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Covid-19: Risk of aerosol transmission to staff outside of intensive care is likely to be higher than predicted

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Pressure is mounting on the government and NHS trusts to adopt a more precautionary approach to personal protective equipment (PPE) for NHS staff working outside of intensive care after the results of a study suggested that such staff may be at greater risk of SARS-CoV-2 infection through aerosol transmission than previously thought.

The study, which was funded by the National Institute for Health Research, has not yet been peer reviewed and is available as a preprint,¹ found that the risk of SARSCoV-2 aerosolisation was likely to be high in departments where patients with covid-19 are coughing, such as emergency departments and general wards. These are places where staff generally wear face masks only.

In contrast, the risks of SARSCoV-2 aerosolisation appeared to be lower than anticipated in situations where patients receive continuous positive airways pressure (CPAP) and high flow nasal oxygen (HFNO)—two respiratory support procedures which have been presumed to be high risk for aerosol generation and delivered in intensive care settings where staff wear more protective FFP3 respirators.

For the study, researchers in Bristol assessed aerosol emissions from 25 healthy volunteers when breathing, speaking, and coughing, and also when using oxygen and respiratory support systems. CPAP (with exhalation port filter) was found to produce fewer aerosols than breathing, speaking, and coughing, and while HFNO did emit aerosols, most of the particles were generated by the HFNO machine, not the patient.

Coughing was associated with the highest aerosol emissions, with a peak concentration at least 10 times greater than the mean concentration generated by speaking or breathing.

“Policy around PPE should be updated to reflect these adjusted risks,” said James Dodd, study lead and consultant senior lecturer in respiratory medicine at the Academic Respiratory Unit, University of Bristol.

Serology has shown that NHS staff working in emergency departments and acute medicine are more than twice as likely to be seropositive for anti-SARS-CoV-2 IgG than those working in intensive care units and anaesthetics.²

“There’s certainly a discussion to be had about trying to explain these differences,” said Dodd. Exposure to patients not on respiratory support who may be coughing and earlier in the disease course—and so have a higher viral load and potentially be more infectious—could have a bearing on why staff in the emergency department and the acute medical assessment unit are more likely to be seropositive,

he added. Lower level PPE, particularly face masks, could be another factor. More attention should also be paid to ventilation within these hospital departments, he said, along with reinforcing the need for patients to wear face masks.

Eilir Hughes is a GP and leader of Fresh Air NHS, a group of healthcare workers calling for the UK and devolved governments to recognise the importance of airborne transmission of SARS CoV-2 and to improve ventilation in care settings and upgrade PPE to protect staff and patients.³ “We would call on Public Health England (PHE) to change their guidance according to what the science is telling us. These staff members need to be protected. It’s not a matter of pulling PPE off the faces of intensive care staff. Of course, they must continue to be adequately protected,” he said. “It’s about improving and raising the standards of protection for other staff, and that includes GP practices.”

The BMA wrote to PHE in January to ask for an urgent review of infection prevention and control guidance for healthcare staff, “specifically, to review the recommendations on PPE usage so that a more precautionary approach is adopted to the provision of respiratory protective equipment (RPE) to ensure staff are protected from aerosol transmission.”⁴

BMA council chair Chaand Nagpaul said, “There are significant and growing concerns about the role of aerosol transmission of covid-19 in healthcare settings, and the need for wider use of RPE (for example, FFP3 respirators) outside of those procedures designated as aerosol generating.”

A spokesperson for the Department of Health and Social Care said, “In response to the new covid-19 variants that have emerged in recent weeks, the UK Infection Prevention Control Cell conducted a comprehensive review of evidence and concluded that the current guidance and PPE recommendations remain appropriate. New and emerging evidence is continually monitored, including on the latest variants, and reviewed by government in conjunction with our world leading scientists.”

1 Hamilton F, Gregson F, Arnold D, et al. Aerosol emission from the respiratory tract: an analysis of relative risks from oxygen delivery systems. *Medrxiv* 2021.01.29.21250552 [Preprint]. 2021. www.medrxiv.org/content/10.1101/2021.01.29.21250552v1.

2 Martin CA, Patel P, Goss C, et al. Demographic and occupational determinants of anti-SARS-CoV-2 IgG seropositivity in hospital staff. *J Public Health (Oxf)*. 2020 Nov 16:fdaa199.

3 Wise J. Covid-19: Doctors and nurses demand better PPE for wider range of procedures. *BMJ* 2021;372:n30. doi: 10.1136/bmj.n30 pmid: 33408072

4 BMA. Letter to Public Health England: enhanced PPE protection for healthcare staff. 13 January 2021. www.bma.org.uk/media/3659/bma-letter-to-phe-130121.pdf.

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