



# COVID-19: Making sense of the literature

## Summary of Current Literature: Prone Positioning in Critically Ill COVID-19 Patients

- No study till date evaluated effectiveness of mechanical ventilation in prone position with conventional ventilation in critically ill COVID-19 patients.
- Mechanical ventilation in prone position was used in varied proportion of critically ill patients; up to 28% of patients required prone positioning in one series.
- Indications and clinical impact of prone positioning have not been reported in these patients.
- One small study reported improvement in lung recruitability with prone positioning.

### Prone Positioning in Critically Ill COVID-19 Patients

Journal Article, Retrospective series

March 30, 2020

Bhatraju PK, Ghassemieh BJ, Nichols M, et al. Covid-19 in Critically Ill Patients in the Seattle Region - Case Series [published online ahead of print, 2020 Mar 30]. *N Engl J Med*. 2020;10.1056/NEJMoa2004500.

#### Summary

##### Methods:

- Retrospective review of 24 critically ill, laboratory confirmed COVID-19 patients
- Data from the 9 ICUs in Seattle region, USA

##### Results:

- Mean ( $\pm$ SD) age was 64 ( $\pm$ 18) years and 62% were male.
- Cough and shortness of breath were commonest symptoms (88% each) but only 50% patients were febrile at presentation.
- 58% had diabetes mellitus, 21% had chronic kidney disease and 14% were asthmatic.
- Lymphocytopenia was present in 75% patients and median lymphocyte count was 720/cubic ml.
- CT scan was performed in 23 patients and all had bilateral opacities.
- 75% patients required invasive mechanical ventilation and all of them had PaO<sub>2</sub>/FiO<sub>2</sub> ratio within definition of moderate to severe ARDS.
- Median driving pressure was 12-13 cm H<sub>2</sub>O during the first three days of ventilation.
- Five patients (28%) were placed in a prone position, 7 (39%) received neuromuscular blockade, and 5 (28%) received inhaled pulmonary vasodilators.
- 50% patients died in the ICU, 17% had been discharged from the ICU but remained in the hospital, 3% were receiving mechanical ventilation and were still in the ICU, and 21% had been discharged from the hospital on 23rd March 2020.

##### Conclusion:

- More than one-fourth patients required prone positioning.
- ICU mortality was high in critically ill COVID-19 patients.

#### Appraisal

- Only a small number of patients were recruited
- Indications of prone positioning were not reported.
- No data were reported about the outcome of patients who required prone positioning.

#### Opinion

This small retrospective series reported that majority of the critically ill patients required mechanical ventilation. Around one-fourth of all critically ill patients required prone positioning; however, neither clinical context of prone positioning nor clinical or physiological outcomes of these patients were reported.

### Prone Positioning in Critically Ill COVID-19 Patients

Journal Article, Retrospective study of consecutive patients

April 6, 2020

Grasselli G, Zangrillo A, Zanella A, et al. Baseline Characteristics and Outcomes of 1591 Patients Infected With SARS-CoV-2 Admitted to ICUs of the Lombardy Region, Italy [published online ahead



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of print, 2020 Apr 6]. *JAMA*. 2020;e205394. doi:10.1001/jama.2020.5394

## Summary

### Methods:

- Retrospective review of 1591 critically ill, laboratory confirmed COVID-19 patients
- Respiratory data were available for 1300 patients
- Data from the ICU networks in Lombardy, Italy

### Results:

- Median age was 63 years and 82% were male.
- 68% patients had at least one comorbid condition; hypertension was the commonest (49%) followed by cardiovascular disease (21%). Only 4% patients had associated COPD
- 88% patients received invasive mechanical ventilation and 11% patients received non-invasive ventilation.
- Median PaO<sub>2</sub>/FiO<sub>2</sub> was 160 in all patients with older patients (≥64 years) had lower PaO<sub>2</sub>/FiO<sub>2</sub> ratio [Median difference of 7].
- Median (IQR) positive end-expiratory pressure (PEEP) was 14 (12-16) cm H<sub>2</sub>O, 89% patients required FiO<sub>2</sub> of 0.5 or more and 12% patients required FiO<sub>2</sub> of 1.0.
- 27% patients required prone positioning and 1% required ECMO.
- Hypertensive patients were older [median difference 4years], required higher PEEP and had lower PaO<sub>2</sub>/FiO<sub>2</sub> ratio [median difference 27].
- At the time of writing this paper, 16% patients had been discharged from ICU, 26% patients died in the ICU and 58% patients were still in the ICU.

### Conclusion:

- Majority of critically ill patients in Italy were older males and most of them required mechanical ventilation with high PEEP and FiO<sub>2</sub>
- Nearly one-fourth patients required prone positioning.

## Appraisal

- More than half the patients were in the ICU at the time of writing the paper.
- Indications for prone positioning were not reported.
- No data were reported about the outcome of patients who required prone positioning.

## Opinion

This retrospective series reported that majority of critically ill patients required mechanical ventilation, high FiO<sub>2</sub> and PEEP. Around one-fourth of all critically ill patients required prone positioning; however, neither indication of prone positioning nor outcome of these patients were reported.

## Prone Positioning in Critically Ill COVID-19 Patients

Journal Article, Retrospective study

March 23, 2020

Pan C, Chen L, Lu C, et al. Lung recruitability in SARS-CoV-2 associated acute respiratory distress syndrome: A single-center, observational study [published online ahead of print, 2020 Mar 23]. *Am J Respir Crit Care Med*. 2020;10.1164/rccm.202003-0527LE.

## Summary

### Methods:

- Retrospective review of 12 critically ill, COVID-19 pneumonia patients fulfilling Berlin definition of ARDS
- Single-centre data from China

### Results:

- Mean age was 59 years and 7 were male.
- On the day of intubation, mean PaO<sub>2</sub>/FiO<sub>2</sub> was 130 with mean PaCO<sub>2</sub> of 57mmHg.
- Seven patients required at least one session of prone ventilation within the six-day observation and three patients received both prone ventilation and ECMO.
- Alternating body position between supine and prone positioning was associated with increased lung recruitability (p=0.02, between group Chi-square test)
- In patients who received prone position, PaO<sub>2</sub>/FiO<sub>2</sub> increased from 120±61 mmHg at supine to 182±140 mmHg at prone (p=0.065 by paired t-test).



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- 28-day mortality rate was 61.5% and median time of death since ICU admission was 7 days.
- Three patients died.

## Conclusion:

- Majority patients with ARDS and COVID-19 pneumonia had poor lung recruitability.
- Prone positioning was associated with increased lung recruitability.

## **Appraisal**

- Small sample size of only 12 patients
- Detailed respiratory mechanics data were not reported.
- Patients received various days of non-invasive or invasive ventilatory support before inclusion in the study.
- No formal data collection was performed.

## **Opinion**

This retrospective series reported that more than two-third of critically ill patients required mechanical ventilation and more than 60% patients died within 28 days. Around 11% of all critically ill patients required prone positioning; however, neither indication of prone positioning nor outcome of these patients were reported.

## **Prone Positioning in Critically Ill COVID-19 Patients**

Journal Article, Retrospective study of consecutive patients

February 24, 2020

Yang X, Yu Y, Xu J, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: A single-centered, retrospective, observational study *Lancet Respir Med* 2020[Epub ahead of print]. DOI: 10.1016/S2213-2600(20)30079-5

## **Summary**

### Methods:

- Retrospective review of 52 critically ill, COVID-19 pneumonia patients
- Single-centre data from Wuhan, China

### Results:

- Mean age was 59.7 years and 67% were male.
- Fever (98%), cough (77%) and dyspnea (63.5%) were commonest presenting features.
- Forty percent patients had chronic disease and 13.5% had cerebrovascular disease.
- Median duration from onset of symptoms to radiological confirmation of pneumonia was 5 days and median duration from onset of symptoms to ICU admission was 9.5 days.
- Median APACHE II score was 17; 67% patients developed ARDS, 29% patients had acute kidney injury, 23% patients had cardiac injury and 29% patients developed liver dysfunction
- Around 71% patients received invasive mechanical ventilation and 11.5% patients received prone position ventilation.
- Compared with survivors, non-survivors were older [mean age 64.6 years vs 51.9 years] and were more likely to have chronic medical illnesses [53% vs 20%], more likely to develop ARDS, and to receive mechanical ventilation, either invasively or non-invasively
- 28-day mortality rate was 61.5% and median time of death since ICU admission was 7 days.

### Conclusion:

- Older patients (>65 years) with comorbid conditions and ARDS were at increased risk of death.
- More than 10% of all critically ill patients required prone position mechanical ventilation.

## **Appraisal**

- Small sample size of only 52
- Indications of prone positioning were not reported.
- No data were reported about the outcome of patients who required prone positioning.
- Details of respiratory data were not reported

## **Opinion**

This retrospective series reported that more than two-thirds of the critically ill patients required mechanical ventilation and more than 60% patients died within 28 days. Around 11% of all critically ill patients required prone positioning; however, neither indication of prone positioning nor outcome of these patients were reported.



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## **Appraisers**

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