The Hierarchy of Evidence

The Hierarchy of evidence is based on summaries from the National Health and Medical Research Council (2009), the Oxford Centre for Evidence-based Medicine Levels of Evidence (2011) and Melynyk and Fineout-Overholt (2011).

I Evidence obtained from a systematic review of all relevant randomised control trials.

II Evidence obtained from at least one well designed randomised control trial.

III Evidence obtained from well-designed controlled trials without randomisation.

IV Evidence obtained from well designed cohort studies, case control studies, interrupted time series with a control group, historically controlled studies, interrupted time series without a control group or with case-series

V Evidence obtained from systematic reviews of descriptive and qualitative studies

VI Evidence obtained from single descriptive and qualitative studies

VII Expert opinion from clinicians, authorities and/or reports of expert committees or based on physiology


<table>
<thead>
<tr>
<th>Reference (include title, author, journal title, year of publication, volume and issue, pages)</th>
<th>Evidence level (I-VII)</th>
<th>Key findings, outcomes or recommendations</th>
</tr>
</thead>
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| Kumar, P., Denson, S.E., Mancuso, T.J. and Committee on Fetus and Newborn, Section on Anesthesiology and Pain Medicine, (2010) Pediatrics; 125(3); 608-616. [http://pediatrics.aappublications.org/content/125/3/608.full.html](http://pediatrics.aappublications.org/content/125/3/608.full.html) | II | • Several trails have demonstrated that premedication prior to intubation in newborns (term and preterm) improves intubating conditions (defined as good jaw relaxation, open and immobile vocal cords, suppression of pharyngeal and laryngeal reflexes), decreases the time and number of intubation attempts and minimises the potential for intubation-related airway trauma.  
• Premedication should be used for all non-emergent endotracheal intubations in newborns. Mediations with rapid onset and short duration are preferable. |
| Nemergut, M.E., Yaster, M., Colby, C.E. (2013) Sedation and analgesia to facilitate mechanical ventilation, 40; 539-558 | II | • Intubation and mechanical ventilation are associated with physiologic changes consistent with pain and stress.  
• Recommendations: Sedatives and analgesics be utilized prior to elective intubation to mollify the stress response in newborns and improve intubation conditions. |
| Barrington, K. (2011), Premedication for endotracheal intubation in the newborn infant. *Paediatric Child Health* 16(3): 159-164. | II | - Premedication reduces the adverse physiological responses of bradycardia, systemic hypertension, intracranial hypertension and hypoxia, as well as decreasing the pain and discomfort associated with the procedure.  
- An optimal protocol for premedication for elective endotracheal intubation includes administration of a vagolytic agent, a rapid-acting analgesic and a short-duration muscle relaxant. |
| Schmölzer GM, Roehr CC. Techniques to ascertain correct endotracheal tube placement in neonates. *Cochrane Database of Systematic Reviews* 2014, Issue 9. Art. No.: CD010221. DOI: 10.1002/14651858.CD010221.pub2. | VI | - There were no randomized or quasi-randomised controlled trials found in this review that addressed the variety of techniques currently in use to confirm correct tracheal tube placement.  
- The gold standard test to confirm ETT position is chest radiography.  
- Additional use of clinical signs, respiratory function monitors or exhaled CO$_2$ detectors to assess correct ETT placement is based on evidence from observational studies and case reports. |
| Neoresus: The Victorian Newborn Resusitation Project Learning Resources (May 2020) Endotracheal Intubation: [https://www.neoresus.org.au/learning-resources/key-concepts/advanced-interventions/endotracheal-intubation/](https://www.neoresus.org.au/learning-resources/key-concepts/advanced-interventions/endotracheal-intubation/) | II | - Chest X-ray is the gold standard for verifying ET Tube placement, although a pedicap will confirm placement in trachea (as opposed to the oesophagus)
- Charts for ETT size and length and chart for estimating depth of oral and nasal ETT tube
- Other signs of successful intubation: misting in the ETT, symmetrical chest movement |
|---|---|---|
- 30% of infants dropped their BP by 20% or above after premed for elective intubation
- Premedication has been shown to:
  - Improve intubation conditions
  - Minimize pain/ traumatic injury
  - Decrease time to successful intubation
  - Decrease number of attempts
  - Improve physiological stability |
| Scott. D. N, Else. MD, Pete. G, Kovatsisi, MD, (April 2020) A Narrative of Oxygenation During Pediatric and Airway Procedures, Pediatric Anesthesiology Vol 130 (4) 831-840. | II | • Children have a high rate of oxygen consumption for body mass as compared to adults. They also have a tendency to alveolar collapse and reduction in functional residual capacity under anaesthesia.  
• The National Emergency Airway Registry for Neonates reported an incidence of 42% in non-difficult and 75% in difficult intubations.  
• Apneic oxygenation- technique to delay the onset of hypoxemia after cessation of ventilation.  
• Adequate pre-oxygenation minimizes the partial pressure of nitrogen in the alveoli thereby maximizing for movement of oxygen from the airspace into the blood.  
• THRIVE- Transnasal Humidified Rapid Insufflation Ventilatory Exchange. |
|---|---|---|
• Premed in both term and preterms facilitated procedures, reduced pain and stress and limited deterioration of vital parameters (such as heart rate, blood pressure oxygen saturation and intracranial pressure).  
• Morphine is not the drug of choice for this procedure due to its delayed onset of action compared with fentanyl.  
• Supports Fentanyl 2-5 mcg/kg combined with a muscle relaxant.  
• Atropine is useful for reducing bradycardias. (dosing 0.01-0.02 mg/kg) |

- Working with colleagues as a member of a coordinated team is an integral part of healthcare delivery in general and in neonatal resuscitation.
- Strategies that decrease cognitive and technical workload could lead to a reduction in resuscitation errors.
- Continuous display of data necessary to guide neonatal resuscitation as well as a combination of visual and auditory prompts.


- Process for intubation explained (prepare and check equipment, position infant in supine position, Aspirate NGT/OGT, maintain warmth)
- Suggests atropine, fentanyl and suxamethonium for neonatal intubation
- Suxamethonium should be given presence of significant hyperkalaemia.
- Suxamethonium se 1-3 mg/kg
- Fentanyl should be given as a slow push due to side effect of chest wall rigidity


- Cross-sectional survey of a sample of healthcare professional involved in neonatal intubations
- 207 responses and 85.5% completed
- 93% used premeds
- 91%- Mid trachea is the best position for ETT in a neonate
- 51%- T2-T3 was the ideal position of an ETT on x-ray
<table>
<thead>
<tr>
<th>Source</th>
<th>Level</th>
<th>Notes</th>
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<tr>
<td></td>
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<td>- Equipment required for intubation, including pictures</td>
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<tr>
<td></td>
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<td>- ETT size and length</td>
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<td>- Monitoring required during procedure</td>
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<tr>
<td></td>
<td></td>
<td>- Supports the use of atropine, fentanyl and suxamethonium as premed for intubation</td>
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<td>- Clinical signs of tracheal intubation</td>
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<td>- Equipment required</td>
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<td>- Verification of ETT in correct position (chest moves with each inflation, increase HR to above 100/min, improving o2 sats)</td>
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<td>- Procedure and team preparation. Role allocation and “walk through” plan.</td>
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<td>- Nasal vs oral intubation</td>
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<td>- ETT selection and depth/ size</td>
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