Self Proning in COVID - 19 Patients

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PICOT Question

Does placing adult COVID-19 patients with a PF ratio <150 and a Fio2 <60 in prone positioning for 12-18 hours in addition to supine positioning vs just supine positioning cause a positive change from baseline in vital signs and pulmonary function test in critical care settings?

- **P:** Adults with COVID-19 with a PF ration <150 nd Fio2 <60%
- **I:** prone positioning combined with supine positioning
- **C:** Supine positioning
- **O:** positive change in vital signs from baseline (HRT, SPO2, RR, PF Ratio)
- **T:** Critical Care setting

Background

- Since the Covid-19 pandemic began there have been over 6 million deaths (WHO, 2022)
- Many of the deaths occured due to respiratory failure
- Hospitals were short staffed and this caused a significant stress on healthcare workers and caused burnout
- Lack of supplies and proper interventions contributed to the stress
- Proning, which has been used for years in intubated patients was reintroduced to be used in awake Covid-19 patients to help improve respiratory outcomes.

Significance

- The SARS virus leads to pneumonia like symptoms such as fever, dyspnea, severe hypoxemia, and respiratory failure symptoms, and can contribute to pulmonary edema, ARDS acute respiratory distress syndrome, and multi-organ failure and possible death (Ghelichkhani et al., 2020).
- Proning is a standard of patient care for ARDS patients. This practice was implemented in the treatment of patients with COVID-19 in attempts to allow more volume distribution of air in the posterior lung regions which have more surface area. This allows for better perfusion/ventilation (Fossali et al., 2022).
- Prone positioning of patients with COVID-19 is associated with reduced mortality, improvements in physiologic parameters such as PF ratio and SpO2 or oxygen saturation within 3 days and increased benefits of proning within 4-7 days (Shelhamer et al., 2022)

Literature Review

Author & Year	Elements of Study	Major Findings
Jayakumar et al. 2021	Multi-centered Feasibility Randomized Controlled Trial 60 participant, 30 patients with covid-19 were told to self prone for a minimum of 6 hours a day. Used Chi-Square test and t-tests to evaluate results.	Study showed that self proning in covid-19 patients was feasible Effects should be further evaluated
Yarahmadi et al. 2022	Randomized controlled trial Inclusion Criteria: Covid positive patients with pneumonia who were not intubated 82 participants, 41 lay in prone positioning for 90 minutes a day Results were compared using Chi-square, Mann-Whitney, and Fischer's exact test. ANOVA was used for baseline values and the logistic regression model.	Spo2, and respiratory rate showed slight improvement Improvement of shortness of breath was also reported No change in hospital stay or survival rate
Ehrmann et al. 2021	Randomized control trial Inclusion criteria: Covid positive patients with acute hypoxemic respiratory failure (support with high-flow nasal cannula P:F ratio less than 300 who were 18 years old or older 1,121 participants 564 patients were placed in prone positioning for as long as they could tolerate Result were analyzed with a proportional hazard model/power analysis, reported with a 95% confidence interval, and assessed by calculating the I squared statistic.	Awake prone positioning lowers risk of intubation and death prone positioning increases the likelihood to be weaned off from high flow oxygen via nasal annual up to day 28 Respiratory rate improves during prone positioning and continues after a return to supine positioning Longer duration of prone positioning decreases likelihood of death or intubation
Alhazzani et al. 2022	Unblinded randomized control trial Inclusion Criteria: Covid positive adult patients who require oxygen and were being treated in an acute care setting 400 participants 205 participants in prone positioning for 8-10 hours per day Results were analyzed with cox proportional hazards regression analysis, hazard rations and 95% confidence intervals	Prone positioning does not reduce endotracheal intubation by 30 days There is a possible reduction in endotracheal intubation in patients who require high flow oxygenation, but further research is necessary
Boffi et al. 2022	Retrospective monocentric study. Inclusion Criteria: intubated COVID-19 ARDS patients hospitalized from March 6 to April 30, 2020 who were managed with early intubation and low to moderate PEEP N= 42 participants. Results were analyzed using descriptive statistics were used in this articles and percentages or medians and interquartile ranges (IQRs) and a a p-value of <0.05 was used for significance.	he results showed that proning produced positive results the PaO2/FiO2 increased (180 [148–210 mmHg] p<0.001) from baseline and Aa-gradient (alveolo-arterial gradient) decreased (127 [92–176] mmHg, p<0.001) with proning (Boffi et al., 2022).
Dubosh et al. 2021	Prospective observational cohort study Aimed to determine whether proning awake, non-intubated COVID-19 positive patients with mild to moderate respiratory distress was associated with an improvement in oxygenation level and to evaluate the feasibility, safety. 22 participants Inclusion criteria: adult ED patients with respiratory illness from confirmed COVID-19, and were dependent on supplemental O2, able to follow commands, able to change positions with minimal assistance. Methods include measuring the SpO2:FiO2 ratio 5 minutes before proning and at 5-35 mins of proning and results were analyzed using comparing values with t-tests or Wilcoxon tests.	The results showed that the SpO2:FiO2 ratio increased by a median of 5 (IQR: 0–15) in patients in 5–35 minutes of proning compared to the 5 min before proning (median: 298 (IQR: 263–352) vs 295 (IQR: 276–350), p = 0.01) (Dubosh et al., 2021). This indicates a positive change from baseline vitals when a patient Is placed in prone positioning.

METHODS:

Key Words: COVID-19, Proning, Prone Positioning, Adults, pulmonary function
Databases: HSHSL Library page, Pub Med
Inclusion Criteria: adults with COVID-19 with a PF ratio <150 and Fio2 <60% in an acute care setting and a control of standard care (supine positioning)
Strategies: Advanced search including my search terms, limit to peer reviewed articles, limit to articles written within the last seven years

Results/Synthesis of Findings

-Prone positioning lowers the risk of death and or need for intubation.
-"Treatment failure occurred in 223 (40%) of 564 patients assigned to awake prone positioning and in 257 (46%) of 557 patients assigned to standard care (relative risk 0·86 [95% CI 0·75−0·98])." (Ehrmann et al., 2021).
-Longer duration of prone positioning decreases likelihood of death or intubation
-"The primary outcome of adherence to protocol was 43% among the patients in the prone group (13 patients completed an average of at least 6 hours a day in prone position)"(Jayakumar et al., 2021)
-"Prone positioning was associated with significant improvement in oxygen saturation (P = 0.001), respiratory rate (P=0.004), the severity of dyspnea (P=0.014)" (Yarahmadi et al., 2022)
-Prone positioning increases the likelihood to be weaned off from high flow oxygen via nasal cannula up to day 28
-Respiratory rate improves during prone positioning and continues after a return to supine positioning
-Proning produced positive results: the PaO2/FiO2 increased, SpO2:FiO2 ratio increased

Nursing Practicea

- Nurses must have access to proper PPE to safely go into COVID-19 rooms
- "five to six personnel…required at the bedside for each position change" (Cotton et al., 2020).
  - This can be difficult due to the current nursing shortage
  - COVID-19 units may have multiple patients who require prone positioning
  - Timely process
  - Requires multiple checks per day on patient not just initial position change
- "Placing patients in [the] prone position can be burdensome to the nursing staff" (Cotton et al., 2020).

Development

- Further research from all sources requests ways to ensure patient adherence and tolerability to prone positioning
  - Some suggestions were pain medication, verbal support, anxiolytics, or mechanical support devices increase patient adherence to prone positioning (Alhazzani et al., 2022)
- Fralick et al. 2022 recommends further research into the benefits of prone positioning for patients with severe hypoxemia who are *not* using a ventilator
- Yarahhmadi et al. 2022 calls for more research with a larger sample size to determine generalization

Figures

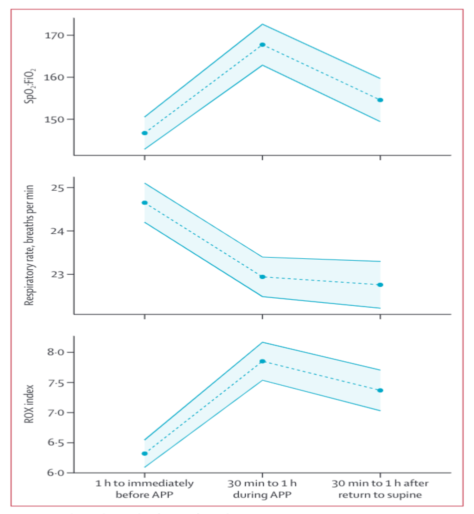
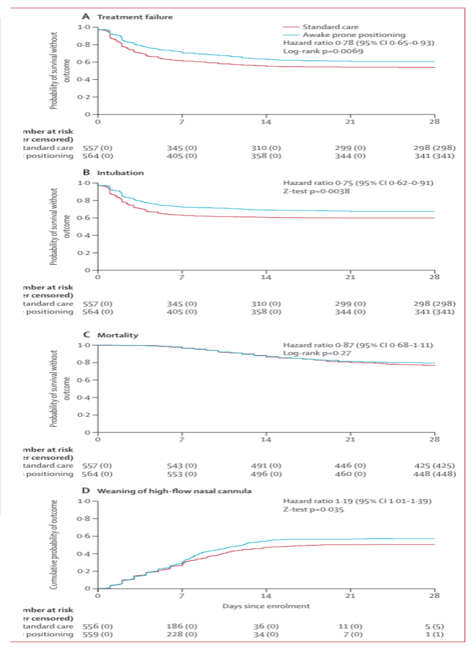


Figure 3: **Physiological effects of awake prone positioning**
Means are indicated by points, with standard deviation indicated by the shaded area. (A) Ratio of peripheral arterial oxygen saturation to the fraction of inspired oxygen (SpO_2:FiO_2). (B) Respiratory rate in breaths per minute. (C) The ROX index is equal to SpO_2:FiO_2 divided by the respiratory rate. Lower values indicate more severe respiratory compromise. Values were recorded 1 h to immediately before the first awake prone positioning session, during the session 30 min to 1 h after the patient was placed into prone position and 30 min to 1 h after the patient had returned into the supine position.



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