

## COVID-19 Putting Patients at Risk of Unplanned Extubation and Airway Providers at Increased Risk of Contamination

### To the Editor

Computs patients at increased risk of experiencing unplanned extubation (UE), and both UE and subsequent reintubation put providers at increased risk of viral contamination. The increased patient surge that has occurred during this COVID-19 pandemic and the associated less-than-ideal provider/patient ratios put patients at increased risk for UE. In addition, patient proning, a common procedure in critically ill COVID-19 adult respiratory distress syndrome (ARDS) patients, is a risk factor for UE.

UE includes any unintentional and uncontrolled removal of an endotracheal tube, such as self-extubation (when a patient pulls his or her own tube) and accidental extubation (when an external force is applied to the endotracheal tube during patient movement or during nursing care and results in dislodgement of the tube). Before the COVID-19 pandemic, the incidence of UE in the adult intensive care unit (ICU) setting ranged in the literature from 0.8% to 35.8%, with a median rate of 7.3%.<sup>1</sup> With an average 1.65 million adult patients requiring mechanical ventilation per year in the United States, approximately 120,000 adult patients experienced these types of UE each year before the current pandemic.<sup>2</sup>

With the massive surge of patients requiring intubation and mechanical ventilation that is occurring with this COVID-19 pandemic, statistically we should also expect an increase in number of incidents of UE. According to the Center for Disease Control (CDC), 60%–75% of COVID-19 patients admitted to the ICU present with ARDS or respiratory failure, and it is likely that these patients required intubation (although there are no reported statistics to date specifically addressing intubation incidence in COVID patients).<sup>3</sup>

UE has been associated with a number of complications, such as failed reintubation, vocal cord injury, hypoxia, hypercarbia, cardiac arrhythmias, brain damage, and even death.<sup>4</sup> UE has also been associated with increased rates of ventilator-associated pneumonia.<sup>4</sup> With the high rates of hypoxia and lung damage associated with COVID-19 infection alone, adding these additional risks due to an UE could further worsen patient morbidity and mortality.

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COVID-19–related intubated patients with severe ARDS often require placement in the prone position to improve ventilation. Proning patients is a known risk for UE, which will also contribute to an increased number of incidents of UE during this pandemic.<sup>5</sup>

### Risk to Providers Due to UE or Need for Reintubation

UE and reintubation are both aerosol-generating procedures with high risk of exposure to personnel. Optimal personal protective equipment (PPE) should be donned before extubation or reintubation, and several strategies have been further suggested to reduce exposure to aerosols, such as covering the patient with plastic drapes or boxes, halting flow of oxygen before extubation, clamping the endotracheal tube, and use of suctioning devices.<sup>6</sup> During an uncontrolled extubation, aerosolized viral particles might be forcefully coughed out, and many of these strategies to prevent exposure might not have been implemented, further increasing provider exposure risk. A forced extubation might also increase the travel distance of aerosolized particles. In addition, providers might not be wearing PPE if extubation was unplanned and emergent reintubation required. It is strongly recommended that providers don appropriate PPE before any airway procedure, no matter how emergent.

During a recent COVID-19 webinar, which included hundreds of critical care and pulmonary physicians, the need to extubate and reintubate patients due to mucus-plugged endotracheal tubes in COVID-19 ARDS patients was discussed as a frequently seen problem in these patients ([www.pertconsortium.org](http://www.pertconsortium.org); April 6, 2020). In addition to UE, this type of intentional and controlled extubation due to endotracheal tube obstruction also places health care providers at increased risk of contamination.

Increased patient surges have resulted in inadequate provider/patient ratios in many hospitals. Optimal provider/patient ratios (<1:2 when caring for critically ill, mechanically ventilated patients) are often not feasible during a COVID-19 surge. Adding to the known shortfall in the availability of mechanical ventilators, fewer critical-care-trained health care providers might be available to manage the increased numbers of intubated COVID-19 patients, thereby increasing the risk of accidental extubation, provider contamination, and both provider and patient morbidity and mortality.

The prone position has been used as a successful strategy for critically ill COVID-19 patients with ARDS.<sup>5</sup> The process of turning a patient between supine and prone positions (“proning”) dramatically increases the risk of UE. COVID-19 patients

might require repetitive cycles of prone ventilation to improve oxygenation. Each change in position risks an UE and potential provider exposure. A recently released Department of Defense (DoD) COVID-19 Practice Management Guide recognizes proning maneuvers as the leading risk factor for UE.<sup>5</sup>

### Treatment/Prevention Strategies

Several strategies can be used to reduce the risk of UE as well as provider exposure. All providers managing intubated COVID-19 patients should wear full PPE including gown, double gloves, N95 face mask, goggles or face shield or full powered air-purifying respirators (PAPRs), especially during procedures that might further increase risk of exposure, such as moving or proning a patient. If PPE resources are limited or scarce, priority should be given to providers at highest risk, such as those providing airway management and managing intubated COVID patients, whenever possible.

Adequate sedation can decrease agitation and restlessness, and proper securement of the endotracheal tube can reduce risk of UE. In addition, during any high-risk procedure such as proning or movement of the patient, one provider must be responsible for maintaining control of the endotracheal tube during the procedure. Increased awareness of circumstances that might increase the incidence of UE is important. Maintaining safe patient/provider ratios and using critical care providers when possible is also important. Because this has become challenging in COVID surge areas, increased awareness and education about UE and how to reduce risk to both patients and providers becomes even more vital. Clear communication and recognition of risk factors and strategies to reduce risk to both providers and patients can be incorporated into airway management protocols

developed for COVID-19 patients. Optimal endotracheal restraint systems and processes for protecting the tube during high-risk procedures such as proning should be utilized, and medical personnel responsible for the care of critically ill, mechanically ventilated patients must wear full PPE to protect them from contamination.

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