Winnipeg Regional Health Authority / Office régional de la santé de Winnipeg Caring for Health / À l'écoute de notre santé **CLINICAL PRACTICE GUIDELINE**	**Practice Guideline:** **Prone Positioning for Severe Hypoxic Respiratory Failure in Critical Care (Adult)**	
	Approval Date: ***September 16, 2020***	**Pages:** *1 of 17*
	Approved By: ***Professional Advisory Committee***	**Supersedes:**

1. PURPOSE AND INTENT

1.1. **An approach to ensure a standard of care is provided to all patients requiring prone positioning.**

1.2. **Prone positioning of patients with severe Acute Respiratory Distress Syndrome (ARDS) may improve oxygenation by improving ventilation-perfusion mismatch, enhances recruitment and allow a decrease in the level of ventilatory support.**

2. DEFINITIONS

2.1. **Acute Respiratory Distress Syndrome: a term used to describe the pathophysiological events that occur in the lungs as a result of direct or indirect injury.**

2.2. **Prone positioning: the placement of a patient into a chest-down position and maintenance of that position for a set interval(s).**

2.3. **PaO_2/FiO_2 ratio (P/F ratio): a formula used to calculate intrapulmonary shunt. It is obtained by dividing the arterial partial pressure of oxygen (PaO_2) by the fraction of inspired oxygen (FiO_2).**

3. GUIDELINES

3.1. **Obtain a prone positioning order that includes duration, from the Attending Physician / designate prior to implementation.**

NOTE: **Recommendation is to position patient prone for 16 consecutive hours, followed by a 4-6 hour interval in the supine position unless otherwise ordered. Develop a plan for the supine turn at the time of initiation of proning.**

3.2. **The inclusion criteria are as follows:**

- **Hypoxemia, specifically a P /F ratio of 200 or less.**
- **Radiologic evidence of diffuse bilateral pulmonary infiltrates.**

3.3. **Absolute contraindications include:**

- **Acute bleeding**
- **Increased intracranial pressure (ICP)**
- **Severe facial trauma**
- **Spinal instability**
- **New pacemaker (less than 48 hours)**
- **New tracheostomy (less than 24 hours)**
- **Extracorporeal Membrane Oxygenation (ECMO)**
- **Intra-Aortic Balloon Pump (IABP)**
- **Patient with an open abdomen or negative pressure wound therapy (VAC®)**

3.4. **Relative contraindications include:**

- **Multiple trauma**
- **Pregnancy**
- **Seizures**
- **Limited neck range of motion e.g. neck fusion**
- **Hemodynamic instability despite vasopressor therapy**
- **Weight greater than 135 kg (300 lbs)**

3.5. **An Attending physician/designate will be present in the unit during turns to prone and supine.**

3.6. **Prone positioning events should be scheduled to allow for maximum staff availability.**

3.7. **If the patient does not tolerate the prone positioning, consider re-attempting within 24 hours.**

Note: **Transient hypoxia & hypotension may occur and should resolve within 30 minutes of pronation.**

3.8. **Monitor oxygenation, ventilation, and hemodynamic parameters during and following position change.**

3.9. **Reposition the head every two hours while prone.**

3.10. **Take chest x-rays while the patient is in a supine position.**

3.11. **Manage cardiac arrest in a supine position.**

3.12. **Use of a peripheral nerve stimulator is strongly recommended in patients that receive neuromuscular blockade. Refer to:** Critical Care Clinical Guideline: Peripheral Nerve Stimulator: Train of Four Monitoring (Adult)**.**

3.13. **Discontinue prone positioning upon physician order, after the patient has been in supine position for at least 4 hours with a P/F ratio of at least 150 mmHg. Additional clinical criteria that supports discontinuation include:**

- **FiO2 of 0.6 or less**
- **PEEP of 10 cm H2O or less**

4. PROCEDURE

PART A: TURNING TO PRONE

PART B: TURNING TO SUPINE

PART C: REPOSTIONING & MONITORING WHILE PRONED

Equipment

1. **Moisture barrier for face**
2. **Eye lubricant / gauze dressings for eyes**
3. **Gel head cushion or prone positioning pillow**
4. **4-6 pillows**
5. **2 - flat bed sheets**
6. **2 - Absorbent pads**
7. **Repositioning sling and / or slider device**
8. **Health Care Team: Attending Physician/designate, Registered Respiratory Therapist (RRT), Nurse, and at 4 least additional health care team members**
9. **Personal protective equipment as required**

PART A: TURNING TO PRONE	
PROCEDURE	**SPECIAL CONSIDERATIONS**
1. Perform hand hygiene before direct patient contact and subsequently as clinically indicated.	
2. Explain purpose for prone positioning to the patient and family where applicable.	
3. Assemble personnel to assist with prone positioning.	

PART A: TURNING TO PRONE	
PROCEDURE	**SPECIAL CONSIDERATIONS**
4. Ensure adequate sedation / analgesia and consider neuromuscular agents as needed.	
5. Apply moisture barrier to patient's entire face.	Protects skin from oral and nasal secretions.
6. Apply lubricant to eyes and cover eyes with gauze eye dressing. Eyes should be closed.	To avoid corneal drying and abrasions.
7. Turn off and disconnect enteral feeding. Aspirate gastric contents if placed to the stomach.	Increased risk of aspiration if placed in the stomach.
8. Arrange all lines & tubes as follows: • Waist up to be gathered at the top of the bed. • Waist down to be gathered at the bottom of the bed.	Ventilator and infusion pumps are to be positioned to not obstruct movements or dislodge equipment.
9. Assign team roles as follows: • Nurse takes charge of coordinating the turn • 2-3 team members are positioned on either side of the bed • RRT is positioned at the head of the bed • Attending physician / designate	The attending physician / designate must be present at the bedside for the first turn to prone, in the unit during subsequent turns to prone and supine.
10. Remove the electrocardiogram (ECG) electrodes from the patient's chest and position them to the patient's back.	This can be done in a two-step process as patient position allows, moving to a temporary lateral position followed by final posterior position once the patient is prone. See diagrams (Appendix A).
11. Position a flat sheet under the full length of the patient (if one is not already in place).	
12. Position patient's arms at sides with palms up and tucked under hips.	

PART A: TURNING TO PRONE	
PROCEDURE	**SPECIAL CONSIDERATIONS**
13. Place an absorbent pad over the patient's genitals.	
14. Place 1 -2 pillows at each of the following locations: • Hips at iliac crests • Chest above breast tissue • Shins (may be placed after the turn)	See diagram (Appendix B) Raising the chest and pelvis relieves tension from the abdominal viscera, which may help to improve ventilation and allow the shoulders to relax. Depending on the size of the patient, 2 pillows may be required to achieve this. An additional flat sheet may be used between the patient and the pillows, to assist with repositioning the pillows.
15. Place flat sheet, followed by a repositioning sling over pillows full length of patient, fanning back edge to prevent covering patient's face, keeping the edge on top.	See diagram (Appendix C) Top sheet will become new bottom sheet following proning.
16. The RRT will: • Pre-oxygenate with 100% $Fi0_2$ • Suction mouth and ETT if required. • Position ETT to the same side as the patient's central line site. • Note ETT position.	
17. Increase the firmness of the mattress to maximum, if applicable.	ICU beds commonly have a "max-inflate" feature that automatically returns to default firmness after a specified time.
18. Grasping both bottom and top sheet edges; staff along both sides of the patient will roll the sheets inward, snug to the patient.	See diagram (Appendix D) The process of rolling the top and bottom sheet "cocoons" the patient securely and enables a controlled turn.
19. **Review the plan** for the turn including: • The plan if emergency response required. • Procedure steps 20 - 29	The patient will be turned in the appropriate direction to ensure the central line site and associated tubing's are continuously visualized. Most central lines are sited on

PART A: TURNING TO PRONE	
PROCEDURE	**SPECIAL CONSIDERATIONS**
• The need to visualize the airway, ETT, and vascular access lines throughout the procedure. • The RRT will initiate the steps for the position change on a count of 3.	patient's right side, requiring an initial turn on to the patient's left side. In the situation of a left sited central line, the patient would require an initial turn onto the patient's right side.
20. Nurse will ensure the team is ready, and that lines and ETT are secure. The RRT will state, "We will **boost** up on 1, 2, 3"	Using appropriate safe working procedures.
21. Move the patient up in bed so their head is over the top of the mattress.	Having the patient's head over the top of the mattress will facilitate greater support of their head, especially with central lines on both sides of the neck.
22. RRT will turn the patient's head so it is facing away from the direction of the turn.	
23. Nurse will ensure the team is ready, and that lines and ETT are secure. The RRT will then state, "We will **slide** to the side on 1, 2, 3".	
24. Slide the patient to the same side of the bed as the central line.	This permits more room in the bed when completing the reposition to prone.
25. Nurse will ensure the team is ready, and that lines and ETT are secure. The RRT will then state, "We will **turn** on 1, 2, 3".	
26. Turn the patient on to their side, into a lateral position, opposite of their central line side.	Ensure the bed sheet rolls remain tight.
27. Supporting the patient in a lateral position, staff will switch their grasp on the roll with the person on the opposite side of the bed as them.	
28. Nurse will ensure the team is ready, and that lines and ETT are secure. The RRT will then state "We will **complete the turn** to prone on 1, 2, 3".	

PART A: TURNING TO PRONE	
PROCEDURE	**SPECIAL CONSIDERATIONS**
29. Complete turn by easing patient forward into prone position while sliding the patient towards the centre of the bed.	
30. Nurse will ensure the team is ready, and that lines and ETT are secure. The RRT will then state "We will **slide down** on 1, 2, 3".	
31. Move the patient down in bed so their head is on the mattress.	
32. RRT will position the patient's head & ETT on the gel pillow such that the airway can be continuous visualized and isn't obstructed.	An absorbent pad over the gel pillow will help control moisture and prevent skin breakdown. Optimal head and neck placement requires individualized adjustment to avoid pressure on the eyes, dependent ear, and the ETT securement device.
33. Following completion of prone positioning, RRT reassess the following: • ETT position • Breath sounds • Cuff leak • Check for any kinks or obstructions in tubing • Ventilator parameters • Potential pressure points around ETT and securement device, patient's eyes and dependent ear	ETT may have moved during prone positioning
34. Adjust all tubing and monitoring devices to ensure safety and functionality.	Close monitoring of oxygenation, hemodynamic and cardiac parameters are essential during and immediately following the turn. Ensure patient is not lying on any tubing or devices.
35. Ensure the shoulders are in a relaxed, neutral position. Arms are to be positioned at the patient's sides with palm up.	Avoid shrugging positions as this can lead to frozen shoulder / brachial plexus injury

PART A: TURNING TO PRONE	
PROCEDURE	**SPECIAL CONSIDERATIONS**
36. Place one pillow under patient's shins and ensure that both feet are maintained in dorsiflexion (ankle at 90º, no extension).	Dorsiflexion can be achieved by placing a pillow under the lower shin to raise the ankles off the bed.
37. Assess for potential pressure ulcer development: • Breast tissue should be positioned laterally. • Male genitalia should hang freely. • Knees & toes should be raised off of the mattress and hang freely.	Pillows or gel pads can be placed to offload pressure.
38. Reset mattress firmness to an appropriate setting for the patient.	
39. Place patient in reverse trendelenburg while in the prone position as tolerated.	Reverse trendelenburg position minimizes risk of aspiration and relieves upward abdominal pressure on the lungs.
40. Restart tube feeds if applicable.	Post-pyloric SBFT is preferred while prone, however prone positioning should not be delayed to establish a feeding tube in the small bowel.

PART B: TURNING TO SUPINE	
PROCEDURE	**SPECIAL CONSIDERATION**
1. Perform hand hygiene before direct patient contact and subsequently as clinically indicated.	
2. Assemble personnel to assist for supine positioning.	The attending physician or delegate must be present at the bedside for the first turn to prone, and in the unit during subsequent turns to prone and supine. They do not have any additional role unless required.

PART B: TURNING TO SUPINE	
PROCEDURE	**SPECIAL CONSIDERATION**
3. Ensure adequate sedation / analgesia and consider neuromuscular agents as needed.	
4. Turn off and disconnect enteral feeding. Aspirate gastric contents if placed to the stomach.	Increased risk of aspiration if placed in the stomach.
5. Arrange all lines & tubes as follows: • Waist up to be gathered at the top of the bed. • Waist down to be gathered at the bottom of the bed.	Ventilator and infusion pumps are to be positioned not to obstruct movements or dislodge equipment.
6. Assign team roles as follows: • Nurse takes charge of coordinating the turn • 2-3 team members are positioned on either side of the bed • RRT is positioned at the head of the bed	
7. Reposition electrodes from the back to patient's anterior chest.	This can be done in a two-step process as patient position allows, moving to a temporary lateral position followed by final anterior position once the patient is supine. See diagram (Appendix A).
8. Position patient's arms at their sides with palms facing up and tucked under hips.	
9. Place an absorbent pad over the patient's buttocks, followed by a flat sheet and a repositioning sling.	See diagram (Appendix C) Top sheet will become new bottom sheet following supine positioning.
10. The RRT will: • Pre-oxygenate with 100% FiO_2 • Suction mouth and ETT if required. • Position ETT to the same side as the patient's central line site.	

PART B: TURNING TO SUPINE	
PROCEDURE	**SPECIAL CONSIDERATION**
• Note ETT position.	
11. Increase the firmness of the mattress to maximum if applicable.	ICU beds commonly have a "max-inflate" feature that automatically returns to default firmness after a specified time.
12. Grasping both bottom and top sheet edges; staff along both sides of the patient will roll the sheets inward, snug to the patient.	See diagram (Appendix D) The process of rolling the top and bottom sheet "cocoons" the patient securely and enables a controlled turn.
13. **Review the plan** for the turn including: • The plan if emergency response required. • Procedure steps 13 - 18 • The need to visualize the airway, ETT, and vascular access lines throughout the procedure. • The RRT will initiate the steps for the position change on a count of 3.	The patient will be turned in the direction to ensure the central line site and associated tubing's are continuously visualized. Most central lines are sited on patient's right side, requiring a turn on to the patient's left side. In the situation of a left sited central line, the patient would require a turn onto the patient's right side.
14. Nurse will ensure the team is ready, and that lines and ETT are secure. The RRT will then state, "We will **boost** up on 1, 2, 3".	Using appropriate safe working procedures.
15. Move the patient up in bed so their head is over the top of the mattress.	Having the patient's head over the top of the mattress will facilitate greater support of their head, especially with central lines on both sides of the neck.
16. RRT will turn the patient's head so it is facing away from the direction of the turn.	
17. Nurse will ensure the team is ready, and that lines and ETT are secure. The RRT will then state, "We will **slide** to the side on 1, 2, 3".	
18. Slide the patient to the same side of the bed as the central line.	This permits more room in the bed as the patient completes the reposition into supine positioning.

PART B: TURNING TO SUPINE	
PROCEDURE	**SPECIAL CONSIDERATION**
19. Nurse will ensure the team is ready, and that lines and ETT are secure. The RRT will then state, "We will **turn** on 1, 2, 3".	
20. Turn the patient on to their side, into a lateral position, opposite of their central line side.	Ensure the bed sheet rolls remain tight.
21. Supporting the patient in a lateral position, staff will switch their grasp on the roll with the person on the opposite side of the bed as them.	
22. Nurse will ensure the team is ready, and that lines and ETT are secure. The RRT will then state, "We will **complete the turn** to supine on 1, 2, 3".	
23. Complete turn by easing patient into supine position while sliding the patient towards the centre of the bed.	
24. Nurse will ensure the team is ready, and lines and ETT are secure. The RRT will then state "We will **slide down** on 1, 2, 3".	
25. Move the patient down in bed so their head is back on the mattress.	
26. Remove additional linens, pillows and pads from patient and straighten out linens.	
27. Following completion of repositioning, RRT reassess the following: • ETT position • Breath sounds • Cuff leak • Check for any kinks or obstructions in tubing • Ventilator parameters	ETT may have moved during repositioning.

PART B: TURNING TO SUPINE	
PROCEDURE	**SPECIAL CONSIDERATION**
• Potential pressure points around the ETT securement device, patient's eyes and dependent ear	
28. Adjust all tubing and monitoring devices to ensure safety and functionality.	Close monitoring of oxygenation, hemodynamic and cardiac parameters are essential during and immediately following the repositioning. Ensure the patient is not lying on any tubing or devices.
29. Reset mattress firmness to an appropriate setting for the patient.	
30. Raise the head of bed to 30 – 45°.	Maintaining the head of bed greater than 30° prevents aspiration.
31. Restart tube feeds as ordered.	

PART C: RESPOSITIONING WHILE PRONE	
PROCEDURE	**SPECIAL CONSIDERATION**
1. Perform hand hygiene before direct patient contact and subsequently as clinically indicated.	
2. Assemble personnel to assist with repositioning.	The team should include: nurse, respiratory therapist and one additional member of the health care team at a minimum.
3. Assign team roles as follows: • Nurse takes charge of coordinating the reposition. • Additional team member on opposite side of bed. • RRT is positioned at the head of the bed.	

PART C: RESPOSITIONING WHILE PRONE	
PROCEDURE	**SPECIAL CONSIDERATION**
4. Upon instruction from RRT, use the sling & ceiling / mechanical lift to raise the patient.	If a mechanical lift device is not available, a slider should be used to slide the position towards the head of the bed such that their head is over the mattress and may be repositioned to the opposite side. The slider device method may require addition staff depending on the patient.
5. RRT will reposition patient's head to face the opposite direction.	
6. The RRT will: • Perform oral care • Suction mouth & ETT • Reposition ETT & gel pillow • Reapply moisture barrier cream to patients face as needed.	
7. Lower the patient back onto the gel pillow.	Pillows (1-2) are to be placed at the level of the chest to raise the shoulder and chest off the mattress to provide room for ETT positioning.
8. Following repositioning, RRT reassess the following: • ETT position • Breath sounds • Cuff leak • Check for any kinks or obstruction in tubing • Ventilator parameters • Potential pressure points around ETT securement device, patient's eyes and dependent ear	
9. Reapply lubricant to eyes, close and cover with gauze dressings. Eyes should remain closed.	To avoid corneal drying and abrasions.

PART C: RESPOSITIONING WHILE PRONE	
PROCEDURE	**SPECIAL CONSIDERATION**
10. Ensure patient is not lying on any tubing or devices.	
11. Ensure shoulders are in a relaxed, neutral position. Arms positioned at the patient's side with palms up.	Avoid shrugging positions as this can lead to frozen shoulder / brachial plexus injury.
12. Assess for potential pressure ulcer development: • Breast tissue should be positioned laterally. • Male genitalia should hang freely. • Knees & toes should be raised off of the mattress and hang freely.	Pillows or gel pads can be placed to relieve pressure.
13. Place patient in reverse trendelenburg while in the prone position as tolerated.	Reverse trendelenburg position minimizes risk of aspiration and relieves upward abdominal pressure on the lungs.
14. Restart tube feeds if applicable.	

5. DOCUMENTATION

Document the following in the Integrated Progress Notes, Flow Sheet or Electronic Patient Record, as applicable:

- Date and time that prone positioning was established.
- Planned duration of pronation.
- Patient response to repositioning.
- Ventilator settings (pre & post repositioning).
- Turns, repositioning, & ETT manipulations.
- Thorough skin assessment.

6. REFERENCES

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7. PRIMARY AUTHORS

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Appendix A: Lead Positioning on Prone Patient for 5 Lead ECG monitoring

Reposition electrodes from the chest and move to patient's back, mirroring chest ECG placement; or in two steps as patient position allows, move to temporary lateral position followed by final posterior position.
Place V lead in V5.

Appendix B: Pillow Preparation while Patient Supine

Place pillows at each of the following locations

- shins
- hips at iliac crests
- chest above breast tissue

Raising the chest and pelvis relieves tension from the abdominal viscera which may help to improve ventilation and allows shoulders to relax.

Pillow Positioned once Turned Prone

Appendix C: Preparation of Sheets while Patient Supine

Place sheet followed by bed sling over pillows full length of patient, fanning back edge to prevent covering patient's face, keeping the edge on top.

- Sandwiches the patient between the sheets more securely

Top sheet will become new bottom sheet following proning.

Appendix D: Sandwiching Patient

Staff on patient's central line site side: grasp both bottom and top sheet edges; roll inward in over roll fashion to snug alongside patient's side.

Staff on opposite side: roll sheets inward in an under roll fashion to snug along patient's side.

Appendix E: Prone Limb Positioning