Neonatal airway management (NAM) and oxygenation are vital skills. Unrecognised oesophageal intubation is a common cause of endotracheal intubation (EI) failure and can result in mortality and significant morbidity. The Difficult Airway Society has algorithms for difficult airway management in adults and children including a ’cannot intubate and cannot ventilate’ (CICV) algorithm. There are no nationally agreed guidelines or algorithms for NAM. The aim of this study is to determine NAM practises in UK level 3 neonatal intensive care units.

Between May and June 2013, a telephone survey of NAM, airway adjuncts and the possession of written NAM policies was undertaken in all UK level 3 neonatal units using a predetermined questionnaire.

All 59 units participated. All units used premedication for elective intubations. Suxamethonium was the most commonly used muscle relaxant along with an analgesic for sedation. Overall, 66% used colour-change capnography for endotracheal tube (ETT) placement confirmation. In all, 34% used them at every intubation. A total of 32% only used capnography if there was uncertainty about ETT position (low oxygen saturations and heart rate); 34% of units did not use capnography. In all, 53% limited the number of intubation attempts; two attempts was the most common limit set. Overall, 51% used oropharyngeal airways routinely; 68% had an emergency difficult airway kit, the contents of which varied (table 1). In all, 7% had a documented CICV policy.

This is the first review of UK NAM practises. The variation shown has potential for mismanagement of the neonatal airway. Capnography is standard adult practice and recommended by The Royal College of Anaesthetists and The Difficult Airway Society for every EI. Overall, performance of neonatal EI is poor with success rates being as low as 21%. Capnography for the confirmation of intubation success in neonates should be standard practice. During cardiac arrest, if exhaled CO₂ is not detected, ETT position should be confirmed using direct laryngoscopy prior to commencing a new intubation attempt. Repeated laryngoscopies should be avoided as they can cause significant trauma to the airway.

Table 1 Neonatal airway management and adjuncts used

<table>
<thead>
<tr>
<th>Standard airway</th>
<th>Number of units (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of muscle relaxants for every intubation?</td>
<td>36 (61%)</td>
</tr>
<tr>
<td>No</td>
<td>23 (39%)</td>
</tr>
<tr>
<td>Reasons for non-routine use muscle relaxants?</td>
<td>23 (100%)</td>
</tr>
<tr>
<td>Elective intubation</td>
<td>42 (71%)</td>
</tr>
<tr>
<td>Type of muscle relaxant</td>
<td>10 (17%)</td>
</tr>
<tr>
<td>vecuronium</td>
<td>4 (7%)</td>
</tr>
<tr>
<td>atracurium or pancuronium</td>
<td>2 (3%)</td>
</tr>
<tr>
<td>Suxamethonium or pancuronium</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Type of sedation</td>
<td>48 (81%)</td>
</tr>
<tr>
<td>Analgesia (fentanyl or morphine)</td>
<td>6 (10%)</td>
</tr>
<tr>
<td>Propofol</td>
<td>5 (9%)</td>
</tr>
<tr>
<td>Limitation of intubation attempts</td>
<td>31 (53%)</td>
</tr>
<tr>
<td>Exact limit=2</td>
<td>30 (51%)</td>
</tr>
<tr>
<td>Exact limit=3</td>
<td>20 (34%)</td>
</tr>
<tr>
<td>Oropharyngeal airway use for airway management on neonatal intensive care unit</td>
<td>39 (66%)</td>
</tr>
<tr>
<td>Colour-change ETCO₂, for ETT placement confirmation</td>
<td>19 (32%)</td>
</tr>
<tr>
<td>Routine use of colour-change ETCO₂</td>
<td>20 (34%)</td>
</tr>
<tr>
<td>Non-routine use of colour-change ETCO₂ (used if poor HR/SpO₂, postintubation or lack of confidence in ETT position)</td>
<td>1 (2%)</td>
</tr>
</tbody>
</table>

Difficult airway

| Use of LMA if in CICV scenario | 9 (15%) |

CICV, cannot intubate and cannot ventilate; ETCO₂, End tidal carbon dioxide; LMA, laryngeal mask airway; SaO₂, oxygen saturations.

Human factors such as stress, poor communication, leadership, team working or inadequacy of equipment can all contribute to a poor outcome in a difficult airway situation. To prevent this, standardisation of practice with evidence based or consensus guidelines is warranted via documented airway management algorithms (suggested CICV algorithm: figure 1) and to avoid the inequality between neonatal and adult and paediatric airway management practises.

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Cannot intubate cannot ventilate (CICV) algorithm in an unconscious neonate

Failed intubation, inadequate ventilation

**CALL FOR HELP**

**Step A: optimise ventilation**
- Airway to be managed by most experienced personnel present
- Give 100% oxygen
- Continue facemask IPPV using two person technique
- Ensure no mechanical obstruction
- Optimise head position and chin life/jaw thrust
- Insert oropharyngeal airway or laryngeal mask airway
- Minimise gastric distension by insertion of orogastric tube and frequent aspiration

**Step B: prepare for rescue techniques**
- Obtain difficult airway kit
- If rocuronium or vecuronium used consider reversal of paralysis with sugammadex (16mg/kg)

**Step C: airway rescue techniques for CICV**
- To be carried out by ENT / anaesthetist
- CALL FOR HELP: ENT/Anaesthetist urgently
  - Prepare for:
    - Percutaneous cannula cricothyroidotomy
    - Surgical tracheostomy

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**Figure 1** Cannot intubate cannot ventilate algorithm in an unconscious neonate.

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Neonatal airway practices: a telephone survey of all UK level 3 neonatal units

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