

Systematic review

Use of personal protective equipment reduces the risk of contamination by highly infectious diseases such as COVID-19

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Commentary on: Verbeek JS, Rajamaki B, Ijaz S, *et al.* Personal protective equipment for preventing highly infectious diseases due to exposure to contaminated body fluids in healthcare staff. *Cochrane Database Syst Rev* 2020; Apr 15;4(4):CD011621. doi:10.1002/14651858.

Implications for practice and research

- ▶ The use of a powered, air-purifying respirator with coverall may protect against the risk of contamination better than an N95 mask and gown but was more difficult to don.
- ▶ The creation of future studies is necessary to compare the risk of contamination during removal of personal protective equipment, (PPE).

Context

Currently more than 59 million people are employed in the health sector worldwide, who are at risk of developing life-threatening infectious diseases due to contact with patients' blood or body fluids.¹ Due to the severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2) pandemic, as well as other infectious diseases, healthcare workers (HCW) must properly use PPE.¹ However, there is still uncertainty about the ideal type, composition, quantity and ways of using full-body PPE to prevent skin and mucous contamination from healthcare professionals when treating patients infected with highly infectious diseases.¹

Methods

The purpose of this systematic review¹ was to evaluate which type of full-body PPE and which method of donning or doffing PPE have the least risk of contamination or infection for HCW, and which training methods increase compliance with PPE protocols. The study was conducted to identify all published trials that could be considered eligible for inclusion in this review. The effectiveness of interventions was measured including contamination of skin or clothing, measured with any type of test material to view contamination or harmless viruses or bacteria; infection with EVD, another viral haemorrhagic fever or comparable highly infectious disease with serious consequences such as SARS or COVID-19; compliance with guidance on selection of type and use of PPE was measured, for example, with an observation checklist.

Findings

Twenty-four studies with 2278 participants were included, they compared types of PPE, donning and doffing processes, and types of training. Also evaluated were adapted PPE, and simulated exposure with fluorescent markers or harmless microbes. The studies using simulated exposure demonstrated contamination rates of 25% in the intervention and 67% in the control groups.

The clinical evidence for evaluated outcomes is of very low certainty, a low quality of evidence is due to a low number of published studies and the high bias due to modelling and simulation studies.

Commentary

This study focused on different types of EPP, such as body protection, eye and face protection, hand protection and foot protection. The effectiveness of training was also assessed to increase compliance with existing guidelines on the selection our use of PPE.

The findings demonstrate the use of a powered air-purifying respirator with coverall may protect against the risk of contamination better than an N95 mask and gown but was more difficult to don. HCW with a long gown had less contamination than those with a coverall, and coveralls were more difficult to doff. Gowns may protect better against contamination than aprons. Modified PPE (sealed gown and glove combination; better fitting gown around the neck, wrists and hands; better cover of the gown-wrist interface; added tabs to grab to facilitate doffing of masks or gloves) may lead to less contamination compared with standard PPE. This study confirms the findings by Paiva *et al.*, which demonstrated the importance of using PPE to reduce illness related absenteeism due to environmental and organisational factors.²

This study demonstrates the importance of conducting a systematic review on this topic of PPE and is necessary to inform current practice of HCW and ensure evidence-based protective measures are in place.³ The use of PPE must be encouraged and correct procedures for donning and doffing followed by all HCW, since they reduce the risk of infection and consequently illness and maintain the quality of protection provided.^{1,2} In this sense, the work of occupational health professionals is essential for the adequate training of HCW for the correct use of PPE, as well as to ensure the purchase of equipment appropriate to the needs of the health service.⁴ In addition, health service managers must contribute to a positive safety climate, which is a more important factor in adhering to universal precautions.⁵

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