Med.Sci.Educ. (2016) 26:517–518
DOI 10.1007/s40670-016-0321-0

INNOVATION

Medical Student Personal Protective Equipment Training Through Simulated Contamination

Kristen M Zach[1] · **Lauren M Maloney**[2] · **Alexander D Praslick**[3] · **Andrew Wackett**[2] · **Peggy A Seidman**[4]

Published online: 6 October 2016

Abstract To teach medical students safe personal protective equipment doffing, we developed a low-cost, time and resource efficient curriculum using dilute, fluorescent laundry detergent to demonstrate visual evidence of breaks in doffing protocol. After two training sessions, self-contamination while doffing decreased and students' confidence to doff improved.

Keywords Personal protective equipment · Doffing · Donning · Simulated contamination · Medical student · Education

Coupled with increasing societal awareness of devastating infectious diseases, the Centers for Disease Control (CDC) has advised that the doffing, or removal, of personal protective equipment (PPE) is a high risk process that must be carefully executed in a proper sequence [1]. In response, as part of a curricular revision of a mandatory procedural skills class for preclinical medical students at a state university allopathic medical school, we developed a doffing curriculum based on current CDC guidelines. Our observational study of this curriculum received educational exempt status by our Institutional Review Board, was conducted over two consecutive years, and included 249 preclinical medical students from two medical school classes.

At the beginning of their training session, students were given a handout containing doffing instructions with illustrations and viewed a video demonstrating proper doffing technique. With assistance from expert faculty, students washed their hands, and then donned two pairs of gloves, a mask, and an impervious isolation gown, and were sprayed with liquid laundry detergent (Tide Original liquid; Procter & Gamble Co., Cincinnati, OH) in a 1:5 aqueous dilution, which is invisible under ambient light but fluoresces under blacklight, as to simulate contamination (Fig. 1). Under faculty supervision, students proceeded with a partner-assisted doffing sequence. Students' hands and arms were then examined with a blacklight (Esco-Lite 395 nM 51 UV Ultraviolet LED flashlight Blacklight; Esco Lighting, Inc., Chicago, IL) and scored as either contaminated or clean. Expert faculty offered doffing feedback to students at this time. Finally, students completed a questionnaire asking about their confidence to doff unsupervised.

To facilitate individualized learning, doffing training sessions were repeated three times; 40 students were trained in each two-hour session. An identical training session was repeated 6 weeks after the first training session. Each student had the opportunity to doff twice over the course of the two sessions and to be the assisting doffing partner at least once over the two sessions.

Data were analyzed using descriptive statistics and chi-square testing, using SPSS Statistics Standard GradPack 22 (IBM Corporation, Armonk, NY), with $p < .05$ for significance. Data points from the two medical school classes were

For submission to Medical Science Educator as an Innovation

✉ Kristen M Zach
ZachKM@evms.edu

[1] Department of Emergency Medicine, Eastern Virginia Medical School, Raleigh Building, Suite 304, 600 Gresham Drive, Norfolk, VA 23507, USA

[2] Department of Emergency Medicine, Stony Brook University School of Medicine, Stony Brook, NY, USA

[3] Department of Anesthesiology, Children's Hospital of Pittsburgh of UPMC, Pittsburgh, PA, USA

[4] Department of Anesthesiology, Case Western Reserve University, Cleveland, OH, USA

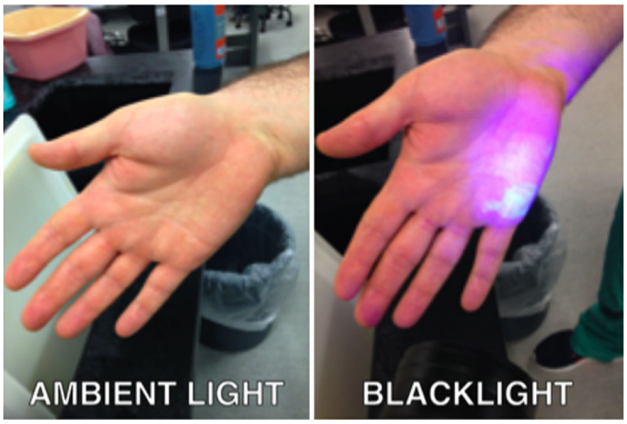

Fig. 1 Simulated contamination using dilute laundry detergent under ambient and blacklight

combined into one total study sample for each of the two doffing experiences.

Following the students' first doffing experience (n = 249), 31.7 % of the students were found to be contaminated and 66.7 % reported feeling confident in their ability to doff properly without supervision.

Following the students' second doffing experience (n = 203), 9.4 % of students were found to be contaminated, a significant (p < .001) decline from the first doffing experience, and 81.8 % of students reported feeling confident in their ability to properly doff without supervision, a significant improvement (p < .001).

Our curriculum significantly reduced the rate of self-contamination while doffing and increased participant's confidence to doff without supervision, after only two training sessions. We believe our curriculum is novel in its use of low-cost materials to train large groups of participants and in its versatility to be used to educate hospital and auxiliary healthcare staff.

References

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