Appropriate Use of Prone Positioning Can Improve Patient Outcomes

In patients with moderate to severe ARDS, who are mechanically ventilated, early use of the prone position has increased survival rates.

- Best practice suggests maintaining prone positioning for between 12 to 20 consecutive hours per day

Nursing care of patients in the prone position is challenging, as is the physical act of turning the patient from supine to prone. Prone positioning should be approached with advanced planning, teamwork and coordination.

Rationale

Turning the patient with ARDS from a supine to a prone position can increase pulmonary capillary perfusion and oxygenation. The physiologic changes (fluid shifting from the posterior lung, allowing undamaged alveoli to be filled with oxygenated blood) that occur when turning a patient into a prone position improve ventilation. Prone positioning expands the dependent lung areas. Expanding dependent lung areas opens collapsed alveoli, increasing ventilation capacity and improving oxygenation.

Work of breathing can also be reduced with prone positioning because it reduces the pressure on the lungs from the cardiac structures and abdominal organs. Reducing work of breathing saves vital energy that the patient can use for healing and recovery.

Prone positioning as a therapeutic intervention for ARDS has been studied for decades, with inconclusive results regarding the benefits to patients. However, recent studies have shown that early application of prone positioning for several hours at a time significantly reduces the mortality of mechanically ventilated patients with moderate to severe ARDS.

Contraindications: (Determine if the risks of prone positioning are outweighed by the patient's need for improved oxygenation)

<table>
<thead>
<tr>
<th>Intracranial Hypertension</th>
<th>Alveolar Hemorrhage</th>
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<tbody>
<tr>
<td>Increased intracranial pressure or concerns for intracranial hemorrhage</td>
<td>Tracheal surgery or sternotomy</td>
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<tr>
<td>Severe Arrhythmias</td>
<td>Ophthalmic surgery</td>
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<tr>
<td>Spine Instability</td>
<td>Increased intraocular pressure</td>
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Considerations before repositioning:

- Appropriate sedation and the possible addition of neuromuscular blocking agents
  - Provide eye care/lubrication and tape eyelids if indicated
  - Ensure the tongue is in the mouth, insert a bite block if needed
  - If the tongue is swollen, place Biotene or Chlorhexidine moistened gauze over tongue and leave in place
  - If receiving tube feeding, hold 1 hour prior to prone positioning

Prone Positioning

Equipment needed:

- Use a pressure redistribution surface if available. Consider potential impact of oxygen deficit on the risk of developing pressure injuries.
- Pillows (3-4) or other positioning devices to offload pressure points.
- Flat Sheets (2-3)
- ECG Patches
- ETT holder (twill tape, E-tab, etc.)
- Extra ventilator circuit including suction
- Ensure oral suction is available
- Have an emergency airway cart (RSI) and appropriate Endotracheal tube available immediately available

Pre-Proning

- Ensure patient has no contraindications to proning as listed above or deemed by provider.
- Turn enteral feeding off for 1 hour prior to prone position turn. May resume once in prone position. Assess all pressure points prior to proning.
  - Apply soft silicone multi-layered foam prophylactic dressings to pressure points (patella, pretibial areas, cheeks, etc.).
  - Apply thin foam dressing under medical devices.
  - Avoid multiple layers of dressings or linen that increase pressure.
- Ensure ETT and other lines are well secured.
- Optimize ventilator settings and pre-oxygenate patient. Place on FiO2 100% while turning.
- Suction ETT and oral cavity
- Remove and cap unnecessary lines and tubes such as; tube feedings, CVP Monitoring, maintenance fluids, blood pressure cuff, etc.
- Assemble the Turn Team. A team of 3 – 6 individuals who can be available for 15 – 20 minutes. The team comprised of a 1 physician, 2 nurses, 1 respiratory therapist and physical &/or occupational therapy are optimal to achieve manual proning of patients on mechanical ventilation.
- Remove urinary securement device (stat-lock) and EKG electrodes prior to turning the patient

Step by step instructions for proning patients on mechanical ventilation

1. A respiratory therapist or the most experienced nurse of the team performing this maneuver should be in charge of the patient's head, ensuring the security of the endotracheal (ET) tube and I.V. lines during the move. This person can then direct the rest of the team.
2. Ensure tube length and lines length is adequate for turn.
3. A minimum of 2 staff members (1 nurse + 1 PT/OT, etc.) are positioned at each side of the bed.
4. Apply 5-layer foam dressings to bony prominences, chin, cheeks and forehead to assist in the avoidance of hospital acquired pressure injury.
5. Place an absorbent pad face down over patient's genital area, followed by a flat sheet over body. Roll the bottom and top sheet together on both sides to secure linens and prepare for the turn (Keep all lines outside of linens to prevent displacement and tangling during the turn).
6. Move patient to the opposite side of the bed selected for the direction of rotation. Position the patient near them at the edge of the bed. If the patient is to be rolled on his right side, his right arm should be placed under his right hip. Ensure E.T. tubing and IV Lines are secure.
7. When the ET tube and I.V. lines are secured, the team can slowly roll the patient into the prone position, leaving the head turned to the right or left side.
8. Replace telemetry patches to the back once the turn is complete.
9. Place the arms either along side the body or in a swimmer's pose (pictured below), with one arm gently curved above the head and one arm curved along side the body.

10. Ensure pressure points are padded. (Pillows or blankets under shins to float feet, pillows under shoulders and head, pillows under pelvis to keep pressure off genitalia.)
11. Carefully place limbs, keeping in mind the goal of preventing extension and contraction of shoulders or elbows. Pillows can be strategically placed to provide additional support to the pelvis, shoulder, and face. AVOID placing pillows directly under abdomen.
12. Rotate arm position and head rotation every 2 hours to prevent hospital acquired pressure injury.
13. The patient's head should be turned toward the ventilator, never face down.

Link to Video Demonstration:
1. (9 min) Click on Skip intro
h%3fq%3dVideo%2bProne%2bPositioning%26FORM%3dVDMHRS&view=detail&mid 
=FEF7181D9EB8DE1C0262FEF7181D9EB8DE1C0262&FORM=VDRVRV

Post prone positioning assessment:
- Immediately after placing the patient in the prone position, assess him or her for acute complications such as prolonged hypotension, bradycardia, prolonged decrease in pulse oximetry, and cardiac arrest.
  Complications that require immediate cessation of prone positioning include:
    o hemoptysis • oxygen saturation < 85% by pulse oximetry
    o PaO₂ < 55 mmHg for more than 5 minutes
    o HR < 30 bpm for more than 1 minute
    o systolic blood pressure < 60 mmHg for 5 minutes
- Consider obtaining an X-ray to ensure ETT placement after each prone turn
- Perform an initial arterial blood gas assessment just before turning the patient from supine to prone, 1 hour
after placement in the prone position, and then at 4-hour intervals

- Assess skin integrity frequently as these patients are at higher risk for pressure injuries, especially the face and the anterior chest wall.
  - To reduce this risk, use 5-layer foam dressings on bony prominences, such as the forehead, chin, and shoulders.
  - Turn and reposition the patient every 2 hours to redistribute pressure and reduce friction. *If the patient is not stable enough for full turns, provide frequent micro turns.*
  - Repositioning the head every hour and providing ocular and eyelid protection can help reduce skin breakdown.
  - Pressure Points
    - Forehead
    - Chin
    - Cheeks
    - Nose
    - Clavicle – shoulders
    - Elbows
    - Chest – breasts
    - Genitalia – penis
    - Anterior pelvic bones (iliac crests, ischium, symphysis pubis)
    - Knees – patella
    - Dorsal feet and toes
    - Heels
    - Under and around medical devices
  - Document all skin assessments, including before and after pronation and supination, and preventive measures

See National Pressure Injury Advisory Panel document on Prevention of Hospital Acquired Pressure Injuries while proning.

Consider Ceasing Prone therapy if:
- Pneumothorax is identified or suspected.
- Endotracheal tube obstruction or mainstem or artificial airway is dislodged
- SBP<60mmHg x 5 minutes
- Refractory hypoxia with optimized vent settings
- Cardiac arrest
- Urgent need for transportation arises
- Inability to drain patient’s bladder after troubleshooting
- End of life decision is made
- Patient requires dialysis
- Massive hemoptysis
- Patient meets extubation criteria

Resources:
2. Nursing Critical Care 2020:
https://journals.lww.com/nursingcriticalcare/Fulltext/2012/03000/Prone_positioning_for_patient_s_with_ARDS.6.aspx
4. Rotoprone beds may be available through your bed rental company
5. NEJM Instructional Video for proning with 3 people https://www.youtube.com/watch?v=E_6jT9R7WJs
6. National Pressure Injury advisory Panel 2020