Non-Invasive Positive Pressure Ventilation in acute respiratory failure

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What’s that?

And why do we use it?
Who should get it?

Patient Selection

- Emergent intubation not necessary
- No contraindications
- Has a condition that may respond
  - COPD Exacerbations with respiratory acidosis
  - Cardiogenic pulmonary edema
  - Some types of acute hypoxemic respiratory failure
  - Hypoventilation syndromes
Who should get it?
Patient Selection

**Ideal Patients**
- Younger
- Lower acuity of illness
- Cooperative (good neuro status)
- Good mask fit (less air leak, intact dentition)
- $92\text{mmHg} > \text{PaCO}_2 > 45\text{mmHg}$
- $7.35 > \text{pH} > 7.10$
- Improvements in first 2 hours

**Contraindications**
- Emergent intubation
- Cardiopulmonary arrest
- Uncooperative, unable to protect airway or clear secretions
- GCS<8
- Facial surgery or deformity
- High aspiration risk
- Prolonged duration of mechanical ventilation anticipated
- Non-respiratory organ failure
- Recent esophageal anastomosis
How well does it work?

Efficacy

- **In severe COPD exacerbations:**
  - Reduces WOB
  - Mortality benefit (ARR 10%)
  - Intubation (ARR 28%)
  - Reduced LOS, reduced treatment failure (ARR 20%)

- **In pulmonary edema:**
  - Mortality benefit (RR 0.66)
  - Decreased need for intubation (RR 0.45)

- **In hypoxemic respiratory failure:**
  - Mixed data 2/2 heterogeneous causes

- **Worth a shot: asthma, post-extubation**

Peter JV, Lancet. 2006;367(9517):1155.
Where do we begin?

Initiation

• Pick a mask
• Humidify!
• Pick a setting
  – Same as invasive ventilation
  – Bilevel: BPAP vs. BiPAP vs. BIPAP
• Set the pressure...
Where do we begin?

Initiation

• Start low in spontaneous triggered mode with a back-up rate
  – IPAP 8-12cmH20
  – EPAP 3-5cmH20

• Gradually increase IPAP to achieve goal while maintaining synchrony
  – Alleviation of dyspnea
  – Decreased RR
  – Increased TV

• Add oxygen through circuit to keep O2 Sat > 90%
Potential Harms

• Mask complications
  – Skin irritation
  – Oculosinus irritation (use face mask or lower IPAP)
• Gastric distention
• PPV-related (barotrauma, hemodynamic instability) less common
• ? MI
Clinical Scenario 1

78 yo female w/ GOLD 4 COPD arrives on the floor from ED with a severe COPD exacerbation. Her ABG is 7.24/76/64/28. She had been started on BPAP prior to transport upstairs. On arrival, the machine is alarming and the patient appears uncomfortable and dysnchronous, and is getting variable TV.

• What might be happening?
  – Mask Leak
  – Increases time to achieve pressure target, prolonging inspiration

• How do you check?
  – Run your hand around the mask, and feel for a leak
  – Some machines actually list % leak on the interface

• How do you fix it?
  – Tighten mask, use dentures, change to full face mask
Clinical Scenario (cont.)

• You fix the mask leak and the patient is much more comfortable. O2 Saturation is 96% and RR 12. You check an ABG after 60 minutes and it is unchanged with persistent primary respiratory acidosis.

• The respiratory therapist asks what you want to do next?
  – Increase IPAP:EPAP to allow for larger TV (Increased MV)
References


