Spontaneous Breathing Trial and Mechanical Ventilation Weaning Process

This practice algorithm has been specifically developed for MD Anderson using a multidisciplinary approach and taking into consideration circumstances particular to MD Anderson, including the following: MD Anderson’s specific patient population; MD Anderson’s services and structure; and MD Anderson’s clinical information. Moreover, this algorithm is not intended to replace the independent medical or professional judgment of physicians or other health care providers. This algorithm should not be used to treat pregnant women.

**ASSESSMENT**

1. Patient receiving mechanical ventilation
   - Baseline ventilatory mode/settings
     - RT and RN to assess criteria\(^1\) for SBT
     - Does patient meet criteria?
       - Yes → RT to initiate SBT
       - No → No

2. Does patient tolerate SBT for 30 minutes?
   - Yes → Return to pre-SBT mode/settings and document failure
   - No → No

**INTERVENTION**

- Notify ICU provider
- Initiate weaning process\(^2\) for PSV and CPAP
- Perform and document pulmonary mechanics
- Pulmonary mechanics acceptable?
  - Yes → Contact provider to obtain order for extubation
  - No → Extubate and begin lung expansion therapy every 4 hours

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\(^1\)See Appendix A for SBT Criteria

\(^2\)See Appendix B for Weaning Process

RT = respiratory therapist
RN = registered nurse
SBT = spontaneous breathing trial
PSV = pressure support ventilation
CPAP = continuous positive airway pressure
APPENDIX A: SBT Criteria

Spontaneous Breathing Readiness Assessment shall be completed by RT and RN by 8 AM (unless otherwise ordered)

(All must be met in order to proceed with protocol)

- Stable hemodynamics (MAP greater than 60 mmHg, HR less than 120 bpm)
- No significant dysrhythmias (unless chronic). If patient has a dysrhythmia, contact ICU provider prior to proceeding with SBT.
- If patient is receiving vasopressor therapy, contact ICU provider prior to proceeding
- The most recent ABG values are as follows: pH greater than 7.28, PCO₂ less than 60 mmHg (unless chronic), and PO₂ greater than 60 mmHg. If ABG is not available, SpO₂ shall be greater than or equal to 92%.
- Temperature less than 102°F
- Ventilator rate is set to no greater than 20 bpm and spontaneous RR is less than 35 bpm
- Capability to breathe spontaneously
- FiO₂ less than or equal to 0.50
- PEEP less than or equal to 10 cm H₂O
- Capable of lifting head off pillow
- Prior to the initiation of SBT, the RASS score should be greater than or equal to -2

MAP = mean arterial pressure  PCO₂ = partial pressure of carbon dioxide  SpO₂ = arterial oxygen saturation  PEEP = positive end-expiratory pressure
ABG = arterial blood gas  PO₂ = partial pressure of oxygen  FiO₂ = fraction of inspired oxygen  RASS = Richmond Agitation-Sedation Scale

APPENDIX B: Weaning Process

- Change ventilator settings to PS of 6 cm H₂O, titrate pressure support to deliver tidal volume of 5 mL/kg of ideal body weight
- Monitor patient’s respiratory status as appropriate

**Note:** If there are signs of intolerance increase PS by 2 cm H₂O every 10 minutes until RR less than or equal to 30 bpm, obtain ABG and notify the physician of results.

- Once the weaning process has reached acceptable level (i.e., PSV of 6 and acceptable spontaneous pulmonary mechanics) consult the physician for extubation orders.

**Note:** If extubation orders are received from a non-critical care Intensivist (i.e. primary physician), the RT should notify the patient’s critical care physician prior to the tube removal.

PS = pressure support
APPENDIX C: Richmond Agitation Sedation Scale (RASS)

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
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<tbody>
<tr>
<td>+4</td>
<td>Combative, Overly combative, violent, immediate danger to staff</td>
</tr>
<tr>
<td>+3</td>
<td>Very agitated, Pulls or removes tube(s) or catheter(s); aggressive</td>
</tr>
<tr>
<td>+2</td>
<td>Agitated, Frequent, non-purposeful movement, fights ventilator</td>
</tr>
<tr>
<td>+1</td>
<td>Restless, Anxious, but movements not aggressive or vigorous</td>
</tr>
<tr>
<td>0</td>
<td>Alert and calm, Not fully alert, but has sustained awakening (eye-opening/eye contact) to voice (greater than or equal to 10 seconds)</td>
</tr>
<tr>
<td>-1</td>
<td>Drowsy, Not fully alert, but has sustained awakening (eye-opening/eye contact) to voice (less than 10 seconds)</td>
</tr>
<tr>
<td>-2</td>
<td>Light sedation, Briefly awakens with eye contact to voice (less than 10 seconds)</td>
</tr>
<tr>
<td>-3</td>
<td>Moderate sedation, Movement or eye openings to voice (but no eye contact)</td>
</tr>
<tr>
<td>-4</td>
<td>Deep sedation, No response to voice, but movement or eye opening to physical stimulation</td>
</tr>
<tr>
<td>-5</td>
<td>Unarousable, Unarousable</td>
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SUGGESTED READINGS

MacIntyre, N. R. (2001). Evidence-based guidelines for weaning and discontinuing ventilatory support: a collective task force facilitated by the American College of Chest Physicians; the American Association for Respiratory Care; and the American College of Critical Care Medicine. Chest Journal, 120(6_suppl), 375S-396S.

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DEVELOPMENT CREDITS

This practice consensus algorithm is based on majority expert opinion of the SBT and Mechanical Ventilation Weaning workgroup at the University of Texas MD Anderson Cancer Center. It was developed using a multidisciplinary approach that included input from the following:

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