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COMMENTARY ON “PRONE POSITIONING OF PATIENTS WITH CORONAVIRUS DISEASE 2019 WHO ARE NONINTUBATED IN HYPOXIC RESPIRATORY DISTRESS”



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CE Earn Up to 10.5 Hours. See page 359.

The impact of the coronavirus disease (COVID-19) pandemic can be felt in all aspects of life, from the daily, mundane “Did I remember my mask?” to the life-changing loss of friends and loved ones. COVID-19 has also had huge impacts on research, with many of the world’s clinicians and researchers focusing their collective powers on addressing the “once in a century” pandemic. In this edition of the *Journal of Emergency Nursing*, we have an example of the work being done by emergency nurses to address COVID-19. Wendt et al¹ submitted the results of a retrospective chart review to determine what effect a practice improvement protocol had on patients. The practice improvement that they evaluated was the effect that prone positioning had on alert patients with hypoxia with presumed COVID-19 infection. This invited commentary recognizes the authors’ great work, notes some restrictions placed on the authors, and provides additional context to the necessarily short background offered by the authors on prone ventilation.

The Genesis of Proning

The act of placing a patient in the prone position can be straightforward. For example, the recovery position is routinely taught in basic first aid and is widely used by

laypersons and emergency nurses alike.² Most commonly, these positional maneuvers are used to maintain airway patency or facilitate oral and nasal drainage, but in the care of patients with acute respiratory distress syndrome (ARDS) the maneuver improves oxygenation status. Proning first appeared in the critical care literature in the 1970s. Douglas et al turned 6 patients in acute respiratory failure from supine to prone and reported a mean increase in PaO₂ of 69 mm Hg without changing any mechanical ventilation parameters such as tidal volume, oxygen concentration, or pressures.³ There was increasing interest in the maneuver as well as research in the decades to follow, but the studies failed to demonstrate important patient-focused outcomes such as improved survival⁴ until the 2013 Proning of Severe ARDS Patients (PROSEVA) controlled trial.⁵ In this randomized trial, Guerin et al⁵ employed long durations of prone ventilation (16 hours or more) in patients with moderate to severe ARDS to reduce the 28-day mortality from 32.8% in patients in the supine group to 16.0% in those in the prone group, resulting in a 16% absolute risk reduction in mortality (number needed to treat: 6 to save 1 life).

Flipped Physiology

Prone positioning has multiple beneficial effects for both ventilation and oxygenation. When a person is in the supine position, the abdominal organs displace the posterior diaphragm superiorly, and the weight of the heart compresses posteriorly, resulting in compression of the posterior lung tissues.⁶ During supine ventilation, fluid infiltrates, because of gravity, will collect in the posterior aspects of the lungs, impairing the capacity for gas exchange (commonly referred to as shunting). These combined effects lead to heterogeneous ventilation and increased volumes of inspired air being delivered to the apical and anterior lung regions—areas that receive less of the pulmonary circulation. This results in perfusion of poorly ventilated lung regions and persistent hypoxemia. Adopting a prone position results in more

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homogeneous ventilation, decreases shunting, and improves ventilation and perfusion matching by offloading abdominal and cardiac weight from the lung tissues and by switching the dependent area of infiltrates away from the posterior lung tissues.⁶ More homogeneous ventilation is thought to also decrease lung injury by distributing mechanical force from the ventilator across the lung during inhalation more evenly.⁶ Evidence from small observational and retrospective studies suggests that prone positioning in nonintubated patients is feasible and associated with improved oxygenation.⁷⁻¹⁴

To date, there are no published randomized controlled trials that definitively demonstrate a mortality benefit of prone over supine positioning for awake and spontaneously breathing patients with COVID-19. This question has resulted in the registration of multiple investigations on the effectiveness of prone positioning in patients requiring low-flow supplemental oxygen (NCT04383613¹⁵ and NCT04402879¹⁶) and higher-flow oxygen support (NCT04350723¹⁷ and NCT04543760¹⁸).

A Pragmatic Look at Proning in an Emergency Department

The research by Wendt et al¹ helps address the question of whether prone ventilation offers similar benefits to patients who are hypoxic yet alert and spontaneously breathing as it does for patients with ARDS who have been mechanically ventilated. This practice improvement initiative makes several important contributions to our knowledge base, using a pragmatic and naturalistic approach. Although many scholars may denigrate pragmatic research, it offers a very important perspective on what an intervention might look like when it occurs “in the real world” without the strict inclusion criteria, resources, and support that randomized trials afford. At the time of this invited commentary, it is only the second study to assess the intervention in the emergency department. And, perhaps more importantly to our readers, this paper discusses an intervention that is nurse-initiated and nurse-led.

The work by Wendt et al¹ crosses boundaries between being a retrospective observational study and a report of a quality improvement (QI) project. Because of these blurred boundaries, the authors may have been well served to have used established reporting guidelines such as Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)¹⁹ or Standards for Quality Improvement Reporting Excellence (SQUIRE).²⁰ These reporting guidelines would have ensured that the authors reported in a consistent manner and would have facilitated future

comparisons among similar studies. Similarly, combining research and QI reporting methods from past pragmatic research studies that use QI methods would improve the comparisons among studies.²¹ We would have liked to have seen more complete reporting of the outcomes for patients without COVID-19 who were placed prone, as well as an assessment of how the dispositions of prone and nonprone patients compared. Furthermore, the reported demographics in the study seem skewed—only 13% of the patients were women, and 55% were Hispanic—and it is unknown how accurate the data collection was to begin with because we cannot tell how long the average patient remained prone, at 1 time or cumulatively. Their methods make it difficult to tell if the results are biased, and the authors freely acknowledge this as a significant limitation of their work.

Despite this, the results reported are meaningful, especially for emergency nurses. The work by Wendt et al¹ shows clinically relevant improvements in patient condition (improved oxygen saturation and respiratory markers). Their effort, beyond their results, is important because it offers a framework to aid clinicians in identifying who can benefit from prone positioning and administrators in deciding how to implement a similar initiative. They also provide very valuable insight into an ethnic group that may be experiencing a greater COVID-19 burden of illness. We applaud the authors' commitment to improving care and their courage to persist when most emergency departments would have stopped “nonessential” activities such as QI work.

Who, How, and When Not to Prone

Although there are differences in the inclusion criteria of the available research on awake proning for suspected COVID-19–related hypoxia, typically those who are eligible will be able to protect their own airway, will require supplemental oxygen, will be hemodynamically stable, oriented, and physically capable of assuming the prone position independently (or with minimal assistance for managing attachments such as intravenous lines and catheters).⁷⁻¹⁴

The procedure for getting patients into the prone position is even less well described, with most studies offering little or no explanation describing how clinical staff (presumably nurses) executed the maneuver. The number of staff cited varies from 2 to 5.²² We instruct our colleagues in the following manner. Preparation for the maneuver requires access to rescue equipment and personnel, physiological monitoring equipment, sufficient oxygen tubing length, and adequate pillows and blankets for positioning. Planning for a period of increased surveillance after the position change is prudent, and having predetermined thresholds

for when to turn back and what rescue therapies would be employed is essential. In our experience, a few degrees of reverse Trendelenburg is helpful for patient comfort, and patients who are larger benefit from an inpatient hospital bed with a footboard instead of an ED stretcher if they slide. Our patients have required as many as 5 pillows and as few as 1 pillow to achieve positional comfort, which is the most commonly reported reason for the intervention's failure.¹³ The duration of proning used in the studies is also highly variable and not well reported. Unlike the critical care ARDS literature where the patient was dependent on nurses for position changes, awake patients may change position ad lib or have intervals where position changes are requested by clinical staff. Some studies describe a 1-hour period, repeated 5 times daily,¹⁴ whereas others used "as long as tolerated" durations, which resulted in a median duration of 75 minutes (range 30 minutes-480 minutes).¹³

Contraindications to proning from the literature include clinical or hemodynamic instability and recent thoracic or abdominal surgery.⁶ Patients with Do Not Resuscitate orders or advanced directives have been excluded from previous research studies on proning, and clinicians should apply proning as individualized comfort or palliative measures indicate for these patients.⁶ Be aware that cardiac arrests do occur in the prone position, they may be more difficult to detect,²³ and they will require a plan to initiate resuscitation that may or may not include immediately rolling them supine.²⁴ We recognize that this is an emerging field of research and that clinical practice will be largely dictated by local governance and judgment.

Despite the decades of work that has gone into assessing the benefit of prone positioning for patients with moderate to severe ARDS, there is comparatively little to support the routine use of prone positioning for patients with early hypoxemia. There is likely a strong physiological rationale for the earlier use of prone positioning, and the demands of the COVID-19 pandemic have brought the importance of answering these questions to the forefront. Wendt et al¹ have recognized the importance of answering these questions and have offered insight into what effect it can have. This invited commentary recognizes that the work of Wendt et al¹ is evaluating the important role that emergency nurses play in recognizing and responding to clinical deterioration while recording, analyzing, and disseminating their experience for the benefit of patients and clinicians alike.

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