CPAP and BiPAP

“A CPAP a day helps keep the ET tube away!”

Thanks to former state medical director Keith Wesley for stolen info…..
Definitions

NPPV = Noninvasive Positive Pressure Ventilation

CPAP = Continuous Positive Airway Pressure

BiPAP = BiPhasic or BiLevel Positive Airway Pressure
CPAP vs. Intubation

CPAP
- Non-invasive
- Easily discontinued
- Easily adjusted
- Use by EMS levels down to EMT-Basic
- Minimal complications
- Does not require sedation
- Comfortable

Intubation
- Invasive
- Intubated stays intubated
- Requires highly trained personnel
- Significant complications
- Can require sedation or RSI
- Potential for infection
The Problem

- Congestive Heart Failure
  - Incidence 10 per 1000 patient (over age 65) transports
  - 25% of Medicare Admissions
  - Average LOS is 6.7 days
  - 6.5 million hospital days
  - Those who get intubated have significantly longer LOS
  - 33% get intubated without non-invasive pressure support
  - Intubated patients have 4 times the mortality of non-intubated patients
The Problem

- CHF/Pulmonary Edema
  - Interstitial fluid interferes with gas exchange (ventilation and oxygenation)
  - Increased myocardial workload resulting in higher oxygen demands (many of these patients are suffering ischemic heart disease)
  - Traditional therapies designed to reduce pre-load and after-load as well as remove interstitial fluid
The Problem

- COPD/Asthma
  - Increased work of breathing
  - Hypercarbic (ventilation issue)
  - Traditional therapies involve brochodilators which require adequate ventilation
  - Higher mortality rate if intubated
  - Difficult to wean once intubated
  - Extremely difficult patient to intubate in the pre-hospital arena – usually requires RSI
Physiology of CPAP

- Airway pressure maintained at set level throughout inspiration and expiration
- Maintains patency of small airways and alveoli
- Improves gas exchange
- Improves delivery of bronchodilators
- Moves extracellular fluid into vasculature
- Reduces work of breathing
Supporting Literature

- JAMA December 28, 2005
  “Noninvasive Ventilation in Acute Cardiogenic Edema”, Massip et al.
  - Meta-analysis of studies with good to excellent data
  - 45% reduction in mortality
  - 60% reduction in need to intubate
Pre-hospital CPAP

- 19 patients
- Mean duration of therapy 15.5 minutes
- Oxygen sat. rose from 83.3% to 95.4%
- None were intubated in the field
- 2 intubated in the ED
- 5 subsequently intubated in hospital
- “Pre-hospital CPAP is feasible and may avert the need for intubation”
Adult Respiratory Distress Protocol
(Age greater than 12)

Routine Medical Assessment

Oxygen
2 LPM via Nasal Cannula
Titrate to maintain Pulse ox of >92%

Is Patient a candidate for Mask CPAP?
-Respiratory Rate > 25 / min
-Retractions or accessory muscle use
-Pulse ox < 94% at any time

See Mask CPAP Protocol

Is the Patient wheezing and/or does the Patient have a history of Asthma/COPD?

Administer Albuterol / Atrovent by Nebulizer

Does the Patient have rales and/or does the Patient have a history of congestive heart failure (CHF)?

If Basic IV Tech:
Administer 1 spray sublingual NTG every 5 minutes as long as systolic BP is greater than 100mmHg

Contact Medical Control
Consider ALS Intercept and Transport
Asses Patient, record vital signs and pulse ox before applying oxygen

Does the Patient meet two or more Inclusion Criteria?

No

Yes

Does the Patient meet any Exclusion Criteria?

No

Yes

Continue standard BLS Respiratory Distress Protocol

Administer CPAP 5 cm H2O of pressure AND

Reassess patient, vital signs, and respiratory distress scale every 5 min.

Patient condition is stable or improving

Continue CPAP Reassess patient every 5 minutes

Notify Medical Control Consider ALS Intercept and continue BLS Respiratory Distress Protocol

Patient condition is deteriorating Decreasing LOC Decreasing Pulse Ox

Notify Medical Control

Remove CPAP Apply BVM Ventilation

Complete CPAP Data Form and submit to service Medical Director for each patient placed on CPAP
Wisconsin EMT-Basic Experience

Results (preliminary – study completed 11/05)

- 500 applications of CPAP (114 services)
- 99% met criteria for CPAP on review of medical director
- No field intubations by those services with ALS intercepts
- No significant complications
- All oxygen sats. improved, dyspnea reduced by average of 50%
Indications for CPAP

- CHF
- Pulmonary Edema
  - Near Drowning
  - Inhalation Exposure
- COPD
- Asthma
- Pneumonia
Contraindications to CPAP

- Unconscious or altered LOC
- Upper airway trauma
- Hypotension
- Pneumothorax
- Apneic
- Serious dysrhythmias
- Nausea, vomiting, GI bleeding issues
Equipment