Prone Therapy, Manual

Purpose
To describe the process of manual prone positioning therapy and subsequent ongoing assessment
and management of intubated patients with severe acute respiratory distress syndrome (ARDS) and
refractory hypoxemia. Manual prone positioning therapy is used in an attempt to improve oxygenation
and reduce ventilator-associated lung injury in patients with severe ARDS.

Definitions
P/F Ratio: PaO2 is the patient’s arterial oxygen level and FIO2 is the amount of oxygen patient
requires.
- Mild: P/F ratio of 200-300 mmHg.
- Moderate: P/F ratio of 100-200 mmHg.
- Severe: P/F ratio of < 100 mmHg.

Prone Positioning: The patient is placed in the face-down position in bed.

Equipment
- (1-2) CPR/backboards
- Extra set of ECG patches
- IV extension tubing
- Twill ties for endotracheal tube (ETT)
- (4+) Pillows
- Prone face pillow (MIC 293227, or obtain from high-use unit [e.g., MB6B/G])
- (3) Bed sheets
- Z-Flo™ positioner pillows: (4-6) small (MIC 375212) and (1) large (MIC 374167)
- 4 x 4 Mepilex® Lite Dressing (MIC 188314) or regular Mepilex® (MIC 263374)

Implementation
General Information
- Manual prone positioning is the preferred method for non-surgical ARDS patients, before ordering a
  specialty bed.
- Prone positioning may be indicated in patients with refractory hypoxemia in which conventional
  ventilator strategies have not been successful.
- Prone positioning is used in an attempt to improve oxygenation in patients with ARDS.
- The improvement of oxygenation during prone ventilation is multifactorial. The most important factors
  are the optimization of ventilation and perfusion, although changes in the distribution of extravascular
  lung water and secretions also plays a role.
- Manual prone therapy is ideal for prolonged prone ventilation lasting 16 to 18 hours.
- Commercial endotracheal tube (ETT) securement devices are not to be used for prone positioning
  because of the possibility for increased skin breakdown and breakdown of adhesive from increased
  salivary damage.
Procedure
Preparation for Manual Pronation Therapy

1. Assemble equipment.
2. Prior to prone positioning, perform any nursing interventions that require access to the anterior body surface (e.g., oral care, suctioning, wound dressings, emptying of ostomy bags, etc.) to minimize the need to return patient to a supine position.
3. Lubricate eyes with Lacri-Lube® (obtain order) to minimize risk of corneal abrasion.
4. Verify the position and security of the ETT or tracheostomy tube.
5. Prior to prone positioning, replace the AnchorFast device securing the ETT with a twill tie or tape to minimize the risk for pressure related injuries. Place Liqui-Cel™ or Mepilex® under twill ties.
6. Readdress and secure all vascular lines, ensuring there is sufficient slack to complete positioning safely without dislodging.
7. Move ECG leads to patient's back to minimize risk of skin breakdown while in prone position. Evaluate for waveform quality and arrhythmias.
8. Move any securement devices (e.g., StatLock® for urinary catheter securement) to the medial leg. Urinary catheters and chest tubes should be aligned with either leg at foot of bed.
9. Assess patient for need of additional sedation, analgesia, and neuromuscular blockade prior to prone positioning, and discuss with provider to obtain orders. Document patient's level of consciousness (LOC), level of sedation, and pain prior to and during administration of sedative and analgesic medication according to policy.
10. Place 1-2 CPR/backboards between the frame of the bed and the mattress to support prone face pillow. Place an absorbent pad over the CPR/backboard.
11. Patient should not be disconnected from the ventilator during manual pronation.

Procedure for Manual Pronation Therapy

1. Ensure provider is present during pronation. Room RN takes the leadership role and gives clear directions such as "toward or away from the ventilator" instead of "right or left" and "toward head or foot of bed" instead of "up or down."
2. Minimum of two staff members positioned on each side of the bed, with another staff member and a respiratory therapist (RT) positioned at the head of bed (HOB). RT is responsible for securing ETT and ventilator circuit during the turn. Number of staff members is dependent on patient size (Figure 1).
3. Place patient's arms at their sides with hands slightly tucked under hips.
4. Remove ECG leads and place new leads as close to the patient's back as possible. This will make repositioning ECG leads easier after the patient is prone.

5. Remove patient's gown and place the second sheet over the patient.

6. Position one pillow horizontally across the patient's upper chest, another pillow horizontally across the pelvis, and the last across the patient's legs, between the knees and ankles (Figure 2).

![Figure 2](image)

7. Place the third flat sheet over pillows (Figure 3).

![Figure 3](image)

8. Roll long edges of all flat sheets tightly together to create a "cocoon" (Figure 4).

![Figure 4](image)

9. Holding all three "cocooned" sheets, pull patient to the side of the bed away from the ventilator.

10. The staff members on the right of the patient gently lift their "cocoon" toward the ventilator and the staff on the left pushes their "cocoon" under the patient, stopping when the patient is left side lying. Hold this
11. Staff members need to adjust their hold so that the patient can complete the roll. Those on the side of the bed in the direction the patient is turning should now be holding the top roll, and team members on the other side of the bed should move their hands to the bottom sheet roll.

12. Staff members confirm the exchange and complete the "cocoon" roll until the patient is prone.

13. Gently lift the patient toward the HOB so the patient's head is now lying on the prone pillow extending above the mattress (Figure 6 and 7).

14. Position patient with head/neck in neutral position. Place the ventilator tubing, attached to the ETT to the side of the patient's face they are positioned to. Loop the excess ventilator tubing above the patient's head.

15. Gently rotate arms into a swimmer's position with the head turned toward the arm away from the face. Flex the arms into a position of comfort but ensure shoulders are not extended more than 90 degrees.
Make minor adjustments to obtain correct alignment as needed (Figure 8).

16. Place bed in reverse Trendelenburg position to minimize facial edema (Figure 9).

Procedure for Returning Patient to Supine Position

1. Room RN takes the leadership role and gives clear directions such as “toward or away from the ventilator” instead of “right or left” and “toward head or foot of bed” instead of “up or down.”

2. Minimum of two staff members positioned on each side of the bed, with another staff member and a RT positioned at the HOB. Number of staff members is dependent on size of patient.

3. Readdress and secure all vascular lines, ensuring there is sufficient slack to complete positioning safely without dislodging them. Lines should be straight up or down aligning with patient. Ensure urinary catheters and chest tubes are aligned with either leg at foot of bed.

4. Suction ETT and oral airway prior to returning patient supine.

5. Place patient's arms at their sides with hands slightly tucked under hips.

6. Roll long edges of all flat sheets tightly together to create a "cocoon" and slide the patient to the top of the mattress closest to the ventilator.

7. The staff members on the right of the patient gently lift their "cocoon" away from the ventilator and the staff on the left pushes their "cocoon" under the patient, toward the ventilator, stopping when the patient is left side lying. Hold this position.

8. Staff members need to adjust their hold so that the patient can complete the roll. Those on the side of the bed in the direction the patient is turning should be holding the top roll, and team members on the other side of the bed should move their hands to the bottom sheet roll.
9. Staff members confirm the exchange and complete the "cocoon" roll until the patient is supine.

10. Continue reverse Trendelenburg position to assist with edema if elevating HOB 30 degrees is not tolerated.

Special Considerations

- Precautions to manual pronation therapy:
  - Unable to tolerate head down position.
  - Increased intracranial pressure.
  - Unstable spine.
  - Hemodynamically unstable condition (systolic BP < 90 mmHg).
  - Extracorporeal membrane oxygenator (ECMO) cannula placement problems.
  - Open chest or unstable chest wall.
  - Bronchopleural fistula.
  - Unstable pelvis.
  - Facial trauma.
  - Pregnancy.
  - Bifurcated endotracheal tube.
  - Continuous renal replacement therapy.

- Absolute contraindications for prone positioning:
  - Unstable cervical, thoracic, lumbar, pelvic, skull or facial fractures.
  - Cervical or skeletal traction.
  - Massive hemoptysis or acute bleeding.
  - Uncontrolled intracranial pressure.
  - Acute tracheal surgery or sternotomy within two weeks.
  - Open chest or unstable chest wall.
  - Open abdomen.

- Important reminders:
  - Align patient's face on foam pillow and ensure there is no pressure on eyes.
  - Knees and abdomen should be floating between pillows.
  - Toes should be elevated and floating off surface of bed.
- Place ECG electrodes on patient's back with white lead on the back of the right shoulder and black lead on the back of the left shoulder ("white lead is still right shoulder") (Figure 10).

![Figure 10](image)

- Place bed in reverse Trendelenburg position of -11 degrees. This may facilitate gastric emptying, as well as minimizing facial and ocular edema.
- Reposition head and arms every 2-3 hours and assess for pressure points using tiny tilts.

**Documentation**

Position: prone or supine.

**References**

2. David R Schwartz, MD, Atul Malhotra, MD, Robert M Kacmarek, PhD, RRT. Prone ventilation. Up-to-date: [http://www.uptodate.com/contents/proneventilation?source=search_result&search=Refractory+Hypoxemia+and+Use+of+Rescue+Strategies&selectedTitle=2%7E150#H18](http://www.uptodate.com/contents/proneventilation?source=search_result&search=Refractory+Hypoxemia+and+Use+of+Rescue+Strategies&selectedTitle=2%7E150#H18)

**Completing Implementation**

Patient Monitoring and Care

1. Assess patient’s tolerance of the turning procedure.
   a. Monitor RR and effort.
   b. HR and BP.
   c. Minimize amount of time patient is not monitored.
2. Assess patient's response to the prone position.
   a. SpO2.
   b. Arterial blood gases.
   c. P/F ratio.
   d. Ventilator measurements (e.g., peak pressure and rate).
3. Reposition patient's head every 2-3 hours to prevent skin breakdown.
   a. One staff member supports/lifts patient's head while another staff member adjusts the
      headpieces to provide support for the head in a different position.

4. Assess pressure points frequently for non-blanchable redness or breakdown.
   a. Place a foam dressing (e.g., Mepilex®) on high risk areas (e.g., knees, shins, pelvis, chest) if
      needed.

5. Continue to provide frequent oral care, eye care, and suctioning.

6. If ordered, tube feedings may be continued as tolerated.

7. Time spent in the prone position is dependent upon patient tolerance and provider order.

8. The average amount of time spent in the prone position is 16-18 hours in a 24 hour time period.

9. Consider a specialty bed with greater pressure reduction relief for extended periods of prone position.

10. The prone position is discontinued when the patient no longer demonstrates a positive response to the
    position change, or mechanical ventilation support has been optimized.