1. INTRODUCTION

To ensure patient safety, the patient with a temporary, artificial trans-laryngeal airway should have this device removed at the earliest appropriate time. Occasionally, acute airway obstruction of the artificial airway due to mucus or mechanical deformation mandates immediate removal of the endotracheal tube.

2. PURPOSE

To outline the safe removal of the endotracheal tube in adult patients

3. APPLICABILITY

To all health care practitioners (HCP) who give direct patient care to patients receiving mechanical ventilation. i.e. physicians, nurses, and respiratory care practitioners (RCP's).

4. RESPONSIBILITIES

4.1 Physicians

4.1.1 Order medications and therapies to extubate the patient from the mechanical ventilator.

4.1.2 Consults with RCPs and nurses during medical rounds regarding patient care.

4.2 Nurses

4.2.1 Administers any necessary medications and therapies as ordered.

4.2.2 Continuous monitoring of patient's vital signs.

4.2.3 Communicates changes in patient's condition to attending physician and bedside RCP.

4.3 RCP's

4.3.1 Verify physician's order to "Extubate".

4.3.2 Start the weaning process as policy No. 1-2-9451-03-019.

4.3.3 Document all extubation criteria, patient assessment, blood gases and changes in the CERNER.

5. POLICY

5.1 Extubation will be performed by trained Respiratory Therapist on the order of the attending physician.

5.2 The RT using established criteria to predict a successful outcome will assess the patient.

5.3 Prior to extubation, the RT will ensure the availability of the necessary equipment required for re-intubation in the event of an unsuccessful outcome.

5.4 The RT will monitor the patient prior to, during, and following extubation for changes in vital signs, pulse oximetry, ECG, and level of consciousness. The physician must be notified of any changes.

5.5 Bedside nurse should be informed and attend the extubation in case of any emergency.

5.6 Hand hygiene and infection control practices should be performed.

5.7 **Indications**:

5.7.1 When the airway control afforded by the endotracheal tube is deemed to be no longer necessary for the continued care of the patient, the tube should be removed. In general, the patient should be capable of maintaining a patent airway and adequate spontaneous ventilation and should not require high levels of positive airway pressure to maintain normal arterial blood oxygenation.

5.7.2 Acute artificial airway obstruction mandates immediate endotracheal tube removal if the obstruction cannot be cleared rapidly. Reintubation or other appropriate techniques for re-establishing the airway must be used to maintain effective gas exchange.

5.8 **Contraindications**:

5.8.1 There are no absolute contraindications to extubation;
However, some patients will require Reintubation, non-invasive ventilation, or high FiO_2 to maintain acceptable gas exchange after extubation.

5.8.2 Airway protective reflexes are usually depressed immediately following and for some time after extubation and therefore, measure to prevent aspiration should be considered.

5.9 **Hazards and Complications**:

5.9.1 Hypoxemia after extubation may result from but is not limited to the following:

5.9.1.1 Failure to deliver adequate FiO_2 through the natural upper airway
5.9.1.2 Acute upper airway obstruction
5.9.1.3 Development of post obstruction pulmonary edema
5.9.1.4 Bronchospasm
5.9.1.5 Development of atelectasis or lung collapse
5.9.1.6 Pulmonary aspiration
5.9.1.7 Hypoventilation

5.9.2 Hypercapnia after extubation may be caused but is not limited to the following:

5.9.2.1 Upper airway obstruction resulting from edema of the trachea, vocal cords, or larynx
5.9.2.2 Respiratory muscle weakness
5.9.2.3 Excessive work of breathing
5.9.2.4 Bronchospasm

5.10 PREPARATION

5.10.1 Off/Minimal sedatives, RASS = 0.

5.10.2 Off feeding.

5.10.3 Pass Weaning/Extubation Criteria

5.10.4 Allow patient to regain full mental status. If patient shows signs of discomfort consider giving more pain medication.

5.10.5 Patient preferred be able to understand respond to commands.

5.10.6 Pay more attention and care for those patients with chronic morbidities when weaning/extubation criteria been done.

5.10.7 Weaning criteria:

5.10.7.1 Negative Inspiratory Force >-20.
5.10.7.2 Rapid Shallow Breathing Index <105.
5.10.7.3 PEEP < 8.
5.10.7.4 $Fi0_2$ < 45%.
5.10.7.5 Presence of cough.
5.10.7.6 Occlusion Pressure at 0.1 sec (PO.1) < 5 cmH20.
5.10.7.7 02/Fi02 Ratio > 200.
5.10.7.8 Spontaneous Vt 4-6 mls/Kg.
5.10.7.9 Spontaneous RR < 35/min.
5.10.7.10 Zero to low inotrope.
5.10.7.11 Zero to low vasopressor.

5.10.8 Extubation Criteria:

5.10.8.1 GCS ≥ 8.
5.10.8.2 Presence of a cuff leak.
5.10.8.3 Presence of gag reflex.
5.10.8.4 Minimal amount of secretions.

6. PROCEDURES

6.1 Verify Physician's order.

6.2 Confirm patient's identification by asking the two patient identifiers. Refer to the Medical City Wide Policy & Procedure, patient Identification Policy.

6.3 Ensures patient privacy, hand hygiene, and implements required precautions/choose appropriate Personal Protective Equipment (PPE).

6.4 Sit the patient up to (at least 45^0) heads up, high fowler position.

6.5 Equipment required, but not limited to:

6.5.1 Scissors

6.5.2 Syringe 10 cc

6.5.3 Yankeur

6.5.4 Appropriate oxygen delivery device

6.5.5 Oxygen source

6.5.6 Intubation equipment set with endotracheal tubes of various sizes, oropharyngeal airways.

6.6 ECG and pulse oximeter monitors.

6.7 Explain the procedure to the patient to reduce anxiety.

6.8 Perform endotracheal suction and oral suction.

6.9 Cut the ties securing the endotracheal tube.

6.10 Deflate the balloon fully using the 10 cc syringe and instruct the patient to take a deep inspiration, (This will ensure opening of the vocal cords).

6.11 Remove the endotracheal tube.

6.12 Instruct the patient to deep breath and cough. Suction any secretions from the oropharynx.

6.13 Place the patient on an appropriate oxygen delivery device or FIO_2 above 10% set on the ventilator.

6.14 Monitor the patient closely for any respiratory distress, stridor, or changes in status that might indicate the need for reintubation.

6.15 Reassure the patient.

6.16 Disposable equipment will be disposed in the appropriate container at the patient's bedside.

6.17 Perform hand hygiene.

6.18 Appropriately documents procedure, outcomes, and completes chart.

7. REFERENCES

7.1 AARC Clinical Practice Guideline: Removal of the Endotracheal Tube. Downloaded February 2, 2012. http:www.rcjournal.com/cpgs/rotectcpg.html.

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7.3 Wilkins, R. L., Stoller, J. K. (2016). Egan's Fundamentals of Respiratory Care, 11th Edition,. St. Louis. Mosby Elsevier

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