Weaning

Critical Care Monitoring

Weaning

Definitions

• Disconnection (Discontinuation)
  • Implies patient no longer needs that form of therapy
  • 80% of patients requiring temporary MVS do not require weaning

Definitions

• Weaning
  • Implies some need for MVS still exists
  • Gradual process began after there is evidence that the problem leading to MVS need has been resolved
Guidelines

• DC or wean begun when underlying disease process improved or reversed
• Requires evaluation of patient’s cardiopulmonary reserves & stability

Guidelines

• Short-term MVS - DC’d quickly & simply
• Long-term - longer weaning process
• Both groups must meet same criteria

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Acceptable Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness</td>
<td>Awake &amp; alert</td>
</tr>
<tr>
<td>Drive to breathe</td>
<td>Present, normal</td>
</tr>
<tr>
<td>CP stability</td>
<td>BP, HR, temp, U.O. normal</td>
</tr>
<tr>
<td>Airway secretions</td>
<td>Normal amt &amp; quality</td>
</tr>
<tr>
<td>Deadspace</td>
<td>V̇/VT &lt; 0.6</td>
</tr>
<tr>
<td>Shunt</td>
<td>Q̇v̇Q̇a &lt; 30%</td>
</tr>
<tr>
<td>RSBI (RR/VT)</td>
<td>&lt; 100</td>
</tr>
</tbody>
</table>
## Weaning

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Acceptable Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC</td>
<td>&gt; 15 ml/kg or 1.5-2 x VT</td>
</tr>
<tr>
<td>NIP</td>
<td>&gt; -25 cmH₂O</td>
</tr>
<tr>
<td>RR</td>
<td>8 - 30/min</td>
</tr>
<tr>
<td>VT</td>
<td>&lt; 10 lpm &amp; can x 2</td>
</tr>
<tr>
<td>VT₂</td>
<td>3 x BWK (5-7 ml/kg)</td>
</tr>
<tr>
<td>ABGs</td>
<td>Normal for patient</td>
</tr>
<tr>
<td>AaDO₂</td>
<td>&lt; 300-350 mmHg</td>
</tr>
</tbody>
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### TP Weaning

- Removing vent on a predetermined time schedule
- Patient preparation
  - Explain
  - Some SOB is expected
  - Vent will be reconnected whenever patient desires

### TP Weaning

- Equipment preparation
  - TP
    - Heated nebulizer
    - Large-bore tubing
    - Temp probe
    - CPAP
TP Weaning

- Patient kept on rate until:
  - Equipment ready
  - Patient ready
  - Patient suctioned
  - EKG monitor on
  - Patient sitting up 45°

- DC rate 5-10 min initially, then gradually increasing time
- Watch for:
  - Dyspnea
  - Fatigue
  - Pain
  - Anxiety
  - Sweating
  - Pallor
  - Cyanosis
  - Drowsiness
  - Restlessness
  - Use of accessory muscles

- Return to vent if:
Weaning

TP Weaning

- Off vent 15-20 min - - ABGs
- Off vent 60 min. - - can increase time off vent more rapidly
- Avoid TP weaning @ noc
- Rate depends on time on vent
- ETCO₂ & SpO₂ helpful

SIMV Weaning

- Done same way as TP weaning:
  - Initial problem resolved
  - Stable condition
  - Breathing spontaneously
  - Meet weaning criteria

SIMV Weaning

- May still need PEEP does not preclude weaning
- Technique:
  - SIMV rate progressively ↓ as patient assumes more of WOB
  - Use PS! On spontaneous breaths
SIMV Weaning

• Rate ↓ depends on time on vent & patient condition
• Decrease rate until SIMV 4 → PS alone →

SIMV Weaning

• Precautions when SIMV weaning:
  • Rate decreased too fast
  • Demand valve system - may require patient to use ↑ effort to activate flow

What Way Is Best?

• Depends on patient
• If 1 doesn’t work - go slower or try another method
• DO NOT ↓ AC rate
Most Successful Weaning Technique?

Weaning the COPD Patient

- Vent support is difficult
- High mortality rate
- High rate of vent dependence

Why?

- Fluctuations in BP
- CHF
- Cachetic
- Blebs rupture easily with PPV
- Resp or met alkalosis
- Malnutrition
Weaning

Why?

- Sedation
- Loss of functional lung tissue (disease & infections)
- Weakened & atrophied respiratory muscles
- Psychological dependence

Remember!

- Ventilate patient to ABGs normal for him
- Example: COPD patient
  - pH 7.40
  - PaCO₂ 40 mmHg
  - HCO₃⁻ 25 mEq/l

- Take him off vent
- PaCO₂ starts to rise
- Physiologic response - increase $V_E$
- Can COPD patient do that?
- Put back on vent - labeled a "weaning problem?"
Nutrition & Weaning

• New studies - inadequate nutrition is 1 of the major causes of respiratory muscle dysfunction

Nutrition & Weaning

• However - overfeeding esp. with carbohydrates

Nutrition & Weaning

• What to feed?
Ventilator Dependence

- Chronic conditions
  - Neuromuscular disease (polio, muscular dystrophy, MS, GBS)
  - Loss of central drive to breathe
  - Phrenic nerve damage, paralysis
- Cervical Fx

Ventilators

- Negative pressure still used
- Positive pressure vents
  - Portable, battery-powered
- Ventilation assist devices
  - Rocking beds, pneumobelts, phrenic nerve pacers

Knowledge of:

- Ventilator
- Manual ventilation
- Physical therapy
- Airway care
- Nutrition
Weaning

After Extubation

- Cool aerosol
- $F_O_2$ same - +10% as on vent
- ABGs 15 - 20 min.
- Consider IS, bronchodilators, CPT

Knowledge of:

- Psychological support
- Adequate electrical power
- Emergency back-up
- Available phone service