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ICS Guidance for Prone Positioning of the Conscious COVID Patient 2020

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Introduction:

The recent COVID-19 pandemic has seen the critical care community treating increasing numbers of patients with ARDS over recent weeks, with one Chinese study reporting the prevalence of hypoxic respiratory failure in these patients at around 19%. (1) Approximately 5% of all COVID-19 patients will require mechanical ventilation on an intensive care unit, with a further 14% requiring oxygen therapy.

Internationally, observations of critical care clinicians treating these patients in critical care have reported that patients with moderate to severe ARDS appear to have responded well to invasive ventilation in the prone position, leading to prone ventilation being recommended in international guidelines for the management of COVID-19. (2) This corroborates well with the findings of the PROSEVA trial; a recent meta-analysis and a Cochrane Systematic review, all of which support the early use of prone ventilation in patients with moderate to severe ARDS to improve oxygenation and reduce mortality when compared with conventional supine ventilation. (3-5)

Given the improvement in mechanically ventilated patients, it has been postulated that adopting the prone position for conscious COVID-19 patients requiring basic respiratory support, may also benefit patients in terms of improving oxygenation, reducing the need for invasive ventilation and potentially even reducing mortality.

The traditional supine position adopted by patients lying in hospital beds has long been known to be detrimental to their underlying pulmonary function. Supine positioning leads to:

- Over-inflation of the ventral alveoli and atelectasis of the dorsal alveoli (due to an increased trans-pulmonary pressure gradient)
- Compression of alveoli secondary to direct pressure from the heart and the diaphragm being pushed cranially by the intra-abdominal contents.
- V/Q Mismatch – As dorsal alveoli are preferentially perfused due to the gravitational gradient in vascular pressures they are poorly ventilation and highly perfused which manifests as hypoxaemia.

Given the physiological benefits, prone positioning should apply to all patients regardless of whether they are intubated or not, the potential benefits include:

- Improved VQ matching and reduced hypoxaemia (secondary to more homogeneous aeration of lung and ameliorating the ventral-dorsal trans-pulmonary pressure gradient)
- Reduced shunt (perfusion pattern remaining relatively constant while lung aeration becomes more homogenous)
- Recruitment of the posterior lung segments due to reversal of atelectasis
- Improved secretion clearance

Prone positioning is a simple intervention that can be done in most circumstances, is compatible with all forms of basic respiratory support and requires little or no equipment in the conscious patient. Given its potential for improving oxygenation in COVID-19 patients we advocate that a trial of conscious prone positioning be performed on all suitable patients on the ward. We have developed the following flow diagram to identify when it may be beneficial to trial conscious proning. We have incorporated indications and contraindications as well as a guide on how patients should position themselves.

References:

1) Wu Z, McCoogan, JM. Characteristics of and important lessons from the Coronavirus Disease 2019 (COVID-19) outbreak in China: summary of a report of 72314 cases from the Chinese center for disease controland prevention. JAMA 2020.
2) Alhazzani W, Moller M, Rhodes A et al. Surviving Sepsis Campaign: guidelines on the management of critically ill adults with Coronavirus Disease 2019 (COVID-19). Intensive Care Medicine 2020.
3) Guérin, C., Reignier, J., Richard, JC. Et al. PROSEVA Study Group. Prone Positioning in Severe Acute Respiratory Distress Syndrome. *N Engl J Med* (2013); 368: 2159–2168.
4) Sud, S., Friedrich, J., Adhikari, N. et al. Effect of prone positioning during mechanical ventilation on mortality among patients with acute respiratory distress syndrome: a systematic review and meta-analysis. CMAJ (2014); 186 (10): 381-390.
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Figure 1 – Flow diagram decision tool for Conscious Proning process

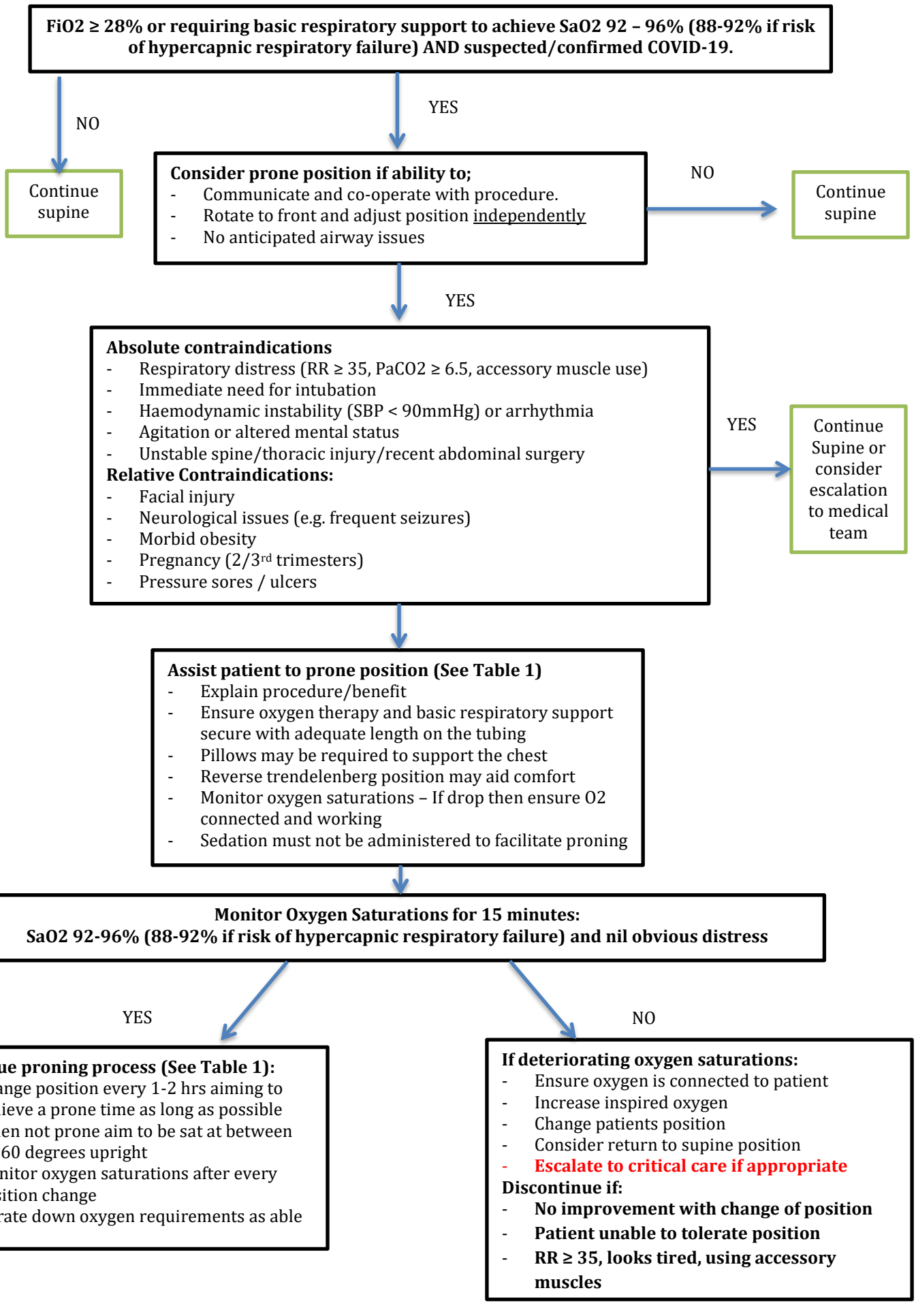

Table 1 – Timed position changes for patients undergoing conscious proning process

Timed Position Changes:

If patient fulfils criteria for proning ask the patient to switch positions as follows. Monitor oxygen saturations 15 minutes after each position change to ensure oxygen saturation has not decreased. Continue to monitor oxygen saturations as per the National Early Warning Score (NEWS)

- 30 minutes to 2 hours lying fully prone (bed flat)
- 30 minutes to 2 hours lying on right side (bed flat)
- 30 minutes to 2 hours sitting up (30-60 degrees) by adjusting head of the bed
- 30 minutes to 2 hours lying on left side (bed flat)
- 30 minutes to 2 hours lying prone again
- Continue to repeat the cycle…….

References used in the preparation of Figure 1 and Table 1

1. Ding L et al. Critical Care 2020;24(1):28
2. Emergency Department Critical Care (EMCrit). 2016. PulmCrit Wee- Proning the non-intubated patient. Retrieved from **https://emcrit.org/pulmcrit/proning-nonintubated/** [Accessed 10th April, 2020]