POLICY

Colorimetric CO₂ detectors will be used for all intubations

- The Registered Respiratory Therapists (RRT) will ensure a colorimetric CO₂ detector is available for each delivery along with supplies for stabilization of the Endotracheal Tube (ETT).
- Colorimetric CO₂ detectors will be stocked in each NICU intubation cart for use at intubations. (Four carts are kept in the NICU with one cart in each of the following areas: Room 41, Room 42, Rooms 44 - 46 and the South).
- Can be used with ventilated patients when patency of the ETT is in question.

Indications for Use:

1. To assist in confirmation of endotracheal tube placement in both the Delivery Suite and the NICU.

Colorimetric CO₂ detectors provide a semi-quantitative visualization of carbon dioxide in a patient’s airway. They are to be used as an adjacent to clinical patient assessment to confirm a tracheal intubation. These clinical assessments currently include but are not limited to:

- Direct visualization of the ETT passing through the vocal chords
- Auscultation of the patient’s chest for equal, bilateral breath sounds
- Auscultation over the stomach to rule out esophageal intubation
- Improvement the patient’s heart rate and SpO₂ with ventilation.

Colorimetric CO₂ detectors visually indicate the presence of exhaled carbon dioxide. They are designed to connect between an endotracheal tube and a resuscitation bag to aid in the verification of proper ETT placement upon intubation. Exhaled gases pass through the chemically treated, pH sensitive paper changing its colour from purple to yellow in a semi-quantitative measure of % ETCO₂. The colour change is rapid, reversible on inspiration and reoccurs with each cycle of inspiration and expiration.

The 2005 NRP Guidelines endorse the use of colorimetric CO₂ detectors as an adjunct to an increasing heart rate as the primary methods of confirming ETT placement.

Limitations of End-Tidal (ET)CO₂ Detectors:

There are several limitations to the use of colorimetric ETCO₂ detectors in neonates.

Colorimetric CO₂ detectors cannot detect hypocarbia or hypercarbia, right mainstem intubation or oropharyngeal intubation. CO₂ is a product of cellular metabolism and is removed through the circulation and the lungs. Therefore, colorimetric ETCO₂ reflects ventilation, metabolism and perfusion.

Please refer to the table below for a list of possible causes for false negative and false positive results and to Appendix A for an algorithm of management if no colorimetric ETCO₂ colour change is observed.

PROCEDURE

Gather Equipment

One Colorimetric End-tidal CO₂ detector

1. Remove the CO₂ Detector from the packaging
2. Check the detector by comparing its color with the reference scale on the face of the detector. A detector is defective if the color of the indicator does not match the blue colour of the label, or if it is lighter than the colour of the label. A defective detector must be discarded.
3. After intubation, connect the CO₂ Detector between the Jackson-Reese (JR) bag and ETT connector.
4. Deliver 6 breaths of normal tidal volume to the infant and then compare the colour change of the indicator to the reference label. During use, the detector will repeatedly change colour in phase with respirations.

5. When finished with the device, discard

ETCO₂ Detectors: Possible causes of false negative and positive results in Neonates

<table>
<thead>
<tr>
<th>False Negative</th>
<th>False Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cardiopulmonary arrest</td>
<td>• Contamination with gastric contents, adrenaline, surfactant, atropine or other drugs</td>
</tr>
<tr>
<td>• Severe Airway Obstruction: blood, secretions, meconium</td>
<td>• Right mainstem intubation</td>
</tr>
<tr>
<td>• Hypocarbia</td>
<td>• Humidity (decreases life span of detector)</td>
</tr>
<tr>
<td>• Cardiac anomalies with reduced pulmonary blood flow</td>
<td></td>
</tr>
<tr>
<td>• Severe myocardial dysfunction, asphyxia</td>
<td></td>
</tr>
<tr>
<td>• Adult ETCO₂ detector (++deadspace)</td>
<td></td>
</tr>
<tr>
<td>• VA ECMO</td>
<td></td>
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<tr>
<td>• Less than 1000 grams</td>
<td></td>
</tr>
</tbody>
</table>

DOCUMENTATION

Nursing Flowsheet
Respiratory Therapy Notes
Resuscitation Record

REFERENCES


APPENDIX

Management if no colorimetric ETCO₂ Colour Change is Observed

Appendix A