

BPG 02: Endo-Tracheal Tube (ETT) Care

Statement of Best Practice

All patients with an endo-tracheal tube in situ will have care delivered competently, optimising their comfort and minimising adverse effects.

1: Introduction

It is common practice for critical care patients to require mechanical ventilation which is initially achieved via the insertion of an oral endo-tracheal tube (ETT), unless contraindications exist; as a consequence endo-tracheal intubation is one of the most commonly performed procedures undertaken in critical care¹.

The main indications for patient intubation in the critical care are:

- To secure or maintain a clear airway
- To prevent aspiration of gastrointestinal tract contents
- To enable adequate tracheal suctioning
- To apply mechanical ventilatory support

A key component of the management of any patient receiving mechanical ventilation is appropriate care and securing of the endo tracheal tube.

It is essential that the position of the ETT remains stable for a number of reasons:

- The ETT is fulfilling the function of the patients airway
- To ensure access for optimal ventilation
- ETT movement within the trachea may cause local trauma and as such is a source of significant discomfort to patients.

2: Potential Risks Associated to ETTs

2.1 Migration of ETT

Migration of the ETT can occur in either direction up and down within the trachea and usually occurs during direct care activities when a patient is being moved. When the ETT moves distally (into the lungs) it can migrate into the right main bronchus which can result in ventilation of on line lung and progressive atelectasis of the non-ventilated lung². The Main risk of ETT migrating up the trachea is unplanned extubation

2.2 Unplanned extubation

Unplanned extubation is a major complication and the commonest incident associated with the management of ETT's³. The adequate securing of ETT's, adequate sedating and early weaning of patients have been demonstrated to reduce the risk of unplanned extubation³.

2.3 Preserving skin integrity

It is acknowledged that medical devices can cause damage to skin and mucosa due to the rigid materials from which they are manufactures, thus creating pressure on soft tissue⁴. Adhesive tapes used to secure

devices may irritate the skin, especially where there is oedema around the device. It is also recognised that correct positioning and appropriate fixation and stabilisation of ETT's can prevent pressure ulcers developing^{4,5}. It is known that the occurrence of pressure ulcers creates pain and discomfort for patients and can result in an extended hospital stay. It is essential therefore that when an ETT is in situ, regular assessment and documentation of the skins condition is undertaken and remedial actions taken where necessary to prevent the development of pressure ulcers. ETT's should be assessed every 2 hours for signs of damage and repositioned 4hrly to prevent damage created by pressure.

2.4 **Venous return and raised intracranial pressure**

In patients with raised intracranial pressure, all efforts should be made to prevent compression of the internal or external jugular veins. The use of tight tapes to secure ETT's may impede cerebral venous return and result in raised ICP.

2.5 **Access to oral cavity to allow oral hygiene procedures**

A recognised risk to intubated patients is the acquisition of ventilator associated pneumonia (VAP) which increases morbidity and likely mortality⁶. Regular and effective oral hygiene, including the brushing of teeth, gums and tongue, has shown to reduce the risk of VAP⁷. ETT's and their securing devices can obstruct access and the view of the oral cavity preventing effective oral care.

2.6 **Maintaining safe cuff pressure**

Any patient who requires an ETT requires regular measurement of the pressure within the cuff. This is to ensure there is an adequate cuff seal to enable effective ventilation without exerting unnecessary pressure on the tracheal mucosa. It is preferable to have an ETT with a high-volume low-pressure cuff that allows a large surface area of the cuff to come into contact with the tracheal wall while exerting lower pressures. Too low a cuff pressure sure may result in air and pressure loss from the lungs during forced ventilation and risk of aspiration of saliva and gastric feed or gastric content. Too high a cuff pressure may result in tissue damage and necrosis, tracheal stenosis and trachea-oesophageal fistulas⁸.

3: Standards of Care

3.1 A risk assessment (Appendix 2) should be undertaken on admission to critical care to determine the most appropriate method of securing the ETT. Elements that need to be considered in the assessment process are:

- Anticipated length of ventilation via ETT
- Level of sedation and patient compliance
- Skin integrity around lips and face, including presence of facial burns/trauma/surgery
- Presence of raised intracranial pressure in neurological patients

There are currently four main methods aimed at ETT stabilisation within the UK:

- Adhesive medical tape
- White cotton tape
- Foam and Velcro straps
- Endotracheal fixation device

Change dressings / tapes every 24hrs or as recommended by manufacturer.

(It is not recommended to use white cotton tape in critical care patients whose anticipated length of intubation will exceed 6 hours or are in a high risk group of developing pressure ulcer⁹.)

- 3.2 Check, observe and document the size and position of the ETT every 8/12 hours unless otherwise indicated by the risk assessment.
- 3.3 Ensure position of the ETT is assessed regularly (recommended 2 hourly), position changed a minimum 4 hourly to prevent oral pressure damage and documented.
- 3.4 Check cuff pressure with a manometer at the beginning of every shift and then 4 hourly as a minimum, ensuring pressures are within safe limits 20-30 mmHg.
- 3.5 Following mouth care or direct care that has resulted in a change of position check the position of the ETT.
- 3.6 Aspiration of Subglottic port (if subglottic tube) or oral cavity suctioning 4 hourly as a minimum or as indicated.
- 3.7 Ensure patient and equipment is ready if extubation planned.
 - Sedation and enteral feeding have been stopped according to trust guidelines / protocol
 - Oxygen therapy (mask and tubing) is set up at the bedside
 - Suction equipment at the bedside
 - Intubation trolley is at the bed side
- 3.8 If an unplanned extubation occurs an incident form (Datix / IR1) should be completed.
- 3.9 Nursing staff have been assessed as competent using the national competency document¹⁰

References

1. **Jaber,S. Jung,B. Chanquers,G.** Yearbook of Intensive Care and Emergency Medicine. 2009, Vol. 2009, pp313-321.
2. **Marino, P,L.** *The ICU Book 3rd Edition* . Philadelphia : Lippincott Williams & Watkins, 2007.
3. *Airway accidents in intubated intensive care unit patients: An epidemiological study.* . **Kapidia et al.** 3, s.l. : Critical Care Medicine, 2000, Vol. 28.
4. *A prospective pilot study of atypical pressure ulcers presentation in a skilled geriatric unit.* . **Jaul, E.** 2, s.l. : Ostomy Wound Management , 2010, Vol. 27.
5. *Preventing device related pressure ulcers. Using data to guide statewide change.* **Apold, J. Rydrych, D.** 1, s.l. : Journal of Nursing Care and Quality, 2012, Vol. 27.
6. *Ventilator associated pneumonia: Diagnosis, treatment and prevention.* **Koeing,SM. Tuit JD.** 4, s.l. : Clinical Microbiology, 2006, Vol. 19.
7. **High Impact Interventions.** *Care bundles to reduce ventilation -associated pneumonia.* s.l. : Department of Health, 2011.
8. **Jane Mallet, John W Albarran and Annette Richardson.** *Critical Care Manual of Clinical Procedures and Competencies.* London : Wiley Blackwell, 2013. 978-1-4051-2252-8.
9. **Critical Care Advisory Group (Hollister Ltd)** . *Best Practice Guidance: For the stabilisation of Endotracheal Tubes in Adult Critical Care Patients.* 2009.

Group Membership

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Complications of Tracheal Tube Cuff Pressure Measurement – Appendix 1

Problem	Cause	Suggested actions
Cuff pressure too high – in excess of 25mmHg	High –pressure low -volume cuffed tube in place	Maintain cuff seal and inform practitioners regarding need to re-intubate with low-pressure high- volume cuffed tube
	High peak airway pressure (in excess of 25mmHg)	Check cause of high airway pressure. Maintain cuff seal and inform relevant practitioners
	Tracheal tube may be too small for the patient.	Maintain cuff seal and inform relevant practitioners of the need to insert appropriate-sized tracheal tube
Cuff pressure too low – below 15mmHg	Low airway peak pressure (under 20 mmHg)	Check cause of low airway pressure and, if required, inform relevant practitioners. Inflate cuff to safe pressure if leak detected.
Persistent cuff leak	Cuff pressure is low	Inflate cuff until leak occluded, maintain seal. Inform relevant practitioners
	Tracheal tube displaced, possibly sitting between and or above the vocal chords	Inform relevant practitioners. Prepare to check length of the ETT on CXR and /or deflate cuff and position tracheal tube further down the trachea by appropriate practitioner

Taken from:

Critical Care Manual of Clinical Procedures and Competencies Jane Mallet, John W Albarran and Annette Richardson.. London : Wiley Blackwell, 2013. 978-1-4051-2252-8.

ENDO TRACHEAL TUBE ASSESSMENT ALGORITHM – Appendix 2

This algorithm should be implemented on orally intubated patients and used as a daily guide to support clinical judgement and determine best practice to minimise ETT harm.

Device	Skin ¹	Sedation Score ³
Bite block = 1	Healthy = 0	Alert and calm = 0
Guedell airway = 2	Tissue paper = 1	Restless = 1
ETT insitu <24 hours = 3	Dry = 1	Agitated = 2
ETT insitu ≥24 hours = 4	Oedematous = 1	Very agitated = 3
	Clammy/pyrexia = 1	Combative = 4
	Discoloured / Category 1 ulcer ² = 2	Heavily sedated / paralysed = 4
	Broken spots / Category 2-4 ulcer = 3	Presence of raised intracranial pressure in neurological patients = 2
	Presence of facial burns / trauma / surgery = 3	

Cumulative Total: Select all scores that apply from the 3 sections to calculate overall risk

NB. Assessments should be undertaken more frequently in response to deteriorating patient conditions and patient with scores > 4

<2 Low Risk	≥2 but ≤4 Medium Risk	4 High Risk
<p>Observation plus:</p> <ul style="list-style-type: none"> • Good general oral hygiene practice • Use appropriate fixation and pressure relieving device (Local policy) 	<p>Observation plus:</p> <ul style="list-style-type: none"> • Good general oral hygiene practice • Use an alternative fixation and pressure relieving device. (Local policy) 	<p>Observation plus:</p> <ul style="list-style-type: none"> • Good general oral hygiene practice • Use of pressure relieving ETT fixation device. (Local Policy) • Consider need for tracheostomy

Best Practice Principles

- ❖ Intubated patients should be monitored constantly and assessed for potential extubation risk
- ❖ Risk assessment of the ETT should be undertaken daily as a minimum, and scores and length at lip documented in the patients notes
- ❖ ET tubes and fixation devices should be checked at least 2 hourly to prevent pressure ulcers developing around the lips and mouth.
- ❖ A critical incident report should be generated for all accidental extubations documenting the ETT Assessment risk scored. Investigation should establish any mitigating circumstances that resulted in extubation.

References: 1. Waterlow J (2005) Pressure Risk Assessment Tool and Waterlow Scale. 2. NPUAP/EPUAP (2009) Prevention and treatment of pressure ulcers. Clinical Practice Guideline. 3. Seessler et al. (2002) The Richmond agitation Score – Sedation Scale: validity and reliability in adult intensive care patients.

Endotracheal Tube Care Plan

TRUST LOGO

Patient Sticker

DAY ONE – Insertion of Endotracheal Tube

Ward / Unit	Hospital	Admission Date

Date Tube Insertion		Intubation performed by: (Doctors Name & grade)																							
Type and Batch number		<table border="1"> <tr> <td>Grade of laryngoscopy view:</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>Bougie used:</td> <td>Y <input type="checkbox"/></td> <td>N <input type="checkbox"/></td> <td colspan="2"> </td> </tr> <tr> <td>Drugs used:</td> <td colspan="4"> </td> </tr> <tr> <td>CXR performed</td> <td>Y <input type="checkbox"/></td> <td>N <input type="checkbox"/></td> <td colspan="2"> </td> </tr> </table>				Grade of laryngoscopy view:	1	2	3	4	Bougie used:	Y <input type="checkbox"/>	N <input type="checkbox"/>			Drugs used:					CXR performed	Y <input type="checkbox"/>	N <input type="checkbox"/>		
Grade of laryngoscopy view:	1					2	3	4																	
Bougie used:	Y <input type="checkbox"/>					N <input type="checkbox"/>																			
Drugs used:																									
CXR performed	Y <input type="checkbox"/>	N <input type="checkbox"/>																							
Size																									
Position of tube at lip/nosecm																								
Left	<input type="checkbox"/>																								
Right	<input type="checkbox"/>																								
Middle	<input type="checkbox"/>																								
Nasal	R <input type="checkbox"/> L <input type="checkbox"/>																								
Risk Assessment Score																									
Tube secured –method																									
CO₂ Monitoring in situ	Y <input type="checkbox"/> N <input type="checkbox"/>	Date / Time																							
Assisting Nurse: (Please print name and grade)		Reviewed by: (Doctors Name & grade)																							

Comments: (please record any difficulties encountered)

ASSESSMENT & MONITORING

<i>Please enter initials in appropriate box</i>	Day 1				Day 2				Day 3				Day 4			
Date																
Time																
All Elements of Ventilator Care Bundle preformed																
Sedation Hold																
10-45° head elevation																
DVT prophylaxis																
GI prophylaxis																
Humidified Oxygen																
Closed suction changed	X	X	X	X	X	X	X	X					X	X	X	X
Subglottic suctioning (if Required)																
Teeth / gums brushed		X	X			X	X			X	X			X	X	
Cuff pressure																
Cm at lips																
Tube position (R= right, L = left , M = middle)																
ET fixation changed																
Filter changed		X	X	X		X	X	X		X	X	X		X	X	X
Ventilator tubing changed	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

ASSESSMENT & MONITORING

<i>Please enter initials in appropriate box</i>	Day 5				Day 6				Day 7			
Date												
Time												
Sedation Hold												
10-45° head elevation												
DVT prophylaxis												
GI prophylaxis												
Humidified Oxygen												
Closed suction changed	X	X	X						X	X	X	X
Subglottic suctioning (if Required)												
Teeth / gums brushed		X	X			X	X			X	X	
Cuff pressure												
Cm at lips												
Tube position (R= right, L = left , M = middle)												
ET fixation changed												
Filter changed		X	X	X		X	X	X		X	X	X
Ventilator tubing changed	X	X	X	X	X	X	X	X				

EXTUBATION CHECKLIST

	Performed by (Name and grade)	Date / Time
Instructed by medical staff, patient ready for extubation. (Doctor's name and grade)		
Sedation Stopped		
Nasogastric feed stopped / tube aspirated		
Patient sat upright		
Equipment available:		
Oxygen Mask	<input type="checkbox"/>	
Oxygen tubing	<input type="checkbox"/>	
Air Entrainer	<input type="checkbox"/>	
10ml syringe	<input type="checkbox"/>	
Intubation trolley at bedside		
C circuit & mask available		
Endo tracheal and oral suctioning performed		
Patient extubated at:		
Comments Re-intubation plans / issues		

