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Awake prone positioning and covid-19

Safely reduces intubation for patients with hypoxaemia

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In a linked paper, Weatherald and colleagues (doi:10.1136/bmj-2022-071966) offer the most up-to-date evidence synthesising the use of awake prone positioning in adults with covid-19 related hypoxaemia,¹ finding that awake prone positioning reduced the risk of endotracheal intubation but not mortality. Their systematic review and meta-analysis was performed more than 40 years after a 1976 study observed that prone positioning improved oxygenation in five patients who were mechanically ventilated for acute respiratory distress syndrome (ARDS).² A year later another study described similar effects in five patients with ARDS who were mechanically ventilated and also found that prone positioning allowed intubation to be deferred in one patient who was breathing spontaneously.³ In subsequent clinical trials prone positioning was found to reduce mortality in patients with moderate-to-severe ARDS who were mechanically ventilated, particularly in trials that targeted a duration of prone positioning for more than 12 hours daily.^{4,5}

In the decades that followed the observation in a single spontaneously breathing patient, the use of awake prone positioning remained limited. Two small uncontrolled studies with a total of 35 patients suggested that prone positioning improved oxygenation in those who were not intubated.^{6,7} The covid-19 pandemic urgently resurfaced questions about the utility of prone positioning, given the surges in patients with hypoxaemia, the limited treatment options, and the constrained supply of ventilators. A series of small observational reports replicated the pre-pandemic observations, suggesting that awake prone positioning might improve oxygenation.⁸ Despite the lack of high quality evidence, awake prone positioning was eagerly adopted for patients with covid-19 related hypoxaemia worldwide.⁹

With the inclusion of 17 randomised trials involving 2931 patients, Weatherald and colleagues captured several studies that were published after another recent systematic review and meta-analysis.¹⁰ The results of both meta-analyses are similar, showing that awake prone positioning in patients with covid-19 related hypoxaemia reduces the need for endotracheal intubation. Weatherald and colleagues observed a reduction of 55 fewer intubations per 1000 patients (95% confidence interval 87 to 19 fewer intubations) compared with usual care, suggesting a “number needed to prone” of 18 to prevent one intubation. Prone positioning had no significant effect on mortality, although these results were inconclusive (relative risk 0.90, 95% confidence interval 0.76 to 1.07) and do not rule out the

possibility that a mortality effect could emerge in future studies.

In clinical trials with selected populations and increased monitoring, awake prone positioning was found to be safe, with infrequent dislodgement of vascular catheters (2.5%) and skin breakdown or ulcers (0.7%).¹ Given that the definitive reductions were in endotracheal intubation and not mortality, it is worth noting that participants and clinicians could not be masked and this could bias decisions about intubation. Whether due to bias or physiological effects, high quality evidence now shows that awake prone positioning can safely reduce endotracheal intubation in patients with covid-19 related hypoxaemia without increasing the risk of mortality.

The reduction in intubation was driven mainly by trials that achieved longer duration of prone positioning (median ≥ 5 hours per day), targeted patients with more severe hypoxaemia (median peripheral oxygen saturation to fraction of inspired oxygen ratio < 150), and focused on patients requiring high flow oxygen or non-invasive ventilation. It is not possible to distinguish which of these features is more important based on the current trial evidence. The cut-points used to define these subgroups were chosen based on post hoc observations and should be interpreted cautiously as they may not have specific physiological significance. Nevertheless, prone positioning in patients receiving mechanical ventilation for ARDS is also most beneficial in those with more severe hypoxaemia and longer duration of prone positioning,⁴ strengthening the plausibility of these findings.

Overall, patients with covid-19 related hypoxaemia find it difficult to tolerate awake prone positioning—the patients in Weatherald and colleagues' analyses spent a median of just 2.8 hours (interquartile range 2.2-5) daily prone despite careful patient selection and many trials targeting at least six hours of prone positioning daily. Trials used numerous potentially resource intensive strategies to help improve adherence, including frequent reminders to patients and clinical staff¹¹⁻¹³ and 24 hour availability of an intensivist.¹¹ Given that the benefits of prone positioning in patients with covid-19 may be confined to those receiving more advanced respiratory support and with more severe hypoxaemia, it may be wise to focus efforts on these subgroups.

Several unanswered questions remain, including the ideal daily duration of treatment, the level of hypoxaemia that should prompt prone positioning, and how best to improve patient comfort and encourage adherence. These questions may never be

answered definitively in patients with covid-19 as, fortunately, far fewer are experiencing hypoxaemic respiratory failure or critical illness.¹⁴ The pandemic should, however, renew interest and encourage further evaluation of awake prone positioning—an intervention that may benefit a wide range of patients with hypoxaemia.

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