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# Mechanical Ventilation Education for All

## Call for Action



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Unlike other pandemics, coronavirus disease 2019 (COVID-19) has required hospitals to increase their ICU capacity, specifically in their ability to provide mechanical ventilation (MV) for a great number of patients. Nearly 115,000 ventilators were projected to be needed at the peak of the US COVID-19 outbreak.<sup>1</sup> Many centers have been able to increase not only their surge capacity but also fulfill the staffing deficit required for such growth. However, a previously documented underlying necessity<sup>2</sup> has now resurfaced: personnel trained in MV are desperately needed.

MV education became undoubtedly relevant since early research from the Acute Respiratory Distress Syndrome Network<sup>3</sup> showed how adequate MV is required to improve outcomes. Nevertheless, some studies confirm that intensivists perform poorly in interpreting ventilator waveforms for patient-ventilator asynchronies and are rarely adherent to low tidal volume ventilation strategies for patients with ARDS.<sup>4</sup> Despite this evidence, the largest internal medicine resident survey

thus far found that 46% of the residents considered their training in MV to be unsatisfactory.<sup>2</sup> Seventy-seven percent of critical care-related residency programs such as emergency medicine assign < 3 curricular hours per year to the topic,<sup>5</sup> and 46% of attendings of that same specialty reported receiving zero to 1 hour per year of education.<sup>6</sup> Furthermore, these studies<sup>5,6</sup> have described that self-efficacy (ie, the individual's belief and comfort in his or her capacity to ventilate patients) is a major determinant in MV test performance. Thus, it is natural to conclude that creating educational interventions that enhance operator familiarity with MV is indispensable as we strive to improve critical care patient outcomes.

Previous studies have calculated, however, that only 36% of ICU patients in the United States are cared for by intensivists,<sup>7</sup> with an associated longer length of stay when managed by non-intensivists.<sup>3</sup> The COVID-19 pandemic has highlighted these numbers and reflects on the importance of a transdisciplinary instruction in basic MV parameters regardless of medical specialties: operating and recovery rooms have been required to transform themselves into ICUs,<sup>8</sup> driving surgeons, anesthesiologists, and other typically non-ICU specialties into MV's unexplored concepts.

Current consensus<sup>9</sup> indicates that topics such as respiratory physiology, ventilation modes, use of noninvasive ventilation, monitoring, complications of MV, and appropriate weaning strategies are the main competencies for any MV operator. However, interprofessional collaboration with nurses and respiratory therapists has rarely been addressed in the literature. When analyzing the historical disregard for MV education in medical curricula, it is often found that respiratory care is usually provided by these other professionals, leaving physicians with little need to focus on MV parameters. Nevertheless, in developing countries, due to a predominance of nonprofessional degrees inside the health-care team, initiation of MV relies on untrained general physicians outside ICUs. This situation is even more widespread in countries such as Mexico, where the specialist gap broadens between main urban centers and rural areas (2.29 vs 0.59 specialist per 100,000 patients).<sup>10</sup>

Thus, in the midst of the COVID-19 pandemic, we believe there is a strong argument for having health

**ABBREVIATIONS:** COVID-19 = coronavirus disease 2019; MV = mechanical ventilation

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professionals feel comfortable programming basic MV parameters, at least on the basic level. Despite simulation emerging as the best methodology available for MV training, it is often resource- and time-intensive, a luxury the COVID-19 outbreak has not provided. Therefore, in response to this fundamental need in our country and many Spanish-speaking countries, we adapted our previously created 12-h coursework along with a free online manual to convey MV knowledge through eight online webinars. From the initial course, a pre-post evaluation revealed that only 20% of interested students scored  $\geq 80\%$ , with ventilator graph interpretation and ARDS parameter programming achieving  $< 50\%$  of correct answers. Following training, 82% of students acquire  $\geq 80\%$  competency, with basic physiology concepts and graph interpretation sections scoring  $\geq 90\%$ . As instructive as in-person courses may be, on its new format, the online webinars and social media videos reached  $> 30,000$  views nationwide. This radical expansion is to help general physicians, nurses, and respiratory therapists grow confident with MV.

Nevertheless, much more remains to be achieved. A deep understanding of better methodologies and established curricula to provide MV training for all must be a priority in medical education. Our ability to scale up MV education across specialties and inequities is what will enable us to become truly prepared to face future pandemic peaks throughout the century.

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