Care of a cardiac pt on mechanical ventilation

CVICU New Hires Orientation Day 2

Winnie Yung, RN, MN
Outline

• Physiology of breathing
• Terminology
• Intubation
• Mode of mechanical ventilation
• Nursing care of a vented pt
• Nursing care of a vented single ventricule pt
• Extubation
Normal Respiration: Terminology

1. Compliance: lung “stiffness”
2. Resistance: inspiratory or expiratory
3. Tidal volume: volume of air inspired in 1 normal breath
Physiology of breathing
Ventilation: Terminology

1. IMV: set respiratory rate
2. PIP: Peak inspiratory pressure
3. PEEP: Positive end-expiratory pressure
4. PS: Pressure support = Mean airway pressure
5. $V_T$: Tidal volume (6 – 10 mL/kg)
6. MV: Minute volume (RR $\times$ $V_T$)
7. i time: inspiratory time
8. FiO$_2$: Fraction of inspired oxygen conc
9. I:E : Inspiration to expiration time ratio (normal = 1:2)
Ventilation Mode

1. IMV: Intermittent mandatory ventilation (thought to be better for weaning; pt maintains use of resp muscle)

2. SIMV: Synchronized intermittent mandatory ventilation (no superimposed breathe)

3. No back up rate (sprinting): PSV, CPAP
Ventilator sub-mode

1. Pressure support or pressure control

2. Volume support or volume control

3. PRVC (SIMV): pressure regulated volume control (dual control mode)
Factors affecting a breathe

1. Pressure
2. Volume
3. Rate
4. Time
5. Synchronized or not
## Volume vs Pressure

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<thead>
<tr>
<th></th>
<th>Volume control</th>
<th>Pressure control</th>
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<tr>
<td><strong>Cycle</strong></td>
<td>Vol</td>
<td>Time or flow</td>
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<tr>
<td><strong>Trigger</strong></td>
<td>Child and machine</td>
<td>Child and machine</td>
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<tr>
<td><strong>Limit</strong></td>
<td>Flow</td>
<td>Pressure</td>
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<tr>
<td><strong>$V_T$</strong></td>
<td>Constant</td>
<td>Variable</td>
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<tr>
<td><strong>Peak pressure</strong></td>
<td>Variable</td>
<td>Constant</td>
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<tr>
<td><strong>Advantages</strong></td>
<td>Constant $V_T$</td>
<td>Avoids excessive PIP</td>
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<td><strong>Disadvantages</strong></td>
<td>Risk of barotrauma</td>
<td>Variable $V_T$ risks atelectasis</td>
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<td>Ventilator setting changes</td>
<td>Typical effects on blood gases</td>
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<td>↑ PIP</td>
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<tr>
<td>↑ PEEP</td>
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<tr>
<td>↑ Rate (IMV)</td>
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<td>Min.↑</td>
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<tr>
<td>↑ I:E ratio</td>
<td>No change</td>
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<tr>
<td>↑ Fio₂</td>
<td>No change</td>
<td>↑</td>
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<tr>
<td>↑ Flow</td>
<td>Min. ↓</td>
<td>Min.↑</td>
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<tr>
<td>↑ Power (in HFOV)</td>
<td>↓</td>
<td>No change</td>
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<tr>
<td>↑ MAP (in HFOV)</td>
<td>Min. ↓</td>
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Indications for intubation

- Work of breathing
- Upper airway obstruction
- Actual or potential decrease in airway protection
- Hypoxemia despite max non invasive O$_2$ supplement
- Inadequate ventilation
Equipment & sequence for intubation

1. CR monitor with QRS tone audible
2. O₂ sat
3. Bag, mask, and O₂ source
4. Suction
5. Meds: paralyzing agent, sedative, and atropine
6. ETT
7. Laryngoscope blade and handle
8. Stylet
9. Ventilator
10. Tape, water-soluble lubricant, and benzoin
11. NG tube
12. CXR
13. ABG
- Frequent Oral Care
- HOB 30°
- Avoid condensation in circuit back wash into pt
Indications for suction

• secretion in ETT
• Chest auscultation
• $V_T$ (if not volume controlled)
• PIP (if not pressure controlled)
• Desaturation (not definitive esp with cardiac population)
• Extreme caution with: fresh post op, single ventricle, or hemodynamically unstable
• HFOV & iNO: MUST suction with RT
Retaping ETT

2 man job: 1 RT + 1 RN
or
2 RT

No exception!
Extubation

Long term vented pt: sprinting

Is your pt ready?
• Minimal support on vent
• ABG
• Cough, gag reflex intact
• LOC / drive to breath consistently
• Held sedative / morphine infusion and prn
• Little secretion
• Secretion thin and clear/white
• No anticipated status change
Extubation

- Right size mask
- Suction (ETT and oral)
- Extubating to nCPAP or Hiflow?
- Sit pt up / HOB 45°
- Informed family and pt (if appropriate)
- Prep family: there is always a chance of reintubation (not a sign of deterioration!)
- Auscultate lungs
- ABG
NCPAP

HIGH RISK FOR: PRESSURE ULCER

• Inspect septum Q shift
• NS drops and suction nares
• Avoid torque with tubing
• Inspect skin where there is pressure