

Best Practice Guidance – Endo Tracheal Tube Care

These recommendations are based on the current evidence and best practice at the time of writing and so will be subject to change as further developments are made in this field.

Aim

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

Scope: All patients in adult critical care who have an endotracheal tube insitu.

Introduction

It is common practice for critical care patients to require mechanical ventilation which is initially achieved via the insertion of an 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.

Potential Risks

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

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 . Philidelphia : Lippincott Williams & Watkins, 2007.*

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.

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 manufactured, 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 skin's 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 a minimum of 4hrly to prevent damage created by pressure.

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.

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.

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. The optimal range is 20 to 30 mmHg. Too low a cuff pressure may result in air and pressure loss from the lungs during forced ventilation and risk of aspiration of saliva and

³ *Airway accidents in intubated intensive care unit patients: An epidemiological study.* . **Kapadia 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.

gastric feed or gastric content. Too high a cuff pressure may result in tissue damage and necrosis, tracheal stenosis and trachea-oesophageal fistulas.⁸

Standards of Care

INTUBATION

A risk assessment 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
- Difficulty of intubation

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 ulcers.⁹

Post intubation, a record should be made in the patient notes and care plan of the laryngoscopy view. Every ICU should have immediate access to a difficult airway trolley. This should have the same content and layout as the one used in that hospital's theatre department. The airway trolley needs regular checking, maintenance and replacement of equipment after use which should be appropriately documented.¹⁰

ACTION: Risk Assessment to determine method of securing

MAINTENANCE

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.*

¹⁰ *Cook TM, Woodall N, Frerk C, eds. The NAP4 report: Major complications of airway management in the UK. Royal College of Anaesthetists. London; 2011.*

Collaborative Regional Benchmarking Group

(North of England, North Yorkshire & Humber and West Yorkshire)

Ensure position of the ETT is assessed regularly (recommended 2 hourly) especially following mouth care or positional changes which could result in change of position.

Position changed a minimum 4 hourly to prevent oral pressure damage and documented in care plan. Any device related pressure damage triggers the need to complete a critical incident report (Datix/IR1)

ACTION: Check, observe and document the size and position of the ETT

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. (Appendix 1)

ACTION: Check cuff pressures a minimum of 4 hourly

Aspiration of subglottic port (if subglottic tube), or oral cavity suctioning 4 hourly as a minimum, or as indicated. (Appendix 2)

ACTION: Aspirate oral cavity or subglottic tube 4 hourly or as indicated

EXTUBATION

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. Consider High flow nasal O₂
- Suction equipment at the bedside
- Emergency intubation trolley is at the bed side and grade of laryngoscope view is known.

If an unplanned extubation occurs a critical incident report (Datix/IR1) should be completed and an investigation should establish any mitigating circumstances.

Nursing staff have been assessed as competent using the national competency document¹¹

¹¹ CC3N. National Competency Framework for Critical Care Nurses.2016.

Complications of Tracheal Tube Cuff Pressure Measurement – Appendix 1

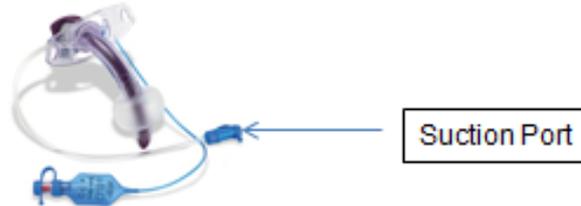
Problem	Cause	Suggested actions
Cuff pressure too high – in excess of 25mmHg	<i>High –pressure low -volume cuffed tube in place</i>	<i>Maintain cuff seal and inform practitioners regarding need to re-intubate with low-pressure high- volume cuffed tube</i>
	<i>High peak airway pressure (in excess of 25mmHg)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

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.

SOP
Subglottic Aspiration via a Tracheal tube

Aspirate the subglottic port on the tracheal tube



- Minimum of 6 times in 24hrs
- Prior to cuff deflation
- Before mobilising the patient

Use a 10ml syringe

Record volume in the respiratory section of the observation chart

If resistance is met on aspiration, flush the suction line with either air or sterile saline (2ml) and aspirate again.

*****If resistance felt to flushing seek medical assistance.*

Less than 5 ml aspirated

Repeat aspirations
every 4 hours

5 ml or more aspirated

Repeat aspirations
every 2 hours

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						
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"/>	Grade of laryngoscopy view: <table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4			
Assisting Nurse: (Please print name and grade)		Bougie used: <table border="1"> <tr> <td>Y <input type="checkbox"/></td> <td>N <input type="checkbox"/></td> </tr> </table>	Y <input type="checkbox"/>	N <input type="checkbox"/>		
Y <input type="checkbox"/>	N <input type="checkbox"/>					
		Drugs used:				
		CXR performed <table border="1"> <tr> <td>Y <input type="checkbox"/></td> <td>N <input type="checkbox"/></td> </tr> </table>	Y <input type="checkbox"/>	N <input type="checkbox"/>		
Y <input type="checkbox"/>	N <input type="checkbox"/>					
		Date / Time				
		Reviewed by: (Doctors Name & grade)				

Comments: (please record any difficulties encountered)

ASSESSMENT & MONITORING

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

ASSESSMENT & MONITORING

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

EXTUBATION CHECKLIST

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