



## COVID-19 pandemic: the 3R's (reduce, refine, and replace) of personal protective equipment (PPE) sustainability

Vivian Ip, MBChB, FRCA · Timur J. P. Özelsel, MD, DESA ·  
Rakesh V. Sondekoppam, MBBS, MD · Ban C. H. Tsui, MD, MSc, FRCPC

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### To the Editor,

Literature regarding the transmission risk of the coronavirus disease (COVID-19) to healthcare providers (HCP) is largely from early case reports/series or other clinical reports, both of which require critical appraisal. Timely recommendations for critical care and anesthesiology teams in managing COVID-19 patients are vital to the wellbeing of HCP.<sup>1</sup> In light of a global shortage of personal protective equipment (PPE), drastic measures are being taken to preserve it. The 3R-mantra of sustainability (reduce, refine, and replace) not only applies to “green anesthesia” practice,<sup>2</sup> but is also well-suited to PPE preservation.

**Reduce.** The first step is to eliminate all unnecessary use of PPE. Deferring all non-urgent surgeries preserves hospital resources and simultaneously reduces transmission of coronavirus. Rigorous screening measures for staff and visitors safeguards the hospital environment, and in turn also reduces the number of people in the hospital further contributing to infection containment. Indeed, this reduction strategy is similar to the current practice of public health policy across the globe of “social

distancing”, “shelter in place”, and public gathering bans to avoid any non-essential contact in an attempt to “flatten” the pandemic curve and to prevent overwhelming the healthcare system.

**Refine.** Understanding the mode(s) of COVID-19 transmission is still evolving. The World Health Organization continues to recommend droplet and contact precautions for general care but airborne precautions for HCPs performing aerosol-generating medical procedures (AGMP) in COVID-19 patients.<sup>A</sup> On the other hand, US Centers for Disease Control and Prevention (CDC) now recommends the use of respirator masks as part of the first line of protection of HCP caring for suspected COVID-19 patients.<sup>B</sup> In the presence of community spread, many centres in the US are already treating all untested surgical patients as presumed infectious. This could likely become the standard in all Canadian healthcare facilities, which will further drain PPE reserves. Modalities to increase airborne and contact/droplet PPE supplies other than procurement of currently used products will need to be explored. The need to *refine* the current culture of using disposable PPE to sustainable PPE solutions is essential for demand to meet supply—ideally, before a pandemic. Recently, the US Food and Drug Administration has

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V. Ip, MBChB, FRCA · T. J. P. Özelsel, MD, DESA  
Department of Anesthesia and Pain Medicine, University of  
Alberta, Edmonton, AB, Canada

R. V. Sondekoppam, MBBS, MD  
Department of Anesthesia, University of Iowa Hospital, Iowa  
City, IA, USA

B. C. H. Tsui, MD, MSc, FRCPC (✉) ·  
Department of Anesthesiology, Perioperative, and Pain  
Medicine, Stanford University School of Medicine, Palo Alto,  
CA, USA  
e-mail: bantsui@stanford.edu

<sup>A</sup> World Health Organization. Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations. Available from URL: <https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations> (accessed March 2020).

<sup>B</sup> Centers for Disease Control and Prevention. Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings. Available from URL: <https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html> (accessed March 2020).

approved (in effect, a refine measure) reusable industrial respirators in clinical settings to address the acute shortage.<sup>C</sup> Decontamination and reclamation of used PPE<sup>D</sup> have also been widely disseminated; however, the safety of such practices is not well-supported with robust evidence. Although this presents a unique opportunity to preserve the limited supplies of PPE while reducing the environmental burden from their eventual disposal, the safety and efficacy of reusable PPE must be carefully studied prior to implementation and recommendation. More importantly, HCPs must also refine their skillset by understanding, simulating, and practicing donning and doffing both their disposable and reusable equipment properly and safely.<sup>3</sup>

**Replace.** Replacement of AGMP should be considered whenever feasible. In the midst of PPE shortage, regional anesthesia is an elegant and environmentally sustainable modality to circumvent the need of AGMP associated with general anesthesia.<sup>4</sup>

During this time of uncertainty, HCPs need to be extra vigilant in protecting themselves, including the likelihood of encountering asymptomatic COVID-19 patients. Despite PPE being a scarce resource, we should not compromise the safety for HCP by limiting use. Instead, we need to develop and implement ways to embrace sustainable solutions both for the current pandemic and for the future. Innovative ideas such as a 3R approach may be one such resource-conscious solution.

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<sup>C</sup> U.S. Food and Drug Administration. Letter authorizing emergency use of all disposable filtering facepiece respirators. Available from URL: <https://www.fda.gov/media/135763/download> (accessed March 2020).

<sup>D</sup> U.S. Food and Drug Administration. Emergency Use Authorization (EUA) for the emergency use of the Battelle CCDS Critical Care Decontamination System<sup>TM</sup>. Available from URL: <http://www.fda.gov/media/136529/download> (accessed March 2020).