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Editorial

Personal protective equipment and Covid-19- a risk to healthcare staff?

Introduction

The novel Coronavirus, COVID-19 (SARS-CoV-2)¹ has recently created a worldwide pandemic. With a death rate that is climbing rapidly, the disease has been declared a global emergency.² A substantial number of healthcare workers tested positive for the disease in Italy, the epicentre of the European outbreak, particularly in its early stages. The number of positive healthcare workers was 10,627 with 34 deaths to date, representing a mortality rate of 0.3%,³ but the Italian authorities acknowledged that healthcare workers were over tested which may account for a lower mortality rate. The most worrying statistic is the rising number of deaths amongst healthcare professionals.⁴ There have already been seven healthcare staff deaths in the UK⁵ as of 5 April 2020. This has been postulated to be for a number of reasons and may be multifactorial.

Viral load

The initial viral load is thought to be a predictor of severity as is the case with influenza.⁶ There is a known poorer prognosis in patient with COVID-19 who have a prolonged virus shedding.⁷ Healthcare professionals are at a higher risk of catching the disease due to their exposure to higher viral loads.⁸ It is also known that if the virus is aerosolised then it becomes more infectious to healthcare staff.⁹ In 2007, the WHO lists intubation and extubation, manual ventilation, open suctioning, cardiopulmonary resuscitation, bronchoscopy, surgery, and post-mortem procedures involving high-speed devices, some dental procedures (e.g. using dental burs), non-invasive ventilation (NIV) e.g. bi-level positive airway pressure (BiPAP) and continuous positive airway pressure ventilation (CPAP) as aerosol generating procedures (AGP).¹⁰ This guidance has not been adopted by all UK regions with Northern Ireland for example delineating only

intubation, manual ventilation, non-invasive ventilation (e.g. BiPAP, BPAP) and tracheostomy insertion as AGP which reflects the most recent WHO guidance in 2014.¹⁰ However, since this reduced list there have been incidences where items from the old list have been implicated in transmission of Mers-Co-V, such as open suction.¹¹ Additionally, bronchoscopy has been shown in several studies to be implicated in aerosolised transmission.¹² If a healthcare worker is exposed to a higher viral load, especially in aerosolised rather than droplet form, then their outcome may be significantly worse.

Personal protective equipment

The personal protective equipment (PPE) at Work Regulations 1992 legislates that an employer will provide suitable protection for an employee in their work.¹³ The employee must also receive adequate training in the use of the equipment. The WHO has recommended that when dealing with patients whom are performing any AGP on a suspected COVID-19 positive patient must wear an N95 or FFP2 mask.¹⁴ There is also a recommendation that a medical mask, gown, gloves, and eye protection (goggles or face shield) is sufficient.¹⁴ The WHO also recommends that other staff on a ward not providing direct care require no PPE. Public health England (PHE) have recommended that an FFP3 mask (Fig. 1) should be used if available but an FFP2/N95 mask can be used when FFP3 are not available for AGP.¹⁵ Otherwise there is very little divergence between the two guidance articles.

Electron microscopy has measured the COVID-19 virus to be between 70–90 nm in diameter.¹⁶ However, Flüge droplets less than 5 µm in size are typically produced by coughing and sneezing during which the virus can travel up to 4.5 m, representing a risk to healthcare staff who are not directly involved in patient care.¹⁷ This is particularly rel-



Fig. 1. Photograph showing an FFP3 mask and full personal protective equipment.

evant when staff are ward based with no additional PPE. Surgical facemasks were found to provide very little protection for particle sizes 10–80 nm.¹⁸ N95/FFP2 masks are at least 95% effective for particle sizes 0.1–0.3 μm which increases to 99.5% or higher for particles that are 0.75 μm or bigger.¹⁹ Therefore over 95% protection is provided with an FFP2/N95 mask when performing an AGP.

Workforce concerns

There has been considerable concern in the UK that front line clinicians are not getting the correct PPE.²⁰ A BBC article raised concerns that Chief Nurse Ruth May held, stating that more staff were likely to die and that there are PPE shortages not only in the frontline NHS but also in communities, but the Government are actively addressing this issue.²⁰ However, at least one NHS staff member has resigned as she was unable to wear a facemask she purchased herself.⁴ With up to 14% of staff absent from work, stretching an already busy workforce stress, emotions and fatigue are running high,²¹ increasing the interplay of human factors, and chance of error and potentially exposing staff to the virus.²² Asymptomatic carriers who are potentially part of the healthcare workforce present a significant challenge as they can be the vectors to

others.²³ Until a reliable antibody test is developed and there is widespread RNA testing of staff this will remain a challenge. Any healthcare staff who are required to self-isolate due to comorbidities should seek to engage with occupational health at the first opportunity to be managed effectively.⁸

There are also concerns over staff members' use of face-masks as not all staff have had a fit test, and little training has been provided in some establishments for donning a surgical mask.²⁴ An ill-fitting mask due to poor donning or prolonged use can increase the risk of infection.²⁴ This is a potential area for further spread of the disease and easy to implement. A lesson the UK military learned from deployment on Operation Gritrock (Humanitarian assistance to the Ebola epidemic Sierra Leone 2014–2015) was to have a donning and doffing supervisor, and when this was not possible a buddy-buddy system.²⁵ This can reduce self-infection/cross contamination and provides automaticity of safe and efficient donning and doffing of PPE amongst healthcare workers.

Conclusions

In order for healthcare professionals to deliver safe care they need adequate protection and training in its use. Where employers are failing to provide adequate PPE, safe healthcare cannot be delivered. This poses both moral and ethical dilemmas to healthcare professionals who are patient focused, thereby creating a sense of inadequacy and undervaluation, resulting in workforce stress. The elected government should be held accountable to the public on its promises. “Rationing” and prioritisation of care has already been seen in the cancellation of all elective surgery, endoscopy lists, and clinics. Healthcare staff want to care for their patients and the government need to put in place a system for future pandemics that safeguards and preserves the NHS workforce.

Conflict of interest

We have no conflicts of interest.

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J.B.T. Herron *

Faculty of Health Sciences and Wellbeing Sunderland University, Chester Road, Sunderland, SR1 3SD, UK

A.G.C. Hay-David

Queen Elizabeth University Hospital, Glasgow, G51 4TF, UK

A.D. Gilliam

Faculty of Health Sciences and Wellbeing Sunderland University, Chester Road, Sunderland, SR1 3SD, UK

P.A. Brennan

Maxillofacial Unit, Queen Alexandra Hospital, Portsmouth, PO6 3LY, UK

* Corresponding author. Tel.: +44 (0)191 515 2000.

E-mail address: Jonathan.herron@nhs.net (J.B.T. Herron)

Available online 13 April 2020