

Evidence Assessment: Summary of a Systematic Review

Who is this summary for?

For Doctors and Health Personal, Administrators and Managers of health facilities, Community Health Workers and the partners involved in the prevention of infectious diseases.

Personal protective equipment for preventing highly infectious diseases due to exposure to contaminated body fluids in healthcare staff

Key findings

- In spite of protective clothing, the marker of contamination was found on the skin of 25% to 100% of workers. More breathable clothing did not lead to more contamination than non-breathable clothing, but users were more satisfied.
- Two pairs of gloves led to less contamination than only one pair of gloves. The outer gloves were immediately removed after the task was finished.
- Active training, including computer simulation and spoken instructions, led to less errors with guidance on which protection to use and how to remove it among healthcare staff compared to passive training.

Background

Healthcare staff are at much greater risk of infections such as Ebola Virus Disease or SARS than people in general. One way of preventing infection is to use personal protective equipment (PPE), such as protective clothing, gloves, masks, and goggles to prevent contamination of the worker. It is unclear which type of equipment protects best and how it can best be removed after use. It is also unclear what is the best way to train workers to comply with guidance for this equipment.

Question

What is the effectiveness of personal protective equipment (PPE) for preventing nosocomial infection in healthcare staff exposed to body fluids contaminated with viral haemorrhagic fevers such as EVD, Lassa, Marburg, Congo-Crimean Haemorrhagic Fever, or comparable highly infectious diseases with serious consequences, such as SARS?

Personal protective equipment for preventing highly infectious diseases due to exposure to contaminated body fluids in healthcare staff in Cameroon: The Ebola virus disease has a total of 28 610 confirmed, probable and suspect were reported in Guinea, Liberia and Sierra Leone, with 11,308 deaths. So far, no case has been reported in Cameroon, but preparedness for potential epidemics is vital.

Table 1: Summary of the systematic review		
	What the review authors searched for	What the review authors found
Studies	Randomized controlled trials, cohort studies	Five were randomised studies, three were non-randomised controlled studies and one retrospective cohort study met the inclusion criteria
Participants	For simulation studies, we included participants using PPE designed for EVD or comparable highly infectious diseases with serious consequences. For field studies, we included studies conducted with HCWs and ancillary staff exposed to body fluids in the form of splashes, droplets or aerosols contaminated with particles of highly infectious diseases that have serious consequences for health such as EVD or SARS.	Healthcare workers with a mixture of occupations, but mainly physicians, nurses and respiratory technicians.
Interventions	<ul style="list-style-type: none"> • Body protection such as gowns, coveralls or hazmat suits; • Eye and face protection such as glasses, goggles, face shields or visors, or masks or hoods that cover the entire head; • Hand protection: gloves; and • Foot protection: overshoes or boots. 	Five studies compared one type of PPE to another. Four studies compared two different ways of removal.
Controls	Enhanced respiratory and contact precautions (E-RCP) attire according to 2005 CDC recommendation	Enhanced respiratory and contact precautions (E-RCP) attire according to 2005 CDC recommendation
Outcomes	<p>Primary outcomes</p> <ul style="list-style-type: none"> • Contamination of skin or clothing, measured with any type of test material to visualise contamination (e.g. stains made visible with UV-light); • Infection with EVD, another viral haemorrhagic fever, or comparable highly infectious disease with serious consequences such as SARS; or • Compliance with guidance on selection of type and use of PPE measured, for example, with an observation checklist. <p>Secondary outcomes</p> <ul style="list-style-type: none"> • User-reported assessment of comfort and convenience • Costs or resource use • Time to don and doff the PPE 	<ul style="list-style-type: none"> • Compliance with guidance: Non-compliance rates with donning and doffing procedures; • Infection with EVD, another viral haemorrhagic fever, or comparable highly infectious disease with serious consequences such as SARS; • Costs ; • Time to don and doff the PPE
Date of the most recent search: 8 January 2016.		
Limitations: This is a high quality systematic review, AMSTAR =11/11		
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Table 2: Summary of findings

PAPR versus E- RCP Attire for preventing contact with contaminated body fluids in healthcare staff			
Patient or population: health care staff volunteers			
Settings: simulation study			
Intervention: PPE with Powered Air Purifying Respirator (PAPR) Attire			
Control: Enhanced respiratory and contact precautions (E-RCP) attire according to 2005 CDC recommendation			
Outcomes	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)
Any contamination fluorescent marker Follow-up: post intervention	0.27 [0.17-0.43]	50 (1)	Very low
Compliance with guidance Noncompliance with donning guidance Follow-up: post intervention	7.5 [1.81-31.1]	50 (1)	Very low
Compliance with guidance - Noncompliance with doffing guidance Follow-up: post intervention	0.5 [0.2-1.23]	50 (1)	Very low

Applicability

Two studies were performed in Canada, three in China and Hong Kong, two studies in the US, one in Russia and one was performed in three countries at the same time: France, Peru and Mexico. These interventions may be applied in other low resources settings such as Cameroon.

Conclusions

There is very low quality evidence that more breathable PPE do not lead to more contamination, but may have higher user satisfaction. There is very low quality evidence that double gloving and doffing as per CDC recommendations may reduce the risk of contamination.

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