

A method for evaluating health care workers' personal protective equipment technique

Elizabeth L. Beam, MSN, RN,^a Shawn G. Gibbs, PhD, CIH,^b Kathleen C. Boulter, BA, RN,^d Marcia E. Beckerdite, MSN, RN, CIC,^d and Philip W. Smith, MD^c
Omaha, Nebraska

Background: Given the potential for the transfer of infectious diseases among patients in isolation, health care workers (HCWs), and other patients in the hospital environment, the proper use of personal protective equipment (PPE) is paramount. The literature is limited regarding studies of HCWs' use of PPE in patient care tasks.

Methods: A pilot study was conducted to examine the feasibility of using a simulated health care environment to assess HCWs' technique when implementing standard airborne and contact isolation precautions. The participants (n = 10) were assigned patient care tasks based on their specific professional roles. The encounters were digitally recorded during donning and doffing of PPE, as well as during interactions with the simulated patient. Powdered fluorescent marker was used as a measure of contamination.

Results: The pilot data show various inconsistencies in the HCWs' PPE technique. Each of the 10 participants committed at least one breach of standard airborne and contact isolation precautions.

Conclusion: An expanded research study of HCW behaviors is needed to properly examine these contamination and exposure pathways. Training programs should be developed that emphasize the common errors in HCWs' PPE technique.

Key Words: Infection control; patient care; contamination; simulation.

Copyright © 2011 by the Association for Professionals in Infection Control and Epidemiology, Inc. Published by Elsevier Inc. All rights reserved. (*Am J Infect Control* 2011;39:415-20.)

Although infection control is recognized as a major patient safety issue, implementing intervention strategies has proven challenging.¹ The literature is limited regarding studies of the behaviors of health care workers (HCWs) while using personal protective equipment (PPE) in patient care activities. Conducting a study of this topic in an actual patient care area would raise both ethical and legal concerns. At the bedside, such a study would involve not only allowing an error to occur, but also documenting the occurrence of poor behavior. Consequently, we conducted a study in a simulated patient care environment to examine the feasibility of using a fluorescent marker to monitor for contamination

and videotaping to assess HCWs' adherence to the use of standard airborne and contact isolation precautions.

Compliance with such interventions as the use of PPE is an important line of defense to protect HCWs, their patients, and the community from contracting such infectious diseases as severe acute respiratory syndrome (SARS) and other contagious respiratory viruses.^{2,3} The proper use of PPE provides a safe barrier between the patient and the HCW by either preventing physical contact or actively filtering out infectious particles in the air. The potential for errors in PPE technique is significant. For instance, a poorly sealed respirator might not provide the necessary protection when caring for a patient with a contagious respiratory illness. Certain hairstyles could prevent the proper alignment of respirator straps for the best face seal. Touching a soiled bedsheet or patient gown with a glove or isolation gown could easily transfer microorganisms to the HCW's face or hands if PPE is removed in the improper order. Tying only one gown fastener or not placing the entire dirty gown inside a hamper in a contact isolation room could result in exposure of garments and later aerosolization of infectious particles. Many such errors occur repeatedly during patient care activities, given the lack quality control at the bedside. Infection control programs need to focus not only on the policies for the use of PPE, but also on the quality of the PPE techniques used while caring for patients.

From the College of Nursing,^a Department of Environmental, Agricultural and Occupational Health, College of Public Health,^b and Department of Internal Medicine, College of Medicine, University of Nebraska Medical Center, Omaha, NE^c; and Nebraska Medical Center, Omaha, NE.^d

Address correspondence to Elizabeth L. Beam, MSN, RN, University of Nebraska Medical Center, College of Nursing, Adult Health and Illness Department, 985330, Nebraska Medical Center, Omaha, NE 68198-5330. E-mail: ebeam@unmc.edu.

Conflict of interest: None to report.

0196-6553/\$36.00

Copyright © 2011 by the Association for Professionals in Infection Control and Epidemiology, Inc. Published by Elsevier Inc. All rights reserved.

doi:10.1016/j.ajic.2010.07.009

Without new system innovations in education of HCWs regarding the use of PPE, the risk of disease transmission in these situations becomes difficult to mitigate. Videotaping and the use of a fluorescent marker might allow HCWs to review their PPE technique and promote changes in behavior. The use of a simulated patient care environment might allow for safe training and compliance testing of infection control techniques.

Historically, simulation has been used in various educational strategies and tools in medical education, including skill trainers, computer-based modules, simulated patients (live actors), and high-fidelity human patient simulator manikins.⁴ In recent years, the nursing literature has exploded with content on simulation. Kaakinen and Arwood⁵ conducted a systematic review of this literature, with a focus on the use of learning theory. Of the 120 articles on nursing simulation that they cited, 94 discussed simulation as a teaching strategy. Only 16 articles described learning as the basis of the simulation development, and only 2 articles examined cognitive changes as a result of participation in the simulation.

Learning theory can drive the simulation design chosen for a particular educational activity. Kaakinen and Arwood⁵ described Schön's theory of reflective practice as a thoughtful, self-regulated process that lends itself to nursing and other caring professions. They discussed using video recording to teach a skill, allowing students to repeat the task until they do it correctly, as a reflective practice educational intervention. Videotaping a patient care skill to demonstrate competency along with performance feedback has been used successfully in nursing students.⁶ Kinsella⁷ described Schön's theory of reflective practice as balancing technical rationality and research-based knowledge with the wisdom of experience. Achieving this balance seems to be especially important in complicated skills, such as those involving aseptic technique or infection control, where numerous factors could affect the process.

Although the use of PPE is meant to prevent disease transmission, contamination errors can actually result in the spread of infection. Step-by-step directions for the use of PPE are available from the Centers for Disease Control and Prevention (CDC),⁸ but the sequence of PPE application or removal may be altered by the patient's status or the patient care task being performed. The Healthcare Infection Control Practices Advisory Committee⁹ has published an updated guide for isolation in health care facilities emphasizing standard precautions, respiratory hygiene, and cough etiquette as new components. The World Health Organization¹⁰ also has published a quick reference guide on infection control strategies for specific procedures in health care facilities. The World Health Organization guide specifically addresses epidemic and

pandemic-prone respiratory illness and categorizes infection control measures by clinical setting and procedure. An method for observing compliance with these PPE guidelines would be helpful in developing performance-enhancing interventions.

Much of the current literature on PPE use and compliance is derived from experiences during the 2003 SARS outbreak.¹¹⁻¹³ Those studies were conducted to ascertain the risk factors for transmission of SARS within the health care setting. Inconsistent or improper use of PPE was significantly associated with SARS infection. A review of the response to the 2009 H1N1 pandemic has led to increased attention to the proper use of respiratory PPE.

Some studies have used monitoring of contamination to examine the use of PPE. Casanova et al¹⁴ evaluated a CDC PPE removal protocol using bacteriophage MS2 and Glo Germ. Following the current CDC PPE doffing protocol did not protect HCWs from all contamination in that study. The authors did not evaluate the HCWs' actions that might have led to contamination through direct observation, and they did not report the study participants' health care experiences.

Videotaping also has been used to evaluate infection control behaviors. Chiang et al¹⁵ conducted a prospective observational study in a metropolitan Taiwan hospital involving videotaping of 44 consecutive cases of out-of-hospital adult cardiac arrest. A review of the tapes using time-motion analysis revealed poor compliance with basic infection control measures during resuscitation, showed frequent contamination events among rescuers, and identified two major systemic sources resulting in >80% of the contaminations: lack of task assignments among rescuers and poor procedure preparation. In another study, Hassan et al¹⁶ investigated hand hygiene using videotaping and self-reporting in a private hospital in Jordan. The major findings included overall low compliance, lower levels of compliance in higher-acuity settings, and sex-related differences in hand hygiene. In that study, the observer waited in the nursing station and accompanied the nurse subject to the bedside, filming only the nurse's hands during a care episode. The study reported on compliance with hand hygiene, but did not explore how to discern the quality of hand hygiene.

In response to a CDC survey following the 2009 H1N1 pandemic, HCWs with likely patient-to-HCW transmission reported inconsistent use of PPE.¹⁷ In fact, none of the HCWs who completed the detailed report for the CDC reported always using gloves, a gown, and a mask or respirator when caring for the presumed source patient. The study assessed the feasibility of studying a simulated encounter and established best practices for a larger study in which several educational interventions may be tested. A simulated patient care environment

Download English Version:

<https://daneshyari.com/en/article/2640243>

Download Persian Version:

<https://daneshyari.com/article/2640243>

[Daneshyari.com](https://daneshyari.com)