HEALTH HOLDING

HAFER ALBATIN HEALTH CLUSTER
MATERNITY AND CHILDREN HOSPITAL

Department:	Pediatric Intensive Care Unit (PICU)		
Document:	Multidisciplinary Policy and Procedure		
Title:	Endotracheal Intubation in Pediatric Patient		
Applies To:	All Pediatric Intensive Care Unit Staff and Respiratory Therapists		
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1. PURPOSE:

1.1 To provide airway patency.
1.2 To provide route for short term mechanical ventilation.
1.3 To facilitate removal of pulmonary secretions.
1.4 To treat acute respiratory failure.
1.5 To prevent potential complication.
1.6 To provide as route in delivery of anesthetic and other drugs via ETT.

2. DEFINITIONS:

2.1 **Endotracheal Intubation** – is an insertion of flexible tube through the mouth or nose into the trachea beyond the vocal cords that acts as an artificial airway permits air to pass freely to and from the lungs in order to ventilate the lungs. Endotracheal tubes can be connected to ventilator machines to provide artificial respiration.
2.2 **Oropharyngeal Intubation** – is a procedure wherein the tracheal tube is slid over the proximal end of the device and advanced into the trachea passing the oral cavity.
2.3 **Nasopharyngeal Intubation** – is carried out if Oropharyngeal route is contraindicated. A tube with the same diameter as the oral tube can be gently advance along the floor of nasal cavity. Nasotracheal intubation is more comfortable for most conscious patients causes less stimulation of the gag reflex, is more easily secured and avoids the problem of biting in patients with seizure, decerebrate rigidity or extreme agitation. Contraindications include coagulopathies, maxillofacial trauma and basilar skull fracture.

3. POLICY:

3.1 Endotracheal intubation is performed by a Physician assisted by a Respiratory therapist and a Staff Nurse who is Basic Life Support Training (BLS) certified and Pediatric Advance Life Support (PALS) provider and has received education/ training and possesses an evidence of successful in skilful competency in assisting Endotracheal Intubation.
3.2 Routine suctioning of the endotracheal tube should be done on a regular basis as needed.
3.3 Blood gases analysis must be obtained as ordered.
3.4 Crash cart and defibrillator must be ready for emergency use.
3.5 Standard precautions are recommended.

4. PROCEDURE:

4.1 Perform hand hygiene to prevent transmission of infection.
4.2 Explain the procedure to the patient or guardian.
4.3 Ensure that intravenous access has been established.
4.4 Clear the oral cavity and pharynx from any foreign objects such as orthodontics retainers and loose teeth.
4.5 Obtain blood gas to monitor gas exchange and oxygenation status.
4.6 Make sure that the respiratory therapist has assembled the mechanical ventilation.

4.7 Check the functioning and completeness of the equipment.

4.7.1 Ensure a working set up for suction system with catheter appropriate suction catheter.

	Small Infant	Infant	Toddler	Small Child	Child	Child	Large Child	Adult
Weight	6 – 7 kg	8 – 9 kg	10 – 11 kg	12 – 14 kg	15 – 18 kg	19 – 23 kg	24 – 29 kg	30 – 36 kg
Suction catheter (French)	8	8	10	10	10	10	10	10 – 12

4.7.2 Prepare a resuscitation bag (Bag – Valve – Mask) with reservoir connected to 100% oxygen source and a face mask.

4.7.2.1 Select an appropriate face mask:

4.7.2.1.1 A facemask that extends from the bridge of the child's nose to the cleft of the chin, covering the nose and mouth but not compressing the eyes.

4.7.2.1.2 The mask should have a soft rim that fits easily to create a tight seal against the face. If the face mask seal is not tight, O_2 intended for ventilation will escape under the mask thus not effective.

4.7.2.1.3 Select a transparent mask. It allows you to see the colour of patient's lips and condensation on the mask (which indicates exhalation) and regurgitation will be observed when occurred.

4.7.2.2 Choose a ventilation bag (self – inflating bag) with a reservoir.

4.7.2.2.1 Maintain 10 – 15L/min into a reservoir attached to a pediatric bag.

4.7.2.2.2 Frequently verify that the O_2 is attached and flowing to the bag.

4.7.2.3 Test the Bag-Mask-Valve device for proper functioning.

4.7.2.3.1 Check the bag for leaks by occluding the patient outlet valve with your hand and squeezing the bag.

4.7.2.3.2 Check the gas flow control valves to verify proper function.

4.7.2.3.3 Check the pop – off valve to ensure that it can be closed.

4.7.2.3.4 Listen the O_2 flow and verify the connection to the wall oxygen source.

4.7.2.3.5 Ensure that the cuff of the mask is adequately inflated.

4.7.2.4 Make certain that laryngoscope blades of straight (miller) and curved (macintosh) should be readily available. Check the adequacy of blade lighting by visualizing it on ones hands in a close fist as if passing the blade into the buccal cavity.

4.7.2.5 Prepare either a cuffed or uncuffed endotracheal tube as per doctor's order. Secure that the tube with an internal diameter 0.5 mm smaller and 0.5mm larger than the estimated size are available.

Age	ETT Cuffed (ID)mm	ETT Un-cuffed ID mm
Infants up to 1 year of age	3.0	3.5
1 to 2 years of age	3.5	4.0
2 years and above	Age in years/ 4+3	Age in years/ 4+4

4.7.2.6 Make sure that stylet is available. These provide rigidity to the tracheal tube and help guide it through and beyond vocal cords.

4.7.2.6.1 Place the stylet tip 1 to 2 cm proximal to the distal end of the tracheal tube to prevent trauma to the trachea from the stylet.

4.7.2.6.2 Lubricate with a sterile, water soluble lubricant or sterile water may be helpful to moisten the stylet and aid its removal from the tracheal tube after successful placement.

4.8 Connect to continuous cardiac and pulse oximeter monitoring throughout the procedure. Monitor the heart rate and rhythm, blood pressure and oxygen saturation.

4.9 Check tracheal cuff for leaking by inflating cuff with air as recommended by manufacturer. Malfunction of the cuff must be ascertained before tube placement occurs if cuffed ETT is to be used.

4.10 Lubricate distal end of ETT with a water soluble lubricant.

4.11 Empty stomach if nasogastric tube is in place. Patients with full stomach are at risk of aspiration of gastric contents during manipulation particularly if protective airway reflexes are impaired.

4.12 Position the patient properly to align the axes of the mouth, pharynx and trachea for ventilation and intubation.

- 4.12.1 Place on sniffing position for infants and children younger than 3 years of age without hyperextension of the neck.
- 4.12.2 Place a folded sheet or towel for patient > 2 years of age under the occiput; < 2 years of age padding under the shoulders or upper torso to prevent excessive flexion of the neck.
- 4.12.3 Flex the patient's neck forward at the level of the shoulders while extending the head. Position the opening of the external ear canal at the level of or in front of the anterior aspect of the shoulder while the head is extended.
- 4.12.4 Avoid manipulation of the neck if a risk exists of cervical spinal instability.

4.13 Open the airway and make a seal between the mask and the face in the absence of cervical spine injury, tilt the head back.

- 4.13.1 Use the E – C clamp technique to lift the jaw against the mask, pressing and sealing the mask on the face. This technique moves the tongue away from the posterior pharynx moves the jaw forward and opens the mouth.
- 4.13.2 Avoid pressure on the soft tissues underneath the chin (submental area) because these can push the tongue into the posterior pharynx, resulting in airway compression and obstruction.

4.14 Pre-oxygenate the patient for 2 – 3 minutes with 100% oxygen, delivered via ambubag with reservoir and a tight- fitting mask to maintain oxygenation during intubation.

- 4.14.1 Assist in each spontaneous respiration with the squeeze of the bag if the patient is breathing.
- 4.14.2 Ventilate only that force and tidal volume necessary to cause the chest to visibly rise.
- 4.14.3 Excessive ventilation volumes and airway pressures may compromise cardiac output by raising the intrathoracic pressure and by distending alveoli, increasing afterload on the right heart.
- 4.14.4 In addition, excessive volumes may distend the stomach, impending ventilation and increasing the risk of regurgitation and aspiration.

4.15 Administer the medications as ordered e.g. Sedatives, Paralytics, Anticholinergic (Atropine)

4.16 Apply 'cricoid pressure' puts direct pressure on the cricoids cartilage (once patient is deeply sedated) during intubation to prevent reflux of gastric contents and minimize gastric distension. It is contraindicated in patients with a cough or gag reflex.

4.17 Suction oral cavity and pharynx to clear secretions while visualizing with the laryngoscope device.

4.18 Observe if there is a large glottis air leak that interferes with oxygenation on ventilation, consider replacing the tube one that is 0.5 mm (ID) larger, or place a cuffed tube of the same size.

4.19 Confirm correct tube position after intubation by clinical assessment and a confirmation device:

- 4.19.1 Observe for chest rise.
- 4.19.2 Auscultate bilaterally over the anterior chest, both axillae and the stomach.
- 4.19.3 Observe for water vapour in the tracheal tube on exhalation.
- 4.19.4 Most reliable means of ensuring proper placement:
  - 4.19.4.1 Request for chest radiograph. Locating the tip of the tube between the thoracic inlet and T4 (just above the carina). Connect exhaled carbon dioxide detector.
  - 4.19.4.2 Documentation of carbon dioxide in the expired gas by Capnometry and Capnograph display. Capnometry provides the numerical measurement of the inspired and end tidal PCO_2. The capnogram displays the patient's airway overtime. The essentials of a normal capnogram are:
    - 4.19.4.2.1 Zero baseline during early exhalation
    - 4.19.4.2.2 Sharp upstroke during mid – exhalation
    - 4.19.4.2.3 Relatively horizontal alveolar plateau
    - 4.19.4.2.4 Sharp down stroke and return to a zero baseline at the start of inhalation

4.20 Tape the tube in place and the depth of insertion should be recorded (in cm) at the lip line.

- 4.20.1 Cut adhesive tape longitudinally to allow half of each piece to attach to the patient's face and the other to the shaft of the ETT.
- 4.20.2 Reinforce with another tape of the same cut as necessary to anchor ETT in place.

4.21 Secure the tape avoiding pressure on the lips, particularly at the angle of the mouth and keeping the vermillion border of the lip free of tape.

4.21.1 Correct depth of insertion formula at the lip line level

4.21.1.1 Orotracheal intubation

Insertion length (cm) = (age in years/2) + 12

Insertion length (cm) = un-cuffed ETT ID x 3

4.21.1.2 Nasotracheal intubation

Insertion length = (age in years/2) + 15

4.22 Make adjustment in tube placement as ordered on the basis of chest x – ray results.

4.23 Maintain the head in a neutral position once the tracheal tube is placed and secured. Excessive movement of the head may displace the tracheal tube. Flexion of the head on the neck moves the tube farther into the airway and extension of the head displaces the tube farther out of the airway.

4.24 Inflate the cuff after intubation only upon doctor's order. Cuffed endotracheal tubes are not commonly used in young pediatric patients because the narrow diameter of the trachea at the cricoids ring allows a fairly snug fit and cuff may likely cause tracheal injury.

4.25 Assess for expansion of both sides of the chest and presence of breath sounds. Observation and auscultation help in determining correct placement of tube and that it has not slipped into the right bronchus.

4.26 Insert Oropharyngeal airway (OPA) in the unconscious patient to maintain a clear unobstructed airway. Use of Oropharyngeal airway in patient with intact cough or gag reflex is not recommended, it may stimulate gagging and vomiting.

4.26.1 Measure the correct size of Oropharyngeal airway from the corner of the mouth to the angle of the jaw. If the size is too large, it may obstruct the pharynx; if it is too small, it may push the base of the tongue back against the posterior pharynx.

4.26.2 Use tongue depressor to insert the Oropharyngeal airway in place. It may also be inserted sideways and rotated 90° into position. Upside down insertion with 180° is not recommended; it may injure tissues or push the tongue posteriorly.

4.27 Insert nasogastric tube and decompress the air in the stomach.

4.28 Observe for signs of tube dislodgement, such as audible crying or talking, oxygen desaturation on pulse Oximetry and decreased breath sounds.

4.29 Reassess the patient after the intubation procedure.

4.30 Obtain blood specimen for blood gas analysis 30 minutes to 1 hour after intubation or as ordered by the Physician. Blood gas analysis ensure adequacy of ventilation and oxygenation.

4.31 Document in the nurses note the patient's condition, date and time of intubation, size, depth and type of ETT and patient's tolerance of the procedure.

5. MATERIAL AND EQUIPMENT:

5.1 Laryngoscope with Blade and Well – Functioning Light.

5.2 Endotracheal Tubes

5.3 Glide scope

5.4 Plaster

5.5 Water Soluble Lubricant

5.6 Magill Forceps

5.7 Disposable Syringe for Cuff Inflation

5.8 Stylet

5.9 Suction System with Correct Suction Catheters

5.10 Stethoscope

5.11 Surgical Gloves

5.12 Ventilation Bag/ Ambubag and Face Mask

5.13 Ventilator

5.14 Ventilator Circuits

5.15 Heparinized Syringe

5.16 Tie/Tape

5.17 Capnograph Connectors

5.18 Oro Pharyngeal Airway
5.19 Oxygen and Medical Air Source

6. RESPONSIBILITIES:

6.1 Physician
6.2 Nurses
6.3 Respiratory Therapist

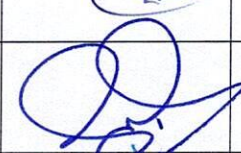
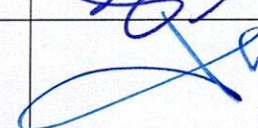
7. APPENDICES:

N/A

8. REFERENCES:

8.1 Ministry of Health, General Directorate of Nursing, Manual of Nursing Policy and Procedure, 2nd edition, 2011.
8.2 American Heart Association, Pediatric Advance Life Support Provider Manual, United States of America, 2011.
8.3 Audrey Berman, Shirlee Synder, Kozier and Erb's Fundamentals of Nursing Concept, Process And Practice, Pearson Education , 9th edition, 2011.

9. APPROVALS:

	Name	Title	Signature	Date
Prepared by:	Ms. AsmaAlShammary	Head Nurse of PICU		January 12, 2025
Prepared by:	Dr. Eman Abdelhakim Amer	Pediatric Specialist		January 12, 2025
Reviewed by:	Mr. Sabah Turayhib Al Harbi	Director of Nursing		January 13, 2025
Reviewed by:	Mr. Hassan Aldahkil	Head of Respiratory Therapy Department		January 14, 2025
Reviewed by:	Dr. Ali Alfayez	PICU Head of the Department		January 13. 2025
Reviewed by:	Mr. Abdulelah Ayed Al Mutairi	QM&PS Director		January 17, 2025
Reviewed by:	Dr. Tamer Mohamed Naguib	Medical Director		January 19, 2025
Approved by:	Mr. Fahad Hazam Al Shammari	Hospital Director		January 26, 2025