Painting the Gown Red: Using a Colored Paint Quality Improvement Process to Evaluate Healthcare Worker Personal Protective Equipment for Highly Pathogenic Infections

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Use of personal protective equipment (PPE) is an important infection control measure to protect healthcare workers (HCWs) from exposure to pathogens as well as to prevent the spread of pathogens to other patients. For this reason, proper and consistent donning and doffing technique is crucial to keep HCWs safe and limit potential transmission. This became particularly apparent during the Ebola outbreak of 2014–16, where improper PPE technique was a recidivist in preventing HCWs from being infected. Improper doffing technique is crucial to keep HCWs safe and limit potential transmission. This became particularly apparent during the Ebola outbreak of 2014–16, where improper PPE technique was a recidivist in preventing HCWs from being infected.

One of the main challenges in evaluating and improving doffing technique is the limited ability to model the transmission of pathogens. A variety of techniques utilizing MS2 RNA bacteriophages (4–5) as well as fluorescent liquids and powders (6–7) have been reported in the literature. In this study, we report on the use of a low cost paint transfer visualization (PTV) technique that may serve as a useful method for systematically evaluating PPE contamination during doffing procedures.

METHODS

Paint Transfer Visualization (PTV) Procedure

A wide range of percent of paint cover was noted between zones as well as among the 22 HCWs participating in the study (Figure 4). The most contaminated areas were the shoulders (1, 1%), waist (5, 3%), and no paint noted by any HCW on the arms (8%). The percent of paint cover was highest for the shoulders (1, 1%), with 20%, and 75% of the HCWs participating in study divided by role.

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RESULTS

• 27 HCWs participated in the paint transfer visualization (PTV) procedure (Figure 4). 10 nurses and 17 physicians (8).
• 21 of the 22 HCWs observed during the doffing process were evaluated as being sufficiently accomplished (9).
• A wide range of percent of paint cover was noted between zones as well as among the 22 HCWs participating in the study (Figure 5, verticals represent range). The percent of paint cover was highest for the shoulders (1, 1%), with 20%, and 75% of the HCWs participating in study divided by role.

CONCLUSIONS

• Powdered paint is an effective and low-cost visual tool for evaluating contact during the PPE doffing process, and may serve as a proxy for PPE contamination.
• PTV technique can be incorporated into any systematic review of PPE as a way to highlight areas of vulnerability with the process.
• PTV may serve as a useful method for real-time feedback during PPE training sessions.

LIMITATIONS

• Powdered paint has a different fluid dynamics than would be seen with viruses or other infective material, and therefore the technique may not represent transmission.
• Amount of paint applied to gloves between steps may not accurately correlate.
• Effectiveness of paint transfer may be dependent on paint color and as well as in PPE material.
• The wide variable to determine whether contact represented by paint splatter correlated with competency of PPE procedures.

REFERENCES