



CEYLON COLLEGE OF
CRITICAL CARE
SPECIALISTS

GUIDELINES ON ICU VENTILATION 01

PRONE VENTILATION

JUNE 2021 - VERSION 01



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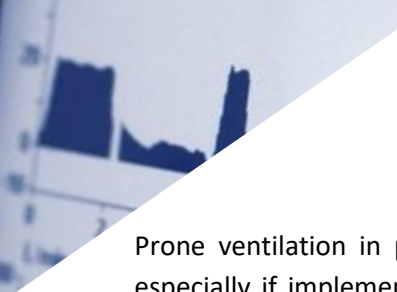
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Prone ventilation in patients with ARDS improves oxygenation and has been shown to improve mortality; especially if implemented early in the ventilatory deterioration. It is the only hypoxemic rescue intervention with evidence base for mortality improvement. It is postulated that proning improves gas exchange in a multifactorial fashion including ventilation of the anatomically largest part of each lung & removal of the cardiac compression of the left lung.

A. Indications:

1. Hypoxemic patients with ARDS
Worsening hypoxemia despite implementation of ventilator-based recruitment via I:E ratio reversal and PEEP optimization. The evidence base suggests a **PF ratio of <140mmHg** as a trigger for implementation.
2. Other patients may be suitable, and ultimately, it is a decision of the consultant after discussion with the nursing staff.

B. Precautions & relative contraindications

- Unstable spinal injuries
- Raised ICP
- Multiple trauma
- Intestinal ischemia/ intra-abdominal hypertension.
- Cardiopulmonary resuscitation or defibrillation required

C. Prior to turning

- Use a **water/air mattress** and flat pillow.
- Arrange any physiotherapy, **line changes**, x-rays, etc. before turning, if necessary.
- Adequate number & size of **pillows and head support** are available
- Ensure **airway trolley** is present and appropriate airway and ventilation equipment is available (ETT, laryngoscope, bag and mask, emergency intubation drugs, etc.)
- Attach **closed suction** circuit
- Ensure ETT, all lines & drains are taped securely & **disconnect all non-essential lines**. Chest drains should be moved before the patient is turned
- Close patient's eyes, **pad eyes** and tape lids
- Stop NG feeds and **aspirate NG tube**
- Ensure patient is adequately **sedated and/or paralyzed** as needed.
- Disconnect ECG leads at the last moment.
- Assemble staff: at least **four** people to turn & **one** to manage the head & airway

D. The turning process

- Ensure a doctor with airway skills is available when turning (in case re-intubation is required).
- Establish a coordinator who will decide the most appropriate side to turn the patient.
- The doctor or a senior nurse should manage the patient's airway.
- All commands will come from the nurse/doctor at the patient's airway.
- Place a pillow on the patients' chest, and another on their pelvis. Place a clean sheet on top of these, aligned to the sheet that the patient is laying on it.
- Roll the edges of the top and bottom sheet together towards the patient, keeping the roll flat to the mattress and as close as possible to the patient.
- The patient is turned slowly onto their abdomen. This may require several stages for complex patients.
- Ideally, arm, leg and neck are placed in the "crawl" position (both to the same side)
- After turning, a flat pillow or support can be placed under the patients head for comfort and pressure relief, ensuring there is no pressure on the ventilator tubing.

E. Once in the prone position

- Reconnect all monitoring equipment (ECG, SpO₂, BP) and lines.
- Position bed reverse Trendelenburg (foot down) at 30 degrees to prevent facial oedema.
- Protect eyes from pressure injury.
- Recommence feed.
- Check ABG after 30 minutes.
- Move arm, leg and neck position to the other side 4-6 hourly.
- If there is an improvement leave prone for the maximum length of time stated by the medical team.

F. Returning to the supine position

Repeat the procedure for the turning process.

G. Duration of prone positioning

About 60-70% of patients show an improvement in oxygenation when placed prone. Some are early responders (less than 30 minutes to show an improvement in PaO₂) and some are late responders

It is not uncommon for the patient to transiently worsen following the turn. This is likely due to changes in pulmonary blood flow and secretion mobilization. The situation usually improves within 2 hours.

Recent studies have shown improvement up to 17 hours with prone ventilation. The duration of proning shown be dictated by the individual patient's response but should ideally be less than 20 hours.

If there is no response to prone ventilation after 4-6 hours, consider placing supine again Failure of PaCO₂ levels to fall following proning is a poor prognostic sign.

Mnemonic to remember....

- *Pillows & 2 bed sheets*
- *Review unnecessary lines/tubes*
- *Oxygenation rescue (Bain, ETT)*
- *NG should be aspirated*
- *Eye pads*

References

- 1) Guerin C, Reignier J, Richard J-C *et al.* Prone positioning in severe acute respiratory distress syndrome. *N Engl J Med* 2013;368:2159-2168.
- 2) Beitler J, Shaefi S, Montesi S, *et al.* Prone positioning reduces mortality from acute respiratory distress syndrome in the low tidal volume era: a meta-analysis. *Int Care Med* 2014;40(3):332-341