Clinical Practice Procedures: 
Airway management/Oral endotracheal tube insertion

<table>
<thead>
<tr>
<th>Policy code</th>
<th>CPP_AM_OE1_0120</th>
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<tbody>
<tr>
<td>Date</td>
<td>January, 2020</td>
</tr>
<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 Queensland Ambulance Service (QAS) clinical staff.</td>
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<tr>
<td>Health care setting</td>
<td>Pre-hospital assessment and treatment.</td>
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<tr>
<td>Population</td>
<td>Applies to all ages unless stated otherwise.</td>
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<tr>
<td>Source of funding</td>
<td>Internal – 100%</td>
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<td>Review date</td>
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Oral endotracheal intubation is an advanced airway procedure involving the insertion of an endotracheal tube (ETT) under laryngoscopy into the trachea. 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.
- **Haylard* 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
Procedure – Oral endotracheal tube insertion

**Adult/large 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 the 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 the mouth and inspect the 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.

**LEGEND:** oral axis (OA), pharyngeal axis (PA), laryngeal axis (LA)

**Instructions:**
- **a)** Laryngoscope is used in left hand
- **b)** Laryngoscope is placed into right side of mouth and tongue is swept to the left
- **c)** Elevate laryngoscope along the axis of the handle to lift the mandible and epiglottis
- **d)** End of blade should rest in the epiglottic vallecula
12. Insert the Frova intubating catheter.

13. While maintaining visualisation of the larynx, request the airway assistant to place an ETT of the appropriate size over the intubating catheter.
   - **Male:** 8.0/9.0 mm
   - **Female:** 7.0/8.0 mm

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

15. 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)

16. With the right hand hold the ETT firmly at the lips until correct placement (appropriate EtCO₂ waveform) is confirmed and the ETT is properly secured.
17. Remove the intubating catheter.

18. Remove the laryngoscope blade from the mouth.

19. Using a syringe, inflate the ETT cuff with the minimum amount of air required to provide an effective seal.

20. Remove the syringe from the ETT to effect the closing of the one-way valve. Ensure the pilot balloon remains inflated.

21. Connect a resuscitation bag and commence ventilation.

22. Confirm correct tracheal placement by observing an appropriate continuous EtCO2 waveform (a minimum of 6 ventilations of moderate tidal volume is required for confirmation) and equal air entry.

23. Secure the ETT with a cloth tie or Thomas™ tube holder.


25. Administer post intubation sedation as required (titrated aliquots of morphine/fentanyl and/or midazolam).

26. Assess and adjust the 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 the 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 a lubricated intubating stylet in the ETT
   - ETT 2.5–4.0 mm: 6 Fr (2.0 mm) stylet
   - ETT 4.5–5.5 mm: 10 Fr (3.3 mm) stylet
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. Open the mouth and inspect the oral cavity.
9. Remove any removable plates from the mouth as required.
11. Suction as required.
12. Consider laryngeal manipulation to optimise visualisation of the larynx.
13. Consider retraction of the corner of the patient’s mouth to optimise unobstructed passage of the ETT.
14. While 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

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

16. If used, remove stylet.

17. Remove the laryngoscope blade from the mouth.

18. Connect the resuscitation bag and commence ventilation.

19. Confirm an audible air leak is present with the cuff fully deflated.

20. Using a syringe, inflate the ETT cuff to the effective sealing pressure, but no higher than 20 cmH2O.

21. Remove the syringe from the ETT to effect the closing of the one-way valve. Ensure the pilot balloon remains inflated.

22. Confirm correct tracheal placement by observing an appropriate continuous EtCO2 waveform (a minimum of 6 ventilations of moderate tidal volume is required for confirmation) and equal air entry.

23. Secure the ETT with a cloth tie or Thomas™ tube holder.


25. Administer post intubation sedation as required (titrated aliquots of morphine/fentanyl and/or midazolam).

26. Assess and adjust the 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. Consider placing a lubricated 6FR (2.0 mm) stylet in the ETT.

6. Position the patient in the optimal position to align the oral, pharyngeal and laryngeal axes (neutral position with MILS if c-spine injury suspected).

7. Open the mouth and inspect the oral cavity.

8. Perform laryngoscopy.

9. Suction as required.
Newly born (cont.)

10. Consider laryngeal manipulation to optimise visualisation of the larynx.

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

12. While maintaining visualisation of the larynx, place the ETT directly into the larynx.

13. While 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)

14. If used, remove stylet.

15. Remove the laryngoscope blade from mouth.

16. Connect a resuscitation bag and commence ventilation.

17. Confirm an audible air leak is present (if a cuffed ETT is being used the cuff must remain deflated).

18. Confirm correct tracheal placement by observing appropriate continuous EtCO2 waveform (a minimum of 6 ventilations or moderate tidal volume is required for confirmation) and equal air entry.

19. Secure the ETT with a cloth tie or Thomas™ tube holder.

20. Administer post intubation sedation as required (titrated aliquots of morphine/fentanyl and/or midazolam).

Additional information

- Under no circumstances is an ETT to be cut to reduce its length.

- 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 in 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) may also be 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. In the 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 perform the intubation. 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.

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>ETT size</th>
<th>Brand</th>
<th>Recommended Patients</th>
<th>Intubating catheter/stylet</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>Covidien™ Mallinckrodt™</td>
<td>Appropriate pre-term infants</td>
<td>6 Fr intubating stylet</td>
</tr>
<tr>
<td>3.0</td>
<td>Haylard* MICROCUF*</td>
<td>≥ 3 kg to &lt; 8 months</td>
<td>6 Fr intubating stylet</td>
</tr>
<tr>
<td>3.5</td>
<td>Haylard* MICROCUF*</td>
<td>8 months to &lt; 2 years</td>
<td>6 Fr intubating stylet</td>
</tr>
<tr>
<td>4.0</td>
<td>Haylard* MICROCUF*</td>
<td>2 to &lt; 4 years</td>
<td>6 Fr intubating stylet</td>
</tr>
<tr>
<td>4.5</td>
<td>Haylard* MICROCUF*</td>
<td>4 to &lt; 6 years</td>
<td>10 Fr intubating stylet</td>
</tr>
<tr>
<td>5.0</td>
<td>Haylard* MICROCUF*</td>
<td>6 to &lt; 8 years</td>
<td>10 Fr intubating stylet</td>
</tr>
<tr>
<td>5.5</td>
<td>Haylard* MICROCUF*</td>
<td>8 to &lt; 10 years</td>
<td>10 Fr intubating stylet</td>
</tr>
<tr>
<td>6.0</td>
<td>Parker Flex-tip™</td>
<td>Large child</td>
<td>Frova 14 Fr intubating catheter</td>
</tr>
<tr>
<td>7.0</td>
<td>Parker Flex-tip™</td>
<td>Adult female</td>
<td>Frova 14 Fr intubating catheter</td>
</tr>
<tr>
<td>8.0</td>
<td>Parker Flex-tip™</td>
<td>Adult female / male</td>
<td>Frova 14 Fr intubating catheter</td>
</tr>
<tr>
<td>9.0</td>
<td>Parker Flex-tip™</td>
<td>Adult male</td>
<td>Frova 14 Fr intubating catheter</td>
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