

Infection control in times of Ebola: how well are we training the next generation of intensivists in Australia and New Zealand?

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The recent outbreak of Ebola virus infection in West Africa has highlighted the importance of the correct use of personal protective equipment (PPE) to prevent transmission of infectious agents, including to health care workers (HCWs). Many lessons were also learnt from the well documented nosocomial outbreaks of severe acute respiratory syndrome (SARS) in Canada, China, Hong Kong, Vietnam and Singapore during the 2002–2004 epidemic, which was also associated with significant morbidity and mortality among infected HCWs.

The literature is clear: failure to implement appropriate barrier precautions is responsible for most nosocomial transmissions of disease.¹ By the nature of their patients and procedures undertaken, intensive care units are potential high-risk areas for transmission of infectious agents. ICUs typically have strict guidelines for infection control measures and the use of PPE. Indications for and correct use of PPE are part of routine daily practice in any ICU and are considered basic core knowledge for all staff, including doctors, working in these areas.

At a recent general fellowship examination for the College of Intensive Care Medicine of Australia and New Zealand, we assessed the capability of candidates, advanced trainees in intensive care medicine, to be able to apply effective infection control measures in the ICU, including the correct use of PPE. The candidates were presented with the following scenario:

A patient with an influenza-like illness has been admitted to your ICU. What are the infection control measures that you and the nursing staff need to take for this patient in this situation?

After a short discussion of this situation, the candidates were then asked to show how they would put on (don) and remove (doff) PPE. The PPE presented consisted of a gown, gloves, protective eyewear and an N95 respirator mask. Alcohol-based hand gel was also made available. In marking the candidates, specific attention was given to the sequence of donning and doffing, the use of hand hygiene, and fit-testing the N95 mask. Candidates were marked down if they did not remove the gloves appropriately or touched potentially contaminated areas after removing the gloves, such as eyewear

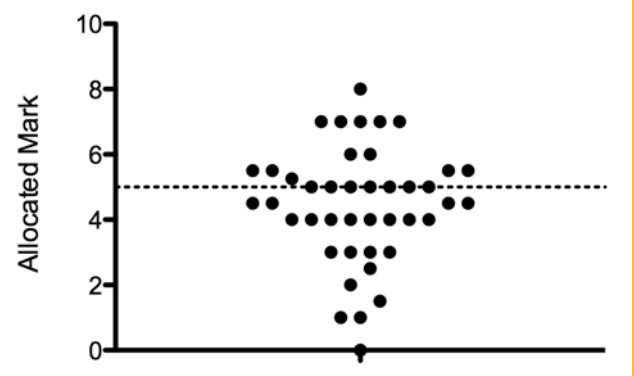
surface, the surface of the mask and the front parts of the gown. Towards the end of the station, candidates were asked the following questions:

What is the difference between a surgical facemask and a P2/N95 mask? When should hand hygiene be performed in the clinical ICU environment? Do you know of situations when an alcohol-based gel for hand hygiene is insufficient?

The results of this viva voce procedure station were of great concern, with 28 out of 42 candidates scoring 50% or less of the marks (Figure 1). Most candidates failed to correctly put on and remove PPE and would have infected themselves, other patients or co-workers frequently, if this was a real situation. Hand hygiene was not consistently implemented and occasionally not at all. Furthermore, a large number of candidates could not identify the moments of hand hygiene in an ICU environment. The distinction between standard, droplet and airborne infection-control precautions was only correctly mentioned by a small minority of trainees.

Disappointing as these results may seem, our observations should be interpreted with caution. First, behaviours in an exam situation may not accurately reflect

Figure 1. Allocated marks out of 10 for candidates presenting for the personal protective equipment viva voce exam in the general fellowship examination (the horizontal line indicates a mark of 5/10)



behaviours in real life and it is possible that exam stress results in an increased number of mistakes in a procedure examination station of the type we used. In addition, our observations did not form part of a well designed study to examine a specific hypothesis and all analysis is, by definition, post hoc.

Our results are consistent with previously published reports. For example, in one study, HCWs in four ICUs in the United States were surveyed to characterise their behaviour, knowledge and attitudes about recommended precautions for the prevention of health care-associated influenza infections. Only 63% of respondents were able to correctly identify adequate influenza PPE, and 62% reported high adherence to PPE use (> 80%) for prevention of nosocomial influenza. The authors concluded that suboptimal adherence levels and significant PPE knowledge gaps indicate that ICU HCWs may be at a substantial risk of developing and/or transmitting nosocomial respiratory viral infection.² In a comparable cross-sectional survey of Canadian paediatric emergency doctors, 22% of participants reported that they had never received PPE training and 32% had not been trained in the previous 2 years. In addition, participants were only correct in a mean of 4.9 of 11 knowledge-based questions.³ Knowledge and self-reported difference to recommended PPE use among Chinese critical care clinicians have also been shown to be suboptimal.⁴

Variations in organisational and individual factors can explain much of the variations in self-protective behaviour in health care settings. Several interventions have been shown to improve knowledge and adherence levels for the use of PPE, including convenient access to PPE and improved education on isolation and PPE practices. In one before–after design study, a theoretical and practical educational intervention was shown to be effective in increasing adherence to the technical recommendations for tracheobronchial aspiration.⁵ However, it is uncertain whether this effect would be sustained over time and how frequently refresher education sessions would need to be offered to maintain adherence. Organisational factors, such as a positive safety climate, have also been associated with increased HCW adherence to universal precautions.⁶ Although currently an untested hypothesis, it is hoped that adding this topic to the general fellowship examination for intensive care medicine in Australia and New Zealand may increase the knowledge level of future candidates.

Advanced intensive care trainees in Australia and New Zealand appear to have limited and insufficient theoretical and practical knowledge of infection control measures, including the correct use of PPE. This requires urgent attention, not just in times of Ebola.

Competing interests

None declared.

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