Caring Practice:
Evidence-based Terminal
Ventilator Withdrawal

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Webinar Goals

- Describe the processes for ensuring patient comfort during terminal ventilator withdrawal

Session Topics

- What is needed for best practice
- Use of the Respiratory Distress Observation Scale© (RDOS)
- Describing a process for terminal ventilator withdrawal
Polling Question

Do you have a protocol or algorithm in place for conducting terminal ventilator withdrawal?

☐ Yes
☐ No
☐ I don’t know
Patients Undergoing Withdrawal Are Heterogeneous

- Awake, aware, made own decision – high risk of respiratory distress
- Cognitively impaired, able to experience distress
- Unconscious, may or may not be able to experience distress
- Brain dead – unable to experience distress
What is Needed?

A patient-centered, evidence-based approach that includes:

- A standardized approach that considers the heterogeneity of patients undergoing withdrawal
  - An algorithm affords standardization and the unique needs of the individual patient
- An objective measure of patient respiratory distress/comfort
# Respiratory Distress Observation Scale®

<table>
<thead>
<tr>
<th>Variable</th>
<th>0 Points</th>
<th>1 Point</th>
<th>2 Points</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate per minute</td>
<td>&lt;90 beats</td>
<td>90-109 beats</td>
<td>≥110 beats</td>
<td></td>
</tr>
<tr>
<td>Respiratory rate per minute</td>
<td>≤18 breaths</td>
<td>19-30 breaths</td>
<td>&gt;30 breaths</td>
<td></td>
</tr>
<tr>
<td>Restlessness: non-purposeful movements</td>
<td>None</td>
<td>Occasional,</td>
<td>Frequent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>slight movements</td>
<td>movements</td>
<td>movements</td>
<td></td>
</tr>
<tr>
<td>Accessory muscle use: rise in clavicle during inspiration</td>
<td>None</td>
<td>Slight rise</td>
<td>Pronounced rise</td>
<td></td>
</tr>
<tr>
<td>Paradoxical breathing pattern</td>
<td>None</td>
<td>Present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grunting at end-expiration: guttural sound</td>
<td>None</td>
<td>Present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasal flaring: involuntary movement of nares</td>
<td>None</td>
<td>Present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Look of fear</td>
<td>None</td>
<td>Eyes wide open, facial muscles tense, brow furrowed, mouth open</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reliability and Validity

**RDOS reliability**
- Inter-rater reliability \( r = 1.0 \)
  - With registered nurses
- Scale reliability \( \alpha = .78, .64, .85 \)

**RDOS validity and cutpoint**
- Construct validity
  - RDOS – SpO\textsubscript{2}
    - \( r = -.369, p < .01, n = 85 \)
    - \( r = -.688, p < .01, n = 210 \)
- Convergent validity
  - RDOS – patient report
    - \( r = .740, p < .01, n = 210 \)
- Discriminant validity
  - RDOS – pain
    - \( F_{(0,20)} = 119.84, p < .01, n = 70 \)
- Distress intensity cutpoint
  - Mild = 3
  - Moderate = 4-6
  - Severe = ≥7
24 Hours in Advance, If Plan to Withdraw Affords Advance Notice:

- Diurese if wet lung sounds / radiographic evidence
  - Reduces volume of post-extubation secretions
- Restrict fluid intake
- Begin dexamethasone 4mg IV q 6 hours
  - Reduces risk of post-extubation stridor
15–30 Minutes Prior to Ventilator Changes:

- Discontinue fluids, vasopressors
- Allow hypotension to occur naturally
  - Reduces patient consciousness
  - Reduces patient ability to experience respiratory distress
Terminal Ventilator Processes

1. Ascertained consciousness/ability to experience distress
2. Ascertained risk for post-extubation stridor
3. Determine need for premedication
   - Premedicate, if indicated
4. Terminal weaning of oxygen and ventilation
5. Determine need for post-withdrawal oxygen
6. Extubate, if indicated
7. Respond to family questions about expected duration of survival
Ascertain Consciousness/Ability to Experience Distress

<table>
<thead>
<tr>
<th>Reaction Level Scale (RLS 85)</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert, with no delay in response (responds without stimulus)</td>
<td>1</td>
</tr>
<tr>
<td>Drowsy or confused, but responds to light stimulation</td>
<td>2</td>
</tr>
<tr>
<td>Very drowsy or confused, but responds to strong stimulation</td>
<td>3</td>
</tr>
<tr>
<td>Unconscious; localizes (moves a hand towards) a painful stimulus but does not ward it off</td>
<td>4</td>
</tr>
<tr>
<td>Unconscious; makes withdrawing movements from a painful stimulus</td>
<td>5</td>
</tr>
<tr>
<td>Unconscious; stereotypic flexion movements following painful stimuli</td>
<td>6</td>
</tr>
<tr>
<td>Unconscious; stereotypic extension movements following painful stimuli</td>
<td>7</td>
</tr>
<tr>
<td>Unconscious; no response to painful stimuli</td>
<td>8</td>
</tr>
</tbody>
</table>

*Likely to experience distress*
Ascertain Risk of Postextubation Stridor
(Not needed if tracheostomy)

Deflate endotracheal tube cuff

Plan to extubate if cuff leak difference is >180 cc

Measure exhaled tidal volume

Calculate difference between set tidal volume and exhaled volume (Set Vt – Exh Vt = xx)

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Estimate Duration of Survival

- **During or shortly after withdrawal**
  - Multiple, concurrent organ system failure
  - Vasopressors
  - Hypoxemia (SpO₂ <80%)

- **Hours**
  - Most patients within 24 hours

- **Days**
  - Patients with neurological disease and no other organ failure
Pre-Medicate for Anticipated Dyspnea

Patients who are able to experience distress

- RLS 85 levels 1–5
- Patients who are exhibiting respiratory distress while ventilated (RDOS ≥3)
  - Morphine 5 mg/lorazepam 1 mg intravenous bolus
  - Adjust doses to correspond with patient prior use or tolerance

Comatose patients (RLS 6-8) do not require premedication

- Small risk of respiratory distress warrants monitoring during withdrawal and medicating if distress is apparent
Withdrawal Processes

Terminal weaning (RLS 1–5)*
1. Turn off PEEP
2. Wean FiO₂
3. SIMV / PSV
4. Wean SIMV Rate
5. CPAP 0 / PSV 5
6. Turn off ventilator
   *Evaluate RDOS with every ventilator change; bolus with morphine if RDOS ≥ 3

One step (RLS 6–8)
• Turn off ventilator*
• Evaluate distress
Extubate

- Patients who passed the cuff-leak test (volume ≥180 cc)
- Patients with normal tongue size and position in mouth
# Results From a Pilot Study to Compare Terminal Weaning with One-Step Terminal Extubation Process

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention n=6</th>
<th>Control n=8</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>68 (13)</td>
<td>75 (11)</td>
<td>NS</td>
</tr>
<tr>
<td>Gender, % male</td>
<td>50</td>
<td>50</td>
<td>NS</td>
</tr>
<tr>
<td>Ethnicity, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black, 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAPS II (SD)</td>
<td>71 (19)</td>
<td>71.5 (16)</td>
<td>NS</td>
</tr>
<tr>
<td>Withdrawal process</td>
<td>Weaning</td>
<td>One-Step</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Days intubated (SD)</td>
<td>3.2 (2.9)</td>
<td>7.8 (4.4)</td>
<td>.046</td>
</tr>
<tr>
<td>Stridor, %</td>
<td>0</td>
<td>38</td>
<td>.06</td>
</tr>
<tr>
<td>Baseline RDOS (SD)</td>
<td>3.8 (2)</td>
<td>4.3 (2.5)</td>
<td>NS</td>
</tr>
<tr>
<td>RDOS at 15&quot; off vent (SD)</td>
<td>2.3 (2)</td>
<td>6.3 (3.7)</td>
<td>.03</td>
</tr>
<tr>
<td>Total morphine (SD)</td>
<td>31.5 (36)</td>
<td>17 (19)</td>
<td>NS</td>
</tr>
<tr>
<td>Total lorazepam (SD)</td>
<td>1 (3)</td>
<td>5 (8)</td>
<td>NS</td>
</tr>
</tbody>
</table>

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Results From a Pilot Study to Compare Terminal Weaning with One-Step Terminal Extubation Ventilator Withdrawal

![](image)


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**Stridor Assessment and Treatment**

- Stridor occurs most often in the first hour after extubation
- Risk factors
  - Traumatic intubation
  - History of self-extubation
  - Prolonged intubation
  - Elevated SAPS II
- Treatment
  - Racemic epinephrine aerosol, 2.5 mg in 3 cc normal saline
  - May need to repeat x1
Ascertain Need for Oxygen Post-withdrawal

- $\text{SpO}_2 < 85\%$ and RDOS $\geq 3$  
  Consider low flow oxygen

- $\text{SpO}_2 < 85\%$ and RDOS $<3$  
  Oxygen not needed

- $\text{SpO}_2 > 85\%$ and RDOS $\geq 3$  
  Oxygen not indicated; bolus with morphine
Ascertain Need for Continuous Morphine After Withdrawal

- Is survival estimated to be longer than minutes/hours?
- Were morphine boluses needed during terminal weaning?
- Is there evidence of continuing respiratory distress?
Calculate Dosing for Continuous Morphine Infusion Post-withdrawal

- Sum the morphine boluses given as premedication and to treat distress
- Begin a morphine infusion at a dose = 50% of summed boluses
- Titrate to RDOS <4
  - Bolus with morphine 5 mg
  - Increase hourly rate by 50%–100%
Polling Question

Patient received 5 mg premedication and 2 boluses of 5 mg = 15 mg pre- and during withdrawal. At what rate would you start your morphine infusion?

- Begin infusion at 7.5 mg/hr
- Begin infusion at 10 mg/hr
- Begin infusion at 15 mg/hr
Summary

- Nurses are integral to ensuring patient respiratory comfort during terminal ventilator withdrawal
- An objective patient assessment (RDOS) can guide the process
- An objective test (cuff-leak) predicts who can be extubated
Discussion
Questions and Answers
AACN Implementation
Tools and Resources

Designed to help you apply these practices in your environment

- **Tools and Tactics:** Applying Caring Practice: Evidence-based Terminal Ventilator Withdrawal
- **Bridging the Gap:** Gap Analysis to Evaluate Staff Comfort and Collaboration During Terminal Ventilator Withdrawal
- **RDOS:** Email m.campbell@wayne.edu for Permission to Use
- Resources and References to Guide Your Practice
- Selected Instruments Measuring Dyspnea (PDF)
- Dyspnea Flowchart (PDF)
- Modified Borg Scale (PDF)
Implement Strategies to Evidence-based Terminal Ventilator Withdrawal
Improve Patient Outcomes

1. Download the Implementation Tools.
   Find them on the Evidence-based Terminal Ventilator Withdrawal webinar information page at www.aacn.org/webinars

2. Discuss the tools and recommended practices with your colleagues

3. Implement practices that are suitable for your unit