Non-invasive ventilation in pre-hospital emergency medicine

Advantages
- Reduced need for sedation
- Improved mucociliary clearance
- Reduced intubation rate
- Reduced rate of nosocomial infections

Recommend treatment (level A) for COPD & cardiopulmonary edema

Indications
- Acute hypoxemic respiratory failure
- Oxygenation failure due to intrapulmonary shunt, e.g., pneumonia
- Acute hypercapnic respiratory failure
- Respiratory failure with ventilatory insufficiency, e.g., decompensated COPD

How to use
Start with: 100%
- FIO₂ 1,0 – reduce if needed, target: SPO₂ above 90%
- CPAP / PEEP ± 5 mbar
- Trigger as low as possible
- Pressure support +20 mbar (+ 5 PEEP + 15 PS = 20 mbar inspiratory pressure)
- Observe patient’s comfort level – Hold the mask initially, adjust once well adapted

Objective:
- Respiration rate < 35/min
- Tidal volume > 3 ml/kg ideal body weight
- Decreased use of respiratory muscles

Success criteria
- Improved oxygenation
- SPO₂ > 90%
- Improvement of ventilatory status
- Decrease in respiratory and heart rate
- Decrease in respiratory rate ≥ 20%
- Less use of accessory muscles
- Improved alveolar ventilation
- Improved eCO₂ (decreased CO₂)
- Elimination

Improved in the patient’s level of consciousness

Cut-off criteria
Re-evaluate treatment if symptoms are observed
- Insufficient improvement
- Advanced deterioration of consciousness
- Extreme agitation
- Uncontrollable apnoeic or hypoxic episodes
- Regurgitation

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Contraindications
- Apnea or cardiac arrest
- Hypoxemic instability
- Acute life-threatening hypoxia
- Severe agitation
- Gonna or uncontrollable confusion (unrelated to hypoxia)
- Increased risk of regurgitation or aspiration
- Acute or imminent airway obstruction

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How to use
1. CPAP 5 mbar
   If comfortable:
   Incrementally increase PS by 5 mbar to max. +20 mbar
   When no improvement after 5 minutes:
   BIPAP* I:E=1:1, Frequency=20
   - lower pressure level similar to CPAP / PEEP
   - determine upper pressure level as in step 2
   Maintain setting at comfort level
   If uncomfortable:
   Reduce PS by 5

2. CPAP-ASB
   PS +5 mbar
   If comfortable:
   Incrementally increase PS by 5 mbar to max. +20 mbar
   When no improvement after 5 minutes:
   BIPAP* I:E=1:1, Frequency=20
   - lower pressure level similar to CPAP / PEEP
   - determine upper pressure level as in step 2
   Maintain setting at comfort level
   If uncomfortable:
   Reduce PS by 5

3. Summary
   - NIV: 0 – 10 mbar
   - CPAP: 5 – 15 mbar
   - Pressure support: 0 – 20 mbar
   - AutoFlow®

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