




## Personal protective equipment during the COVID-19 pandemic (Letter #2)

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### To the Editor,

We read with appreciation and great interest the “Personal protective equipment (PPE) for both anesthesiologists and other airway managers” by Lockhart *et al.*<sup>1</sup> We are grateful for this thorough review, which defines a rational approach to PPE, including those specific individual elements such as masks, shields, and gowns. Nevertheless, we believe it is critically important to leverage the information that the authors have provided to address the broader issue of national and global preparedness.

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This letter is accompanied by a reply. Please see Can J Anesth 2020; this issue.

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Key to the design and effectiveness of PPE is understanding how the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) responsible for coronavirus disease (COVID-19) gains access to the body. The SARS-CoV-2 virus present in droplets cannot enter the body transdermally; it can only enter when contaminated droplets, aerosols, and hands come in contact with mucous membranes of the mouth, nose, and eyes.<sup>2</sup>

While it is helpful to use the size of viral-laden droplets (greater or smaller than 5  $\mu\text{m}$ ) as an index of transmissibility for infection control measures, it is also important for healthcare workers (HCWs) to take into consideration the complex dynamic nature and the site of deposition of infected droplets, and the critical pathogen load of droplets required for establishing infection in different airway regions.<sup>3</sup> Hence, a distance of 2 m has been identified and recommended to prevent the large droplets projected by coughing from landing on the face or body; “smaller” droplets will likely be suspended, drifting about in the air. The kinetics of these “smaller” viral droplets has not been well-characterized. It is possible that the water content of the small droplets will evaporate, making the droplets even smaller and allowing them to drift farther, eventually exposing the virus, which releases its genetic material when its lipid envelope breaks.<sup>4</sup> Even though the World Health Organization states that the evidence of viral RNA “is not indicative of a viable virus that could be transmissible”, the infectivity of genetic material from SARS-CoV-2 remains unknown.<sup>5</sup> It is tremendously important that further research be undertaken in these regards so that safe environments and appropriate protective barriers can be well-defined.

To summarize, transmission of the infection can occur only if viral droplets land on the exposed skin or objects in the environment (fomites), subsequently contaminating the

hands, which then may deposit viral droplets on eyes, nose, or mouth. Therefore, HCWs need to protect the three key entry points (eyes, nose, and mouth) when caring for COVID-19 patients. Hence, glasses, goggles, appropriate mask, face shield, and hood (for HCWs with facial hair) are critically important and should be worn. Gloves are also important to avoid cross-contamination. Given what we know now, gowns and shoe coverings (booties) cannot be considered essential but rather are of secondary importance, provided that the scrubs or reusable gowns can be changed and that the HCWs can shower and wash hands thoroughly after caring for the COVID-19 patient. This approach is critical to avoid unnecessary waste of scarce resources.

None of this is new, and much knowledge has been gained from many past pandemics. Tragically, however, the experience of the last several months has also revealed widespread unpreparedness by many national and international authorities. This must not be allowed to happen in future pandemics. Those of us working on the frontlines need to stand up and challenge our health and political authorities to act from lessons learned, particularly from the current pandemic, and we should be ready to be a part of, and work toward, whatever preparations must be in place for the next outbreak.

We must recognize that not everyone will be able to comply with all these recommendations, all of the time. Misunderstanding of the COVID-19 transmission process, coupled with the impossibility of complying with official recommendations in a resource challenged environment can lead to intensifying fears and increasing risk perceptions, hoarding, as well as the inappropriate use of PPEs. When resources are depleting or when PPEs are no longer available, one should emphasize that it is also safe and possible to employ whatever means available to protect eyes, nose, and mouth (including reused N95 masks, shields, etc.) while caring for COVID-19 patients. This may also include stratification of HCWs according to their vulnerability to harm under some circumstances.

Hand sanitization remains the single most important step in minimizing the risk of contracting the COVID-19 virus, more so than wearing a gown and booties. With this clear understanding of how and where COVID-19 virus transmission occurs, and which pieces of protective equipment have been proven effective, HCWs need not be any more apprehensive about caring for COVID-19 patients than when they would be managing others with severe viral respiratory illness. Well informed HCWs, and a more knowledgeable public, are less likely to use PPE inappropriately and may help to reduce the rapid depletion of this valuable life-saving equipment.

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## References

1. Lockhart SL, Duggan LV, Wax RS, Saad S, Grocott HP. Personal protective equipment (PPE) for both anesthesiologists and other airway managers: principles and practice during the COVID-19 pandemic. *Can J Anesth* 2020. <https://doi.org/10.1007/s2630-020-01673-w>.
2. Peiris JS, Yuen KY, Osterhaus AD, Stohr K. The severe acute respiratory syndrome. *N Engl J Med* 2003; 349: 2431-41.
3. Gralton J, Tovey E, McLaws ML, Rawlinson WD. The role of particle size in aerosolised pathogen transmission: a review. *J Infect* 2011; 62: 1-13.
4. Morawska L. Droplet fate in indoor environments, or can we prevent the spread of infection? *Indoor Air* 2006; 16: 335-47.
5. Joynt GM, Wu WK. Understanding COVID-19: what does viral RNA load really mean? *Lancet Infect Dis* 2020. [https://doi.org/10.1016/S1473-3099\(20\)30237-1](https://doi.org/10.1016/S1473-3099(20)30237-1).

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