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Hand Hygiene Compliance in the Setting of Trauma Resuscitation

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ABSTRACT

Introduction: Healthcare-associated infections are a significant health burden, and hand hygiene (HH) is an essential prevention strategy. World Health Organization (WHO) 2009 guidelines recommend washing hands during five moments of patient care; 1)before touching a patient; 2)before a clean procedure; 3)after body fluid exposure; and 4)after touching a patient or 5)patient surroundings. HH opportunities at these 5 moments are frequent and compliance is low (22-60%). Infection risk is particularly high in trauma patients, and HH compliance during active trauma resuscitation has yet to be evaluated.

Materials and Methods: Using video surveillance, all healthcare worker (HCW)-patient interactions for 30 patients were retrospectively reviewed for HH compliance according to WHO guidelines and glove use during initial resuscitation at a level-1 trauma center.

Results: 342 HCW-patient interactions and 1034 HH opportunities were observed. HH compliance with the WHO moments was 7% (71/1034) overall; 3% (10/375) before patient contact, 0% (0/178) before a clean procedure, 11% (2/19) after body fluid contact, 15% (57/376) after patient contact and 2% (2/86) after contact with the environment. Glove use was more common, particularly before (69%) and after (47%) patient contact and after body fluid contact (58%). No HH was observed before clean procedures, but HCW donned new gloves 75% of the time before bedside procedures. If donning/removing gloves was included with HH as compliant, compliance was 57% overall.

Conclusion: HH opportunities are frequent and compliance with WHO HH guidelines may be infeasible, requiring significant amounts of time that may be better spent with the patient during the golden hour of trauma resuscitation. In an era where more scrutiny is being applied to patient safety, particularly the prevention of inpatient infections, more research is needed to identify alternative strategies (e.g. glove use, prioritizing moments) that may more effectively promote compliance in this setting.

Introduction

Healthcare-associated infections are globally recognized as a significant health burden, safety issue and financial strain [1–5]. Reported incidence of these infections ranges from approximately 4.5% in developed countries to 15.5% in resource-limited settings, and they carry a high financial burden [1,3,6]. The Center for Disease Control and Prevention estimates the overall direct medical costs range from $28.4 to $45 billion annually [6]. Risk of infection is particularly high among trauma patients and is associated with increased morbidity, mortality and cost [7–10].

Hand hygiene (HH) is an essential infection prevention strategy. World Health Organization (WHO) 2009 guidelines recommend using alcohol-based hand rub or washing hands with soap and water during five moments of HH to minimize risk of health care-associated infections: 1) before touching a patient; 2) before a clean/aseptic procedure; 3) after body fluid exposure risk; and 4)

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after touching a patient or 5) patient surroundings [11]. Previous studies evaluating compliance with WHO guidelines have shown that HH opportunities are frequent, sometimes over 44 HH opportunities per patient per hour, and are associated with low compliance (22 to 60%) suggesting that strict adherence to the guidelines may not be feasible [12–23]. In time sensitive conditions, like emergent care, time is of the essence. It is unclear if the time used for HH would be better spent in direct patient care which could be live saving and whether HH in these particular settings actually improves outcomes.

There have been no published studies to our knowledge that have examined compliance with WHO guidelines specifically in trauma patients or in the setting of active resuscitation where opportunities for HH are great and multiple barriers to compliance may exist [1,24]. The University of Maryland's R Adams Cowley Shock Trauma Center offers a unique opportunity to study HH compliance in this context where existing video surveillance infrastructure allows for unbiased viewing of healthcare worker (HCW) behavior. We aimed to quantify opportunities for HH according to WHO guidelines and measure HH compliance and glove use during active resuscitation of trauma patients in the center's Trauma Resuscitation Unit (TRU).

Materials and Methods

Study Design

We conducted a retrospective review of HH compliance among trauma patients during their initial resuscitation event using a video surveillance system to mitigate potential Hawthorne effect. With Hawthorne effect, the knowledge that the HCW is being observed for compliance can influence the HCW actions and improve HH compliance [25]. The study was conducted at the R Adams Cowley Shock Trauma Center's Trauma Resuscitation Unit (TRU) over a one-month period from August 25, 2015 to September 24, 2015. This study was reviewed and approved by the University of Maryland Institutional Review Board.

Study Setting

The R. Adams Cowley Shock Trauma Center is a 110-bed freestanding trauma hospital with capabilities exceeding a Level-1trauma center designation. It serves as the primary adult trauma referral center for the entire state of Maryland. The center serves more than 8,000 critically ill and severely injured patients annually; 18% arrive via air transport. A majority (37%) of injuries seen are a result of motor vehicle collisions; 32% from falls, 18% from violence and 13% are other injury types [26].

The TRU is the resuscitation and admitting area for all trauma patients brought to the center. It has 13 trauma bays capable of accommodating 26 patients positioned in a semi-circular manner around a central provider work area. Each bay is equipped with two HH stations that have alcohol gel and gloves. Additional HH stations, which include a sink with soap and alcohol gel, are located in the general TRU work area. However, these additional HH stations are not monitored by the surveillance videos. HCWs receive training in HH during hospital orientation and annual competencies for the medical center that covers each of the WHO HH moments in a brief online educational module followed by a required test. The training does not specify all clean procedure indications so HCWs may be unaware of certain specific HH indications (*e.g.*, inserting or accessing a nasogastric tube). The unit uses an anonymous embedded observer to audit HH compliance on bay entry/exit, and the unit is provided with monthly reports of compliance. The TRU is known for having high HH compliance as reported by the hospital with rates on entry/exit reported at 80% during the study period.

Surveillance cameras are located in each TRU bay and provide three views of the bay; one bird's eye view of the entire bay and two close-up views from different angles. Surveillance cameras have been in place for the past twenty years, further limiting the potential Hawthorne effect. The camera system was primarily designed for training, quality and research purposes. While HCWs may be aware of the cameras they were unaware that they were being monitored with respect to HH compliance.

Study Participants

Thirty patients were selected for review; similar numbers of critical and non-critical patients and various presentation times during weekdays, weekends and day and night shifts were included. For the purposes of this study, critical condition patients were defined as those needing cardiopulmonary resuscitation, emergent intubation or an emergent surgical procedure such as central or arterial line, chest tube, resuscitative-endovascular balloon occlusion of the aorta or clamshell thoracotomy.

Data Collection

A general surgery resident with experience running traumas in the TRU reviewed all HCW-patient interactions during the initial assessment and resuscitation period for each patient for HH compliance. A HCW-patient interaction was defined as the period of time from when a HCW entered the patient bay (surrounded by curtain) to final exit from the patient bay during initial resuscitation of the trauma patient. The resident reviewing the videos was trained in WHO 5 moments data extraction and a modified WHO data collection form was used (Appendix A) [27]. Each HH moment as defined by the WHO guidelines was documented including the reason for HH, the indication if the moment occurred before a clean procedure, and the type of HH (e.g. alcohol versus soap and water) performed, if any, by the HCW. Glove use was also recorded, specifically whether HCWs donned new gloves during opportunities for HH. Trauma bay, day of the week, shift (day versus night), HCW type, and time of initial room entry and exit were recorded. Additional data were collected based on potential to influence HH compliance such as whether the patient appeared awake and appropriately interactive, whether the patient was in critical condition and whether family was in the patient bay.

All digital cameras are networked via hospital video intranet and all video data were recorded in a digital video recoder at a rate of 30 frames per second. The resuscitation was reviewed as many times as needed to get clarity on the HH indications and compliance for each HCW-patient interaction. Videos could be rewound, timing slowed and areas of the scene could be magnified for review if the HH method was unclear initially. Video review is a robust data collection method for quality improvement for emergency tasks. It has been used extensively in the trauma resuscitation setting to evaluate adherence to universal barrier precautions [28–31]. It allows for identification of performance details not found in other quality improvement approaches while at the same time reducing personnel requirements for capture and simplifying data collection.

Data Analysis

Data was entered into a Microsoft Access database and results were analyzed using Stata 11. Categorical variables were compared with chi-squared tests. A p-value < 0.05 was considered significant.

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