Clinical Practice Procedures:
Airway management/Oral endotracheal tube insertion

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Clinical.Guidelines@ambulance.qld.gov.au

<table>
<thead>
<tr>
<th>Date</th>
<th>October, 2015</th>
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<tbody>
<tr>
<td>Purpose</td>
<td>To ensure a consistent procedural approach to Oral endotracheal tube insertion.</td>
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<tr>
<td>Scope</td>
<td>Applies to all QAS clinical staff.</td>
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<tr>
<td>Author</td>
<td>Clinical Quality &amp; Patient Safety Unit, QAS</td>
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<tr>
<td>Review date</td>
<td>October, 2017</td>
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Oral endotracheal intubation is an advanced airway procedure involving the insertion of an endotracheal tube under laryngoscopy into the trachea. Endotracheal tube (ETT) sizing is measured according to internal diameter (millimetres). Additionally, as a reference during intubation each ETT has a scale, in centimetres, for determining the distance along the ETT from the tip.

The QAS supplies three (3) designs of ETT:

- **Cuffed Parker Flex-tip™ ETT**[^1] (Adult) – specifically designed for use with an intubating catheter.
- **Paediatric Microcuff™ ETT**[^2,3,4] (Paediatric) – supplied without a Murphy eye.
- **Uncuffed Coviden Mallinckrodt™ ETT** (Neonates) – used for pre-term neonates, supplied with a single Murphy eye.[^5]

### Indications
- Actual loss of airway patency and/or airway protection

### Contraindications
- Conscious breathing patients

### Complications
- Unrecognised oesophageal intubation
- Malposition
- Aspiration
- Hypoxia
- Laryngospasm
- Oropharyngeal trauma
- Vagal stimulation

[^1]: Parker Medical
[^2]: Coviden Mallinckrodt
[^3]: Paediatric Microcuff
[^4]: Paediatric
[^5]: Neonates
**Procedure – Oral endotracheal tube insertion**

**Adult**

1. Assess the patients airway for predictors of difficulty.
2. Prepare all equipment to ensure rapid access if needed.
3. Establish and verbalise an intubation plan.
4. Test integrity of the cuff, pilot balloon and valve by confirming appropriate inflation/deflation prior to use.
5. Lubricate the external surface of the ETT’s flexible distal tip with water-soluble lubricant.
6. Elevate the patient’s head and place in the appropriate position to align the oral (OA), pharyngeal (PA) and laryngeal (LA) axes (neutral position with MILS if c-spine injury suspected).

7. Open mouth and inspect oral cavity.
8. Remove any dentures or removable plates from the mouth as required.
10. Suction as required.
11. Consider laryngeal manipulation to optimise visualisation of the larynx.

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**LEGEND:** oral axis (OA), pharyngeal axis (PA), laryngeal axis (LA)
11. Insert Frova intubating catheter.

12. Whilst maintaining visualisation of the larynx, request the airway assistant to place appropriately sized ETT over the intubating catheter.
   - **Male**: 8.0/9.0 mm
   - **Female**: 7.0/8.0 mm

13. Consider retraction of the corner of the patient’s mouth to optimise unobstructed passage of the ETT.

14. Gently insert the ETT’s flexible distal tip through the vocal cords to position the vocal cords between the two (2) ring markers. If resistance is encountered, gently rotate the ETT anti-clockwise and attempt re-insertion.
   - **Male**: 22–24 cm (at lips)
   - **Female**: 20–22 cm (at lips)

15. With right hand hold ETT firmly at the lips until correct placement (appropriate EtCO₂ waveform) is confirmed and ETT is properly secured.
Procedure – Oral endotracheal tube insertion

16. Remove intubating catheter.
17. Remove laryngoscope blade from mouth.
18. Using a syringe, inflate the ETT cuff with the minimum amount of air required to provide an effective seal.
19. Remove syringe from the ETT to effect the closing of the one-way valve, ensure pilot balloon remains inflated.
20. Connect resuscitation bag and commence ventilation.

21. Confirm correct tracheal placement by observing an appropriate continuous EtCO2 waveform (minimum of 6 ventilations of moderate tidal volume required for confirmation) and equal air entry.
22. Secure ETT (cloth tie/commercial ETT holder) as appropriate.
23. Consider insertion of bite block.
24. Administer post intubation sedation as required (titrated aliquots of morphine/fentanyl and/or midazolam).
25. Assess and adjust ETT cuff pressure as required.
**Procedure – Oral endotracheal tube insertion**

**Paediatric**

1. Assess the patient's airway for predictors of technical difficulty.
2. Prepare all equipment to ensure rapid access if needed.
3. Establish and verbalise an intubation plan.
4. Test integrity of the cuff, pilot balloon and valve by confirming appropriate inflation/deflation prior to use.
5. Lubricate the external surface of the ETT's distal tip with water-soluble lubricant.
6. Consider placing an intubating catheter in the ETT if the selected ETT internal diameter is ≥ 6mm.
7. Position the patient in the optimal position to align the oral, pharyngeal and laryngeal axes (neutral position with MILS if c-spine injury suspected).

- **Infant** – slight elevation of the shoulders
- **Small child** – slight extension of the head
- **Older child** – extension of the head (elevation of the head may also be required). Open mouth and inspect oral cavity.

8. Consider laryngeal manipulation to optimise visualisation of the larynx.
9. Whilst maintaining visualisation of the larynx, request the airway assistant to place appropriately sized ETT over the intubating catheter or place ETT directly into the larynx.
10. Consider retraction of the corner of the patient's mouth to optimise unobstructed passage of the ETT.

11. Whilst maintaining visualisation of the larynx, gently insert the ETT's distal tip through the cords to position the vocal cords at the ring marker.

- Neonate: 9.5 cm
- 6 months: 11 cm
- 1 year: size 12 cm
- > 1 year: age/2+12 cm
**Procedure – Oral endotracheal tube insertion**

12. If used, remove bougie.
13. Remove laryngoscope blade from mouth.
14. Connect resuscitation bag and commence ventilation.
15. Confirm an audible air leak is present with cuff fully deflated.
16. Using a syringe, inflate the ETT cuff to the effective sealing pressure but no higher than 20 cmH2O.
17. Remove syringe from the ETT to effect the closing of the one-way valve, ensure pilot balloon remains inflated.
18. Confirm correct placement by an appropriate continuous EtCO2 waveform (minimum of 6 ventilations of moderate tidal volume required for confirmation).
19. Secure ETT (cloth tie/commercial ETT holder) as appropriate.
20. Consider insertion of bite block.
21. Administer post intubation sedation as required (titrated aliquots of morphine/fentanyl and/or midazolam).
22. Assess and adjust ETT cuff pressure as required.

**Newly born**

1. Assess the patients airway for predictors of technical difficulty.
2. Prepare all equipment to ensure rapid access if needed.
3. Establish and verbalise an intubation plan.
4. Lubricate the external surface of the ETT's distal tip with water-soluble lubricant.
5. Position the patient in the optimal position to align the oral, pharyngeal and laryngeal axes (neutral position with MILS if c-spine injury suspected).
6. Consider laryngeal manipulation to optimise visualisation of the larynx.
7. Whilst maintaining visualisation of the larynx, place ETT directly into the larynx.
8. Consider retraction of the corner of the patient's mouth to optimise unobstructed passage of the ETT.
9. Whilst maintaining visualisation of the larynx, gently insert the ETT's distal tip through the cords to position the vocal cords at the ring marker.
**Procedure – Oral endotracheal tube insertion**

**Newly born**

10. Whilst maintaining visualisation of the larynx, gently insert the ETT's distal tip through the cords to position the vocal cords at the ring marker.
    - Oral tube length (cm) = 6 + weight (kg)
11. Remove laryngoscope blade from mouth.
12. Connect resuscitation bag and commence ventilation.
13. Confirm an audible air leak is present (cuff is to remain fully deflated).
14. Confirm correct placement by an appropriate continuous EtCO₂ waveform (minimum of 6 ventilations of moderate tidal volume required for confirmation).
15. Secure ETT (cloth tie/commercial ETT holder) as appropriate.

**Additional information**

- Under no circumstances is an ETT to be cut to reduce its length from the original size.
- Airway management in the pre-hospital setting presents a unique set of challenges for clinicians. It is important to have a defined procedure that can be reproduced each time intubation is employed to maximise the chance of a successful first attempt.
- ETT insertion will typically be performed on scene, either in the field or within the ambulance. The airway team should always consist of an airway clinician and airway assistant. In trauma, a separate person to stabilise the c-spine (by manual in-line stabilisation) is also warranted.
- The clinician performing the intubation is to take control of the patient's airway during the preparation phase. The airway assistant is to stand behind and to the right of the operator doing the intubating, and will pass all the intubating equipment.
Additional information (cont.)

- It is important to ensure that all equipment is laid out within easy reach of the airway assistant prior to intubation being attempted. Within an ambulance, this is best achieved by laying equipment out on the bench beside the left cabin compartment door. In the field, the equipment should rest to the right of the patient’s head. Suction should be available, with the Yankeur catheter located under the right shoulder of the patient.

- If, on patient assessment, the airway appears particularly difficult, or there are patient factors that suggest the intubation will be very high risk (e.g. significant haemodynamic instability, hypoxia), the most experienced clinician should undertake the first attempt. In such circumstances consideration could be given to delaying intubation until arrival at the hospital.

- Paediatric patients may prove difficult to intubate in the pre-hospital setting. Challenging airway anatomy and the infrequency of intubating opportunities are thought to be the main factors accounting for the lower success rate in paediatric ETT insertion.[12] Specialised training in paediatric airways is important to acquire and maintain skills in this population.

- If a cuffed ETT is used to intubate a newly born the cuff is to remain deflated.

- If there is an absence of EtCO2 sensing or inappropriate EtCO2 waveform or quantitative measurement the ETT must be removed and the failed airway algorithm is to be commenced.

- If intubation is unable to be achieved within 30 seconds OR two (2) attempts the failed airway algorithm is to be commenced.

The QAS supplies ETTs in the following sizes:

<table>
<thead>
<tr>
<th>Size (I.D.)</th>
<th>Brand</th>
<th>Recommended Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>Covidien™ Mallinckrodt™</td>
<td>Appropriate pre-term neonates</td>
</tr>
<tr>
<td>3.0</td>
<td>Paediatric Microcuff™ MICROCUFT™</td>
<td>Term ≥ 3 kg to &lt; 8 months</td>
</tr>
<tr>
<td>3.5</td>
<td>Paediatric Microcuff™ MICROCUFT™</td>
<td>8 months to 2 years</td>
</tr>
<tr>
<td>4.0</td>
<td>Paediatric Microcuff™ MICROCUFT™</td>
<td>2 to &lt; 4 years</td>
</tr>
<tr>
<td>4.5</td>
<td>Paediatric Microcuff™ MICROCUFT™</td>
<td>4 to &lt; 6 years</td>
</tr>
<tr>
<td>5.0</td>
<td>Paediatric Microcuff™ MICROCUFT™</td>
<td>6 to &lt; 8 years</td>
</tr>
<tr>
<td>5.5</td>
<td>Paediatric Microcuff™ MICROCUFT™</td>
<td>8 to &lt; 10 years</td>
</tr>
<tr>
<td>6.0</td>
<td>Parker Flex-tip™</td>
<td>Large child</td>
</tr>
<tr>
<td>7.0</td>
<td>Parker Flex-tip™</td>
<td>Adult female</td>
</tr>
<tr>
<td>8.0</td>
<td>Parker Flex-tip™</td>
<td>Adult female / male</td>
</tr>
<tr>
<td>9.0</td>
<td>Parker Flex-tip™</td>
<td>Adult male</td>
</tr>
</tbody>
</table>