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Purpose:

To provide the guidelines for prone positioning of the adult patient with mild to moderate Acute Respiratory Distress Syndrome (ARDS). Prone therapy optimizes distribution of ventilation and perfusion in the lung. Anticipated outcomes are improved oxygenation, lung compliance, alveolar recruitment and the potential benefit of avoiding mechanical ventilation.

Population:

Patients age ≥ 18 years old (younger patients will be considered on a case by case basis) with mild-moderate ARDS*.

1. Respiratory symptoms within 1 week of clinical insult or worsening over the past week
2. Bilateral opacities on chest radiograph or CT scan.
3. Respiratory failure not fully explained by cardiac failure or fluid overload.
4. Impairment of oxygenation as measure by $\text{PaO}_2/\text{FiO}_2 > 100$ mmHg but ≤ 300 mmHg on oxygen supplementation (OS)*

*(OS =nasal cannula [NC] or high flow nasal cannula [HFNC] or non-rebreather mask [NRB])

Background:

From the PROSEVA trial (and others), have shown early prone positioning of patients on mechanical ventilation and ARDS improves outcomes. **(See Prone Therapy for Acute Respiratory Distress Syndrome, Procedure and Care, References)**. There are emerging case reports of successful prone positioning in patients with mild to moderate ARDS managed with non-invasive ventilator or oxygen supplementation (Scaravilli et al, 2015, Ding et al, 2020; see References). It is anticipated that the benefits in intubated patients may extend to non-intubated individuals with ARDS. Notably, there is no randomized clinical trial data to support proning in non-intubated patients. It is inferred potential benefit in non-intubated individuals with ARDS from small physiological studies noted above and in the literature in ARDS managed by mechanical ventilation (see References).

Standard Operating Procedure:

Evaluation of non-intubated patient for proning eligibility, during and after the procedure

Step 1. Eligibility evaluation. A clinical assessment of patient tolerance to oxygen supplementation (OS, NC \leq 5 LPM, HFNC protocol or NRB [100% FiO₂]) in the supine position without sedation. The evaluation should include:

- MAP \geq 65 mmHg on a single or no vasopressors and no unstable dysrhythmias
- Level of alertness enabling airway protection
- A negative score on CAM-ICU or absence of delirium by appropriate assessment scale
- Ability of the patient to self-prone with minimal assistance from one staff member
- Nothing by mouth (NPO except for medications) for two hours prior to proning
- Absence of significant respiratory distress as assessed by the clinician
- SpO₂ > 88% while on OS (300 mmHg > PaO₂/FiO₂ ratio \geq 100 mmHg^a)
- No clinical concern for acidosis, hypercapnia (or pH \geq 7.30, PaCO₂ \leq 55 mmHg)
- No contraindications

If a patient fails to meet the above criteria, the medical team should consider intubation.

Relative contraindications (further assessment needed by interdisciplinary team to determine if benefit outweighs risks):

- Recent cardiovascular arrest
- Unstable spine, pelvis, femur fracture
- Open wounds, recent procedures or drainage devices over ventral body surface
- Anterior chest tube(s) with air leak (consider adverse effects on chest tube drainage)
- Hemoptysis (requiring immediate intervention/procedures)
- Tracheal surgery (including tracheostomy) or sternotomy during prior 15 days
- Body mass index of 45 kg/m² or greater
- Abdominal hypertension / abdominal compartment syndrome

Place an order. Once it is determined that the patient is eligible and relative contraindications have been addressed, place an EPIC order for Adult Prone Positioning in ICU/SDU Non-intubated Patients **Pre-oxygenate.** If SpO₂ is 88-95%, pre-oxygenate the patient with NRB (100% FiO₂) or HFNC protocol in addition to baseline OS for 10-15 minutes prior to proning.

Prone Ask patient to self-prone. Patient should notify nursing staff prior to each prone session for awareness.

For patients with 100 mmHg > PaO₂/FiO₂ ratio > 65 mmHg *and meeting all other evaluation parameters*, proning can be considered after an evaluation by the attending ICU physician with input from respiratory therapy and nursing.

Step 2. Evaluation during procedure. If patient is proned, an assessment within 30 minutes of proning should meet the following metrics (designed to detect clinical deterioration):

- SpO₂ > 88% *without* an increase in oxygen supplementation or a PaO₂ \geq 100 mmHg (or \geq 65 mmHg if proned in setting of above exception^a). Patients that were pre-oxygenated should return to their baseline oxygen requirement within 30 minutes of proning.
- RR < 30
- No worsening mental status and stable hemodynamics
- No worsening respiratory distress

If patient fails to meet above criteria or there is a concern about clinical deterioration, patient should be supinated and / or arterial blood gas obtained to assess for acidosis (pH \geq 7.30), hypoventilation (PaCO₂ \geq 55 mmHg) or worsening PaO₂ / FiO₂.

Step 3: Prone positioning duration, efficacy assessment and additional considerations:

- Target prone position therapy duration of 3 days or more as tolerated
- Target prone position for 10 – 16 hours during a 24 hours period in blocks of 4 hours or more (as tolerated). Including at least 1 session of nightly prone position may be well tolerated and extend prone time.
- OS should be titrated down as tolerated to keep SpO₂ 88 – 95%.
- Conservative fluid strategy
- Low dose anxiolytics and analgesics may be used to reduce anxiety or pain when proning (Continuous SpO₂ and / or serial PaCO₂ measurement should be considered).
- In cases where complete proning cannot be accomplished, partial proning (e.g. positioning with $\frac{3}{4}$ turn or lateral decubitus position may be trialed)
- At termination of each proning period an evaluation for signs of deterioration (See Step 2).
- Nursing to perform skin evaluation after every prone period.

Step 4: The decision to continue prone position therapy should occur at least daily and assess for:

- Absence of signs of deterioration (See Step 2)
- Presence of signs of improvement
 - Increase in SpO₂ or improvement in the PaO₂ / FiO₂
 - Improvement of respiratory rate, work of breathing or dyspnea

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