Spontaneous Breathing Trial and Mechanical Ventilation Weaning Process

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson’s specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient’s care. This algorithm should not be used to treat pregnant women.

ASSESSMENT

Patient receiving mechanical ventilation

Baseline ventilatory mode/settings

RT and RN to assess criteria¹ for SBT

Does patient meet criteria?

Yes

RT to initiate SBT

Does patient tolerate SBT for 30 minutes?

Yes

Return to pre-SBT mode/settings and document failure

No

No

INTERVENTION

Yes

● Notify ICU provider
● Initiate weaning process² for PSV and CPAP

Perform and document pulmonary mechanics

Pulmonary mechanics acceptable?

Yes

Contact provider to obtain order for extubation

Extubate and begin lung expansion therapy every 4 hours

No

Return to pre-SBT mode/settings and document failure

¹See Appendix A for SBT Criteria
²See Appendix B for Weaning Process

RT = respiratory therapist
RN = registered nurse
SBT = spontaneous breathing trial
PSV = pressure support ventilation
CPAP = continuous positive airway pressure
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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 respiratory rate 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 (see Appendix C)

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

APPENDIX B: Weaning Process

- Change ventilator settings to PS of 6 cm H₂O and titrate PS 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 provider (i.e., primary physician), the RT should notify the patient’s critical care physician prior to the tube removal

PS = pressure support
PSV = pressure support ventilation

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

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<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</td>
</tr>
<tr>
<td>-1</td>
<td>Drowsy: Not fully alert, but has sustained awakening (eye-opening/eye contact) to voice (greater than or equal to 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</td>
</tr>
</tbody>
</table>

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SUGGESTED READINGS


DEVELOPMENT CREDITS

This practice consensus statement is based on majority expert opinion of the SBT and Mechanical Ventilation Weaning workgroup at the University of Texas MD Anderson Cancer Center for the population. These experts included:

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