Jackson Hole Fire/EMS Operations Manual

Approved by: _____
Will Smith, Medical Director

Approved by: _____
Willy Watsabaugh, Chief

Title: **Procedure Guidelines: NASAL CANNULA CAPNOGRPAHY**
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NASAL CANNULA CAPNOGRPAHY
APPLICATIONS FOR SPONTANEOUSLY BREATHING PATIENTS
(Procedure Guideline)

SCOPE OF PRACTICE

All AEMTs and Paramedics shall operate within their authorized Scope of Practice as limited to those skills and medication approved for use by the Physician Medical Director and Physician Task Force on Pre-Hospital Care as approved and authorized by the Wyoming Board of Medicine.

SCOPE OF PRACTICE: Advanced EMTs and Paramedics

NO VOICE ORDER REQUIRED

INDICATIONS:

Nasal cannula capnography (NCC) answers need for noninvasive measurement of partial pressure of carbon dioxide (CO_2) in exhaled breath. Capnography represents CO_2 concentration over time relationship as CO_2 waveform. NCC placement should not to interfere with dealing with primary life threats or other primary treatment strategies.

In spontaneously breathing, nonintubated patients NCC can be used for:

- performing rapid assessment of critically ill or seizing patients
- determining response to treatment in acute respiratory distress
- determining adequacy of ventilation in obtunded or unconscious patients
- providing indicator for acid-base disorders
- providing additional data for patients with sepsis or septic shock
- providing low flow oxygen therapy

CONTRAINDICATIONS:

NCC therapy may be contraindicated for:
- Patients with nasal blockage
- Patients with facial injuries precluding the use of a cannula

- Patients who will not tolerate placement of nasal cannula

PROCEDURE:

1. Assemble $EtCO_2$ Sampling Nasal Cannula, O_2 source, Zoll X series cardiac monitor.
2. Attach $EtCO_2$ Sampling Nasal Cannula to O_2 source and set to desired flow rate.
3. Place $EtCO_2$ Sampling Nasal Cannula on patient
4. Attach sampling tube to cardiac monitor CO_2 intake and activate sampling mode by pressing Zoll X series monitor's CO_2 quick access key.
    a. **Please note**: The Zoll X series has a typical system response time of 2.9 seconds before capnographic waveforms will present with rated accuracy.
5. Note reading and waveform(s).
6. Document procedure, numeric values and attach file to electronic patient care report.
7. Monitor patient's O_2 saturation, breath sounds, chest wall movement, respiratory rate, and capnography.

GUIDELINES:

NCC can be used to assess a wide range of patients. Capnography provides reliable readings in low perfusion states.

- **NCC can be used with actively seizing patients** and is not confounded by muscle activity or movement artifact. Providers can use capnographic data to distinguish among seizing patients who are apneic, ineffectively ventilated, or effectively ventilated.

- **NCC allows providers dynamic real-time monitoring of ventilatory status in patients with acute respiratory distress** from any cause, including: bronchiolitis, croup, asthma, cystic fibrosis, heart failure, and chronic obstructive pulmonary disease.
    a. Increasing $EtCO_2$ indicates worsening ventilatory status despite treatment
    b. Stable or improving $EtCO_2$ indicates effective treatment

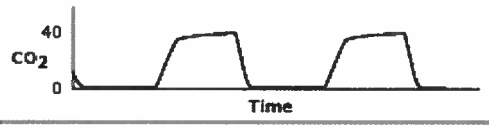
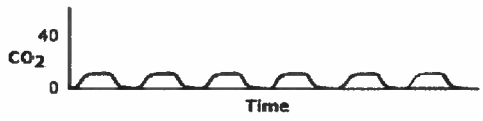
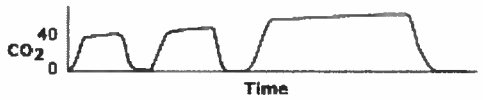
- **NCC helps differentiate between obtunded or unconscious patients with effective ventilation and those with ineffective ventilation**. Conditions that may impair ventilator function alcohol intoxication, intentional or unintentional drug overdose, and postictal conditions (especially those complicated by benzodiazepine administration).

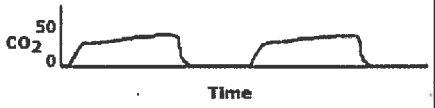
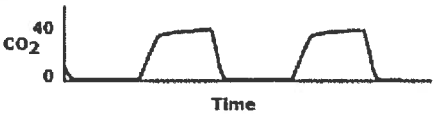
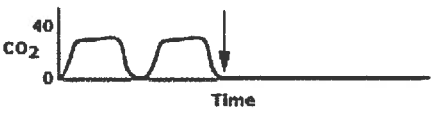
- **NCC provides data for acid-base disturbances and can help guide treatment plan**.

- **NCC can provide another data-stream for recognizing septic patients.** In addition to standard sepsis alert criteria (e.g. high-risk patients with known/suspected infection, temperature < 36°C or > 38°C, increased pulse and respiratory rate in combination with systolic BP < 90 mm/Hg), patients may present with decreased $ETCO_2$ levels.[1]

[1] Hunter CL, Silvestri S, Dean M, et al. "End-tidal carbon dioxide is associated with mortality and lactate in patients with suspected sepsis." Am J Emerg Med 2013; 31:64.

Common Waveforms and Associated Ventilatory Features

Diagnosis	Waveform	Features	
Normal		SpO_2 $EtCO_2$ Waveform RR	Normal Normal Normal Normal
Hyper-ventilation		SpO_2 $EtCO_2$ Waveform RR	Normal ↓ Decreased amplitude and width ↑
Bradypneic Hypo-ventilation (Type 1)		SpO_2 $EtCO_2$ Waveform RR	Normal ↑ Increased amplitude and width ↓↓↓
		SpO_2 $EtCO_2$ Waveform RR	↓ ↑ Increased amplitude and width ↓↓↓
Hypopneic Hypo-ventilation (Type 2)		SpO_2 $EtCO_2$ Waveform RR	Normal ↓ Decreased amplitude ↓
		SpO_2 $EtCO_2$ Waveform RR	↓ ↓ Decreased amplitude ↓
Hypopneic Hypo-ventilation with periodic breathing		SpO_2 $EtCO_2$ Waveform RR Other	Normal or ↓ ↓ Decreased amplitude ↓ Apneic pauses

Diagnosis	Waveform	Features
Physio-logical variability		SpO_2 Normal $EtCO_2$ Normal Waveform Varying* RR Normal
Broncho-spasm		SpO_2 Normal or ↓ $EtCO_2$ Normal, ↑, or ↓• Waveform Curved RR Normal, ↑, or ↓• Other Wheezing
Partial airway obstruction Partial laryngo-spasm		SpO_2 Normal or ↓ $EtCO_2$ Normal Waveform Normal RR Variable Other Noisy breathing and/or inspiratory stridor
Apnea Complete airway obstruction Complete laryngo-spasm		SpO_2 Normal or ↓Δ $EtCO_2$ Zero Waveform Absent RR Zero Other No chest wall movement or breath sounds SpO_2 Normal or ↓Δ $EtCO_2$ Zero Waveform Absent RR Zero Other No chest wall movement or breath sounds