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Easier access to mechanical ventilation worldwide: an urgent need for low income countries, especially in face of the growing COVID-19 crisis

Claude Guérin [1,2] and Patrick Lévy[3,4]

Affiliations: [1]Intensive Care Unit-Réanimation Groupement Hospitalier Centre Edouard Herriot Hospital and Faculty of Medicine Lyon Est, University of Lyon, Lyon, France. [2]INSERM 955, Créteil, France. [3]Univ. Grenoble Alpes, Inserm, HP2 laboratory, Grenoble, France. [4]Grenoble Alpes University, Thorax and Vessels Dept, Physiology and Respiratory Section, Grenoble, France.

Correspondence: Patrick Lévy, Physiology and Respiratory Department, EFCR, Hôpital Michallon, CHU Grenoble Alpes, 38043 Grenoble Cedex 9, France. E-mail: Patrick.levy@univ-grenoble-alpes.fr

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Combining easy-to-build noninvasive ventilator and open-source hardware description, may allow for adequate availability of ventilators to patients in low- and middle-income countries. This is urgently needed in the growing COVID-19 epidemic. https://bit.ly/3f8ZkUR

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That positive pressure mechanical ventilation can save lives was proved during the poliomyelitis epidemics of the 1950s. Since that time there has been a growing increase in the use of ventilatory support, and it has been closely associated with the development of critical care medicine [1]. Positive pressure ventilation can be life-saving in patients with acute severe hypoxaemia that is refractory to more conservative measures. In patients with severe cardiopulmonary distress for whom the effort of breathing is intolerable, mechanical ventilation substitutes for the action of the respiratory muscles [1]. Mechanical ventilation is often lifesaving but is associated with serious complications, in part because it is delivered to patients at high risk of lung or cardiac compromise. These complications may be related to the direct mechanical effects of the intrathoracic pressures generated by the ventilator, to alveolar and systemic inflammation, or to neural stimulation [2]. Endotracheal intubation is a critical procedure [3] in which patients are at risk of respiratory and circulatory compromise. Noninvasive ventilation (NIV) using facial or nasal masks, which has been revealed to be particularly helpful in the long-term treatment of patients with chronic respiratory failure, including in the context of obesity [4], can also improve pulmonary gas exchange rapidly in patients with acute ventilatory failure. As compared with conventional treatment, NIV may reduce the need for endotracheal intubation and thus decrease mortality [1]. Whilst NIV demonstrated a strong evidence for its benefits in patients with acute exacerbations of COPD [5] and cardiogenic pulmonary oedema, it may also be used in the management of patients with acute respiratory distress syndrome (ARDS) [6]. In a sub-study of a large observational study to understand the global impact of severe acute respiratory failure, NIV was used in about 15% of patients with ARDS, irrespective of the severity of hypoxaemia. However, use of NIV, in comparison with invasive ventilation, had important implications for patient management. Although mortality rate was low in patients successfully managed with NIV,

patients who failed NIV had a high mortality. NIV may be associated with a worse intensive care unit outcome than invasive mechanical ventilation in moderate to severe ARDS [6]. Lastly, NIV may be used prior to the occurrence of ARDS or when weaning from invasive mechanical ventilation.