Title: Weaning Pathway Guideline - ICU

Initiated by: Practice Leader/Supervisor  Category: Service
Authorized by:  Number: RT-SER-173
Effective date: July 30, 2007  Review date: October 2, 2007

Scope:

This policy describes the Weaning Pathway Guideline for use with ventilated ICU patients, and includes a copy of the Weaning Readiness Report as well as the Trend of Weaning Readiness Reports.

Policy:

The bedside RT and/or bedside RN will complete a daily screening between 0600 and 0800 and PRN on all ventilated patients who are not currently following a Weaning Pathway Guideline. **NOTE:** Wean screening can also be done at any time during the day or night as applicable.

**NOTE:** An ICU physician may write an order for no wean screening to be done, if they determine the patient will never be able to wean from a ventilator due to their medical condition (examples: C2 Quadriplegia, home ventilator dependency, diaphragmatic paralysis, etc). The order for no wean screening and description of contributing patient condition should be clearly documented in the chart orders and recorded in the RT Comment Section of the Weaning Readiness Report. These patients would not require daily screening.

All other patients will be screened for the following criteria:

- Stable Neurophysiologic status*
- *(able to tolerate hypercapnia)*
- Minimal vasopressors/inotropes
- Core temp ≤ 38°C:
- pH >7.25
- Hgb ≥ 80 mg/dL
- PaO₂/FiO₂ >150mmHg
- PEEP <10cmH₂O
- *VC  ___________ ml/kg IBW
- *MIP  ___________ cmH₂O

*For patients who have a Spinal Cord Injury or documented or suspected neuromuscular or respiratory muscle weakness, record Vital Capacity in ml/kg IBW and MIP in cmH₂O.
Patients not meeting all of the criteria listed above will continue on their current supportive ventilation parameters. Patients that do meet all of the criteria will be started on a Spontaneous Breathing Trial (SBT) for $\leq 5$ min to assess for tolerance. The SBT will take the form of one of the following options at the discretion of the RT:

- CPAP $\leq 10$ cmH$_2$O
- PS $\leq 5$ cmH$_2$O
- PAV$^+$ support setting $\leq 20$
- T-Piece
- Trach Mask

Patients will be assessed during SBT for the following signs of intolerance:

- $f/V_T \geq 105$
- $\text{SpO}_2 < 0.90$
- HR $> 140$ or sustained change by $\geq 20\%^{*}$
- Systolic BP $> 180$ or sustained change by $\geq 20\%^{*}$
- Increased Anxiety
- Increased WOB

*NOTE: Significant changes in HR or BP may not be seen in patients with Spinal Cord Injuries due to loss of sympathetic tone.

The Weaning Algorithm Protocol sheet will be filled out by the bedside RT and given to the Charge RT before 0830. **The patient will be returned to the previous supportive ventilation while awaiting orders.**

The Charge RT and ICU Director or designate, with optional attendance by the Charge RN and physiotherapist, will complete RT/MD rounds for all ICU patients before 0830. All SBT reports will be discussed and verbal orders given by the physician for relevant Weaning Pathway Guideline or extubation as appropriate. The Charge RT will transcribe the verbal orders in the patient chart and fill out the Trend of Weaning Readiness Reports in the RT binder. Weaning Readiness Reports can then be disposed of in the appropriate document shredding box.

The bedside RT will begin the Weaning Pathway Guideline or extubation at 0830 as ordered.

The bedside RT should discuss HS sedation requirements and daily sedation needs with bedside RN to facilitate wean processes, and should communicate with the bedside physiotherapist to optimise mobilization and secretion clearance as necessary.

All patients on a Weaning Pathway will be assessed daily for weaning parameters and charted on the critical care flowsheet.

**Procedure:**

*Weaning Pathway Guideline #1*

For all patients **without** documented respiratory muscle weakness, or Spinal Cord Injuries (SCI) (ASIA A/B/C at T6 or above) with VC $\geq 15$ ml/kg IBW.
Place patient on PSV, and titrate PS to lowest level to achieve RR 15-25 bpm and VT > 5ml/kg IBW. Maintain set PEEP level, and titrate FiO₂ to achieve SpO₂ ≥ 92%. Decrease PS level in 2 cm H₂O increments Q4H AND as tolerated.

Watch patient for signs of intolerance and document, including but not limited to:

f/VT ≥ 105
SpO₂ < 0.90
HR > 140 or sustained change by ≥ 20%
Systolic BP > 180 or sustained change by ≥ 20%
Increased anxiety
Increased WOB

*NOTE: Significant changes in HR or BP may not be seen in patients with SCI due to loss of sympathetic tone.

Adjust PS following guideline above until patient tolerates PS ≤ 5 cm H₂O for ≥ 30 minutes, then follow RT-SER-020 Extubation ICU/CSICU/CCU/ER to assess for extubation readiness and contact ICU physician for extubation order if indicated. If patient is on CPAP 6-10 cm H₂O, wean CPAP as tolerated to 5 cm H₂O before removing ventilator.

Patients should be assessed frequently throughout the shift for stability criteria. If criteria for stability are no longer met (e.g. temp >38°C, pH <7.25, PEEP₉₀ >10cmH₂O, etc), bedside RT should notify physician and ask for an order to discontinue Weaning Pathway if appropriate. Verbal orders to D/C pathway should be transcribed in the patient chart. RT will then start filling out Weaning Readiness Reports daily and PRN to check for stability.

If patient fails Weaning Pathway Guideline #1, assess VC and MIP (inability to generate -20cmH₂O indicates respiratory muscle weakness) and discuss with physician. Consider orders for Weaning Pathway Guideline #2.

OR

Place patient on PAV⁺, and titrate %Support to lowest level to achieve RR 15-25 and patient comfort. Maintain set PEEP level, and titrate FiO₂ to achieve SpO₂ ≥ 92%. Decrease % Support level in 5% increments Q4H or as tolerated. Watch patient for signs of intolerance and document, including but not limited to:

f/VT ≥ 105
SpO₂ < 0.90
HR > 140 or sustained change by ≥ 20%
Systolic BP > 180 or sustained change by ≥ 20%
Increased anxiety
Increased WOB₉₀

*NOTE: Significant changes in HR or BP may not be seen in patients with SCI due to loss of sympathetic tone.

Adjust %Support following guideline above until patient tolerates %Support ≤ 20% for ≥ 30 minutes, then follow RT-SER-020 Extubation ICU/CSICU/CCU/ER to assess for extubation readiness and contact ICU
Physician for extubation order if indicated. If patient is on CPAP 6-10 cmH₂O, wean CPAP as tolerated to 5 cmH₂O before removing ventilator.

Patients should be assessed frequently throughout the shift for stability criteria. If criteria for stability are no longer met (e.g. temp > 38°C, pH < 7.25, PEEPTOT > 10 cmH₂O, etc), bedside RT should notify physician and ask for an order to discontinue Weaning Pathway if appropriate. Verbal orders to D/C pathway should be transcribed in the patient chart. RT will then start filling out Weaning Readiness Reports daily and PRN to check for stability.

If patient fails Weaning Pathway Guideline #1, assess VC and MIP (inability to generate -20 cmH₂O indicates respiratory muscle weakness) and discuss with physician. Consider orders for Weaning Pathway Guideline #2.

Weaning Pathway Guideline #2

For patients with documented respiratory muscle weakness, SCI (ASIA A/B/C at T6 or above) with VC 10-14 ml/kg IBW*, or those who fail Weaning Pathway Guideline #1 due to muscle weakness.

*NOTE: When assessing SCI patients for VC, assess for signs of abdominal movement indicating diaphragmatic function. It is possible for patients with good thoracic compliance to generate a VC with only accessory muscle use. VC measurements on SCI patients with level of injury T6 or higher should be done in the supine position. Patients without diaphragmatic function or with VC < 10 ml/kg IBW should be transitioned to a home ventilator and transferred to the Spinal Cord Unit at VGH or rehabilitation facility when stable.

Patients will likely require assisted cough and chest physiotherapy for pulmonary hygiene Q4H or PRN. SCI patients may also need assisted cough pre and post mobilization and after turns (see RT-SER-155 Assisted Cough). Consider bronchodilator therapy for SCI patients as an adjunct to enhance mucociliary clearance due to loss of sympathetic airway innervation.

Consider tracheostomy if the patient will likely be ventilated >3 weeks, has severe bulbar involvement, or is unable to effectively clear secretions despite assisted cough.

Consider continuous ETCO₂ monitoring to assess tolerance during CPAP trials. Hypercapnia is often an early warning sign of respiratory failure.

Place patient on one of the following methods of unassisted breathing:

- CPAP ≤ 10 cmH₂O
- PS ≤ 5 cmH₂O
- PAV support setting ≤ 20%
- T-Piece
- Trach Mask

Titrated FiO₂ to achieve SpO₂ ≥ 92%. Communicate with bedside RN and watch patient closely for signs of intolerance, including but not limited to:

- f/V₁ ≥ 105
- SpO₂ < 0.90
- HR > 140 or sustained change by ≥ 20%*
Systolic BP > 180 or sustained change by ≥ 20%*
ETCO₂ > 45 mmHg or increased by ≥10 mmHg
Increased anxiety
Increased WOB
Decreased VC > 25%

*NOTE: Significant changes in HR or BP may not be seen in patients with Spinal Cord Injuries due to loss of sympathetic tone.

When signs of intolerance are noted, return patient to previous supportive ventilation and document. Follow guideline chart below for examples of length and frequency of unassisted breathing trials until 2200. Communicate with bedside physiotherapist and RN regarding timing of unassisted breathing trials to optimize patient care and procedures. Return patient to supportive ventilation overnight and repeat with lengthening trials as tolerated each day until patient tolerates unassisted breathing for 24 hours, then remove ventilator or follow RT-SER-020 Extubation ICU/CSICU/CCU/ER to assess for extubation readiness and contact ICU physician for extubation order if indicated. If patient is on CPAP 6-10 cmH₂O, wean CPAP as tolerated to 5 cmH₂O before removing ventilator.

Patients should be assessed frequently throughout the shift for stability criteria. If criteria for stability are no longer met (e.g. temp > 38°C, pH < 7.25, PEEP_{TOT} > 10 cmH₂O, etc), bedside RT should notify physician and ask for an order to discontinue Weaning Pathway if appropriate. Verbal orders to D/C pathway should be transcribed in the patient chart. RT will then start filling out Weaning Readiness Reports daily and PRN to check for stability.

Guideline chart for length and frequency of unassisted breathing trials

<table>
<thead>
<tr>
<th>Length</th>
<th>Frequency</th>
<th>Rest Between</th>
<th>Total Trial Time</th>
<th>Rest Overnight</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 min</td>
<td>5</td>
<td>3 hours 50min</td>
<td>2200-0600</td>
<td></td>
</tr>
<tr>
<td>30 min</td>
<td>4</td>
<td>3 hours 30 min</td>
<td>2 hours 2200-0600</td>
<td></td>
</tr>
<tr>
<td>1 hour</td>
<td>3</td>
<td>4 hours 20 min</td>
<td>3 hours 2200-0600</td>
<td></td>
</tr>
<tr>
<td>2 hours</td>
<td>2</td>
<td>12 hours 4 hours</td>
<td>2200-0600</td>
<td></td>
</tr>
<tr>
<td>3 hours</td>
<td>2</td>
<td>5 hours 6 hours</td>
<td>2200-0600</td>
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<tr>
<td>4 hours</td>
<td>2</td>
<td>4 hours 8 hours</td>
<td>2200-0600</td>
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<td>5 hours</td>
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<td>4 hours 10 hours</td>
<td>2200-0600</td>
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<td>6 hours</td>
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<td>4 hours 12 hours</td>
<td>2200-0600</td>
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<tr>
<td>7 hours</td>
<td>2</td>
<td>2 hour 14 hours</td>
<td>2200-0600</td>
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<tr>
<td>16 hours</td>
<td>1</td>
<td>0 16 hours</td>
<td>2200-0600</td>
<td></td>
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</tbody>
</table>

References:


# Weaning Readiness Report

**Red** _____ **Blue** _____

**DATE (M/D/Y)**

___ / ____ / _____ VGH ICU Bed #________ IBW_______kg

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Does this patient have a medical condition that would prohibit them from ever weaning from a ventilator?  YES  NO  (C2 Quadriplegia, diaphragmatic paralysis, home ventilator dependency)

If YES, obtain physician's order for **No Wean Screen** and document in chart.

If NO, continue daily wean screening.

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## RN/RT Daily Screening (0600-0800 & PRN)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>Stable Neurophysiologic status</td>
<td>(able to tolerate hypercapnia)</td>
</tr>
<tr>
<td>Minimal vaspressors/inotropes</td>
<td></td>
</tr>
<tr>
<td>Core temp $\leq$ 38°C</td>
<td></td>
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<tr>
<td>pH $&gt; 7.25$</td>
<td></td>
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<tr>
<td>Hgb $\geq 80$ mg/dL</td>
<td></td>
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<tr>
<td>PaO$_2$/FiO$_2$ $&gt;$ 150mmHg</td>
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<tr>
<td>PEEP$_{TOT}$ $\leq 10$cmH$_2$O</td>
<td></td>
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</tbody>
</table>

For SCI and NM Weakness:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>VC $\geq 15$ ml/kg IBW</td>
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<tr>
<td>MIP $\geq 20$ cmH$_2$O</td>
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</tbody>
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## Spontaneous Breathing Trial $\leq 5$ min (0600-0800 & PRN)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Status</th>
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<tr>
<td>CPAP $\leq 10$ cmH$_2$O</td>
<td></td>
</tr>
<tr>
<td>PS $\leq 5$ cmH$_2$O or PAV’ $\leq 20%$</td>
<td></td>
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(T-Piece or Trach Mask acceptable)

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## Signs of Intolerance:

(please indicate which parameter patient is demonstrating)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Status</th>
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<tbody>
<tr>
<td>$f/V_T \geq 105$</td>
<td></td>
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<tr>
<td>$SpO_2 &lt; 0.90$</td>
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<tr>
<td>HR $&gt;140$ or sustained change by $\geq 20%$</td>
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<tr>
<td>Sys BP $&gt;180$ or sustained change by $\geq 20%$</td>
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<tr>
<td>Increased anxiety</td>
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<td>Increased WOB</td>
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## Return to Previous Mode and Report to Charge RT

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## RT/MD Weaning Rounds (0800-0830)

**Attendance:**

- Charge RT (required)
- ICU Physician (required)
- Charge RN (optional)
- Physiotherapist (optional)

Discuss all Weaning Readiness Reports. Charge RT to write verbal orders for appropriate Weaning Pathway Guideline or extubation and complete Wean Trend Report.

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## RT Begins Weaning Pathway Guideline #1 (0830)

For all patients **without** documented respiratory muscle weakness, Spinal Cord Injuries (ASIA A/B/C at T6 or above) with VC 10-14 ml/kg, or those who fail Weaning Pathway Guideline #1 due to muscle weakness.

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## RT Begins Weaning Pathway Guideline #2 (0830)

For all patients **with** documented respiratory muscle weakness, Spinal Cord Injuries (ASIA A/B/C at T6 or above) with VC 10-14 ml/kg, or those who fail Weaning Pathway Guideline #1 due to muscle weakness.

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**RT Comments:**

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Revised October 2, 2007
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<th>Assessment Number</th>
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<td>Minimal vasopressors/inotropes</td>
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<td>pH &gt; 7.25</td>
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<td>Hgb ≥ 80 mg/dL</td>
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<td>PaO2/FiO2 &gt; 150 mmHg</td>
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<td>PeepTOT ≤ 10 cmH20</td>
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Weaning Pathway Guideline # __________
Ordered (mm/dd/yr): __________
Discontinued (mm/dd/yr): __________
Re-ordered (mm/dd/yr): __________
Discontinued (mm/dd/yr): __________
Re-ordered (mm/dd/yr): __________

Date weaned to minimum support (mm/dd/yr): __________
(definition) CPAP, TPCE, PS ≤ 5, PAV ≤ 20%

Date extubated (mm/dd/yr): __________
Did extubation occur on the day patient weaned to min support?
YES__________ NO__________

If NO, describe why:______________________________________
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RT comments:____________________________________________
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MRN