the infection control and prevention unit of the medical center.

The observers were divided into 2 teams of 4 each (team A and team B). The observers were unaware to which team they belonged. Only 1 researcher (ILR) was aware of the affiliation of the observers.

Variables

The recorded outcomes were the number of opportunities to perform hand hygiene; the actual hand hygiene compliance of the HCWs at these opportunities. The compliance rates were analyzed per session and per total number of observed opportunities.

CCTV

CCTV is a modern observation system based on online\real-time television camera monitoring. It is used in the GICU at Soroka Medical Center to observe each patient's unit. The CCTV system did not make recordings of the relevant events so all the observations were performed in real time.