PROCEDURE

3 Endotracheal Intubation (Assist)

Cindy Goodrich

PURPOSE: Endotracheal intubation is performed to establish and maintain a patent airway, facilitate oxygenation and ventilation, reduce the risk of aspiration, and assist with the clearance of secretions.

PREREQUISITE NURSING KNOWLEDGE

- Anatomy and physiology of the pulmonary system should be understood.
- Indications for endotracheal intubation include the following[15,20]:
  - Inadequate oxygenation and ventilation
  - Altered mental status (e.g., head injury, drug overdose) for airway protection
  - Anticipated airway obstruction (e.g., facial burns, epiglottitis, major facial or oral trauma)
  - Upper airway obstruction (e.g., from swelling, trauma, tumor, bleeding)
  - Apnea
  - Ineffective clearance of secretions (i.e., inability to maintain or protect airway adequately)
  - High risk of aspiration
  - Respiratory distress, respiratory failure
- Pulse oximetry should be used during intubation so that oxygen desaturation can be quickly detected and treated (see Procedure 18).[3,14]
- Proper positioning of the patient is critical for successful intubation.
- Two types of laryngoscope blades exist: straight and curved. The straight (Miller) blade is designed so that the tip extends below the epiglottis to lift and expose the glottic opening. The straight blade is recommended for use in obese patients, pediatric patients, and patients with short necks because their tracheas may be located more anteriorly. When a curved (Macintosh) blade is used, the tip is advanced into the vallecula (the space between the epiglottis and the base of the tongue) to expose the glottic opening.
- Laryngoscope blades are available with bulbs or with a fiberoptic light delivery system. Fiberoptic light delivery systems provide a brighter light. Bulbs are prone to becoming scratched or covered with secretions.
- Video laryngoscopy is gaining increased popularity as a method for oral intubation. This involves using fiberoptics or a micro video camera encased in the laryngoscope that provides a wide-angle view of the glottic opening while attempting oral intubation. Emerging literature supports this highly effective tool as a method to increase first-pass success by providing a superior view of the glottis, compared with traditional direct laryngoscopy.[5,7,16] This method also requires minimal lifting force, resulting in less movement of the cervical spine during intubation.[13]
- Endotracheal tube size reflects the size of the internal diameter of the tube. Tubes range in size from 2 mm for neonates to 9 mm for large adults. Endotracheal tubes that range in size from 7 to 7.5 mm are used for average-sized adult women, whereas endotracheal tubes that range in size from 8 to 9 mm are used for average-sized adult men (see Fig. 2-2).[9,10,20] The tube with the largest clinically acceptable internal diameter should be used to minimize airway resistance and assist in suctioning.
- Double-lumen endotracheal tubes are used for independent lung ventilation in situations with bleeding of one lung or a large air leak that would impair ventilation of the good lung.
- Visualization of the vocal cords can be aided by using laryngeal manipulation. This is accomplished by applying backward, upward, and rightward pressure (BURP) on the thyroid cartilage to move the larynx to the right while the tongue is displaced to the left by the laryngoscope blade.[3]
- Application of cricoid pressure (Sellick maneuver) may increase the success of the intubation as long as it does not interfere with ventilation or placement of the endotracheal tube. This procedure is accomplished by applying firm downward pressure on the cricoid ring, pushing the vocal cords downward so that they are visualized more easily (see Fig. 2-1).When applied correctly it may protect against insufflation of the stomach and aspiration of the lungs. If applied incorrectly it may interfere with ventilation and make laryngoscopy intubation more difficult. *Once begun, cricoid pressure must be maintained until intubation is completed* unless there is difficulty intubating or ventilating the patient. The routine use of cricoid pressure is not recommended during cardiac arrest.[14]
- Endotracheal intubation can be done via nasal or oral routes. The route selected will depend on the skill of the practitioner performing the intubation and the patient's clinical condition.
- Nasal intubation requires a patient who is breathing spontaneously and is relatively contraindicated in trauma patients with facial fractures or suspected fractures at the

base of the skull and after cranial surgeries, such as transnasal hypophysectomy.[3]

- Improper intubation technique may result in trauma to the teeth, soft tissues of the mouth or nose, vocal cords, and posterior pharynx.
- In trauma patients with suspected spinal cord injuries and those not completely evaluated, manual in-line cervical immobilization of the head must be maintained during endotracheal intubation to keep the head in a neutral position. An assistant should be directed to manually immobilize the head and neck by placing his or her hands on either side of the patient's head, with thumbs along the mandible and fingers behind the head on the occipital ridge. Gentle, but firm stabilization should be maintained throughout the procedure.[3,10]
- Confirmation of endotracheal tube placement should be done immediately after intubation to protect against unrecognized esophageal intubation. This includes using both clinical findings and end-tidal carbon dioxide (CO_2).[3,4,14]
  - Clinical findings consistent with tracheal placement include visualization of the tube passing through the vocal cords, absence of gurgling over the epigastric area, auscultation of bilateral breath sounds, bilateral chest rise and fall during ventilation, and mist in the tube.[14,15]
  - End-tidal CO_2 detectors assist in confirming proper placement of the endotracheal tube into the trachea (see procedure 14). The presence of CO_2 in the expired air indicates that the airway has been successfully intubated, but does not ensure the correct position of the endotracheal tube.
  - Disposable end-tidal CO_2 detectors are chemically treated with a nontoxic indicator that changes color in the presence of CO_2.
  - Continuous end-tidal CO_2 (capnography) assists in confirming proper placement of the endotracheal tube into the trachea as well as allowing for detection of future tube dislodgment.
  - During cardiac arrest (nonperfusing rhythms), low pulmonary blood flow may cause insufficient expired CO_2.[22] If CO_2 is not detected, use of an esophageal detector device is recommended for confirmation of proper placement into the trachea.[2,3,14,18,23]
  - At least five to six exhalations with a consistent CO_2 level must be assessed to confirm endotracheal tube placement in the trachea because the esophagus may yield a small but detectable amount of CO_2 during the first few breaths.[15]
  - Esophageal detector devices work by creating suction at the end of the endotracheal tube by compressing a flexible bulb or pulling back on a syringe plunger. When the tube is placed correctly in the trachea, air allows for reexpansion of the bulb or movement of the syringe plunger. If the tube is located in the esophagus, no movement of the syringe plunger or reexpansion of the bulb is seen. These devices may be misleading in patients who are morbidly obese, in status asthmaticus, late in pregnancy, or in patients with large amounts of tracheal secretions.[14]
- Endotracheal tube cuff pressure should be checked after verifying correct endotracheal tube position. The cuff pressure recommended for assistance in preventing both microaspiration and tracheal damage is 20 to 30 cm H_2O.[11,17,19]
- Intubation attempts should take no longer than 15 to 20 seconds. If more than one intubation attempt is necessary, ventilation with 100% oxygen using a self-inflating manual resuscitation bag device with a tight-fitting face mask should be performed for 3 to 5 minutes before each attempt. If intubation is not successful after three attempts, consider using another airway adjunct, such as a laryngeal mask airway (LMA), Combitube, or King LT Airway (see Procedures 1, 7, and 8).
- It is important to have a clearly defined difficult/failed airway plan and alternative airway equipment available at the bedside in case of unsuccessful intubation. This may consist of a gum elastic bougie, LMA, and video laryngoscope. Surgical airway equipment such as that needed for a cricothyroidotomy should be available at the bedside in case of a failed airway.[15]
- Those assisting with intubation should have additional knowledge, skills, and demonstrated competence per professional licensure and institutional standard.

EQUIPMENT

- Personal protective equipment, including eye protection
- Endotracheal tube with intact cuff and 15-mm connector (women, 7-mm to 7.5-mm tube; men, 8-mm to 9-mm tube)
- Laryngoscope handle with fresh batteries
- Laryngoscope blades (straight and curved)
- Spare bulb for laryngoscope blades
- Flexible stylet
- Magill forceps (to remove foreign bodies obstructing the airway if present)
- Self-inflating manual resuscitation bag-valve-mask device with tight fitting face mask connected to supplemental oxygen (15 L/min)
- Oxygen source
- Luer-tip 10-mL syringe for cuff inflation
- Water-soluble lubricant
- Rigid pharyngeal suction-tip (Yankauer) catheter
- Suction apparatus (portable or wall)
- Suction catheters
- Bite-block or oropharyngeal airway
- Endotracheal tube–securing apparatus or appropriate tape
  - Commercially available endotracheal tube holder
  - Adhesive tape (6 to 8 inches long)
- Stethoscope
- Monitoring equipment: cardiac monitor, pulse oximetry, and sphygmomanometer
- Disposable end-tidal CO_2 detector, continuous end-tidal CO_2 monitoring device, and esophageal detection device
- Drugs for intubation as indicated (induction agent, sedation, paralyzing agents, lidocaine, atropine)
- Assortment of oropharyngeal airways and nasopharyngeal airways
- Rescue airways such as LMA, King LT, or Combitube

- Failed airway equipment: gum elastic bougie, video laryngoscope, optical stylet fiberoptic scope, and cricothyroidotomy kit

Additional equipment, to have available as needed, includes the following:

- Anesthetic spray (nasal approach)
- Local anesthetic jelly (nasal approach)
- Ventilator

PATIENT AND FAMILY EDUCATION

- If time permits, assess the patient's and the family's level of understanding about the condition and rationale for endotracheal intubation. ***Rationale:*** This assessment identifies the patient's and the family's knowledge deficits concerning the patient's condition, the procedure, the expected benefits, and the potential risks. It also allows time for questions to clarify information and voice concerns. Explanations decrease patient anxiety and enhance cooperation.
- Explain the procedure and the reason for intubation, if the clinical situation permits. If not, explain the procedure and reason for the intubation after it is completed. ***Rationale:*** This explanation enhances patient and family understanding and decreases anxiety.
- If indicated and the clinical situation permits, explain the patient's role in assisting with insertion of the endotracheal tube. ***Rationale:*** This explanation elicits the patient's cooperation, which assists with insertion.
- Explain that the patient will be unable to speak while the endotracheal tube is in place but that other means of communication will be provided. ***Rationale:*** This information enhances patient and family understanding and decreases anxiety.
- Explain that the patient's hands are often immobilized to prevent accidental dislodgment of the tube. ***Rationale:*** This information enhances patient and family understanding and decreases anxiety.

PATIENT ASSESSMENT AND PREPARATION

Patient Assessment

- Verify correct patient with two identifiers. ***Rationale:*** Prior to performing a procedure, the nurse should ensure the correct identification of the patient for the intended intervention.
- Assess for recent history of trauma with suspected spinal cord injury or cranial surgery. ***Rationale:*** Knowledge of pertinent patient history allows for selection of the most appropriate method for intubation, which helps reduce the risk of secondary injury.
- Assess nothing-by-mouth status, the use of a self-inflating manual resuscitation bag-valve device with mask before intubation, and for signs of gastric distention. ***Rationale:*** Increased risk of aspiration and vomiting occurs with accumulation of air (from the use of a self-inflating manual resuscitation bag-valve-mask device), food, or secretions.
- Assess level of consciousness, level of anxiety, and respiratory difficulty. ***Rationale:*** This assessment determines the need for sedation or the use of paralytic agents and the patient's ability to lie flat and supine for intubation.
- Assess oral cavity for presence of dentures, loose teeth, or other possible obstructions and remove if appropriate. ***Rationale:*** Ensures that the airway is free from any obstructions.
- Assess vital signs and assess for the following: tachypnea, dyspnea, shallow respirations, cyanosis, apnea, altered level of consciousness, tachycardia, cardiac dysrhythmias, hypertension, and headache. ***Rationale:*** Any of these conditions may indicate a problem with oxygenation or ventilation or both.
- Assess patency of nares (for nasal intubation). ***Rationale:*** Selection of the most appropriate naris facilitates insertion and may improve patient tolerance of the tube.
- Assess need for premedication. ***Rationale:*** Various medications provide sedation or paralysis of the patient as needed.

Patient Preparation

- Perform a preprocedure verification and time out. ***Rationale:*** Ensures patient safety.
- Ensure that the patient understands preprocedural teaching, if appropriate. Answer questions as they arise, and reinforce information as needed. ***Rationale:*** Understanding of previously taught information is evaluated and reinforced.
- Before intubation, initiate intravenous or intraosseous access. ***Rationale:*** Readily available intravenous or intraosseous access may be necessary if the patient needs to be sedated or paralyzed or needs other medications because of a negative response to the intubation procedure.
- Position the patient appropriately.
  - Positioning of the nontrauma patient is as follows: Place the patient supine with the head in the sniffing position, in which the head is extended and the neck is flexed. Placement of a small towel under the occiput elevates it several inches, allowing for proper flexion of the neck (see Fig. 2-3). ***Rationale:*** Placement of the head in the sniffing position allows for better visualization of the larynx and vocal cords by aligning the axes of the mouth, pharynx, and trachea.
  - Positioning of the trauma patient is as follows: Manual in-line cervical spinal immobilization must be maintained during the entire process of intubation. ***Rationale:*** Because cervical spinal cord injury must be suspected in all trauma patients until proved otherwise, this position helps prevent secondary injury should a cervical spine injury be present.
- Premedicate as indicated. ***Rationale:*** Appropriate premedication allows for more controlled intubation, reducing the incidence of insertion trauma, aspiration, laryngospasm, and improper tube placement.
- As appropriate, notify the respiratory therapy department of impending intubation so that a ventilator can be set up. ***Rationale:*** The ventilator is set up before intubation.

Procedure for Performing Endotracheal Intubation

Steps	Rationale	Special Considerations
General Setup		
1. HH	Reduces the transmission of microorganisms and body secretions. Standard Precautions.	Protective eyewear should be worn by all individuals involved in the intubation, including those who are assisting, to avoid exposure to secretions.
2. PE		
3. Establish intravenous or intraosseous access if not present.	Provides access to deliver indicated medications.	
4. Attach patient to monitoring equipment, including cardiac and blood pressure monitor and pulse oximeter.	Provides continuous patient monitoring during intubation.	
5. Set up suction apparatus, and connect rigid suction-tip catheter to tubing.	Prepares for oropharyngeal suctioning as needed.	
6. Check equipment as directed by individual performing the intubation.		
A. Gather appropriate-sized endotracheal tube.	Appropriate-sized endotracheal tubes facilitate both intubation and ventilation.	Generally a 7–7.5-mm internal diameter tube is used for adult females and an 8–9-mm internal diameter for adult males.[9,10,14,20]
B. Use 10-mL syringe to inflate cuff on tube, assessing for leaks. Completely deflate cuff.	Verifies that equipment is functional and that tube cuff is patent without leaks; prepares tube for insertion.	Once the endotracheal tube cuff has been checked for leak and it is completely deflated, place back into its packaging to avoid contamination.
C. Insert the stylet into the endotracheal tube, ensuring that the tip of the stylet does not extend past the end of the endotracheal tube.	Provides structural support for the flexible endotracheal tube during insertion. Maintaining the tip of the stylet within the lumen of the endotracheal tube prevents damage to the vocal cords and trachea.	Stylet must be recessed by at least 0.5 inch from the distal end of the tube so that it does not protrude beyond the end of the tube.
D. Connect the laryngoscope blade to the handle, and ensure the blade's bulb is securely seated.	Verifies that the equipment is functional.	Check the bulb for brightness. Replace bulb if dull or burnt out.
7. Assist in positioning the patient's head by flexing the neck forward and extending the head, into the sniffing position (only if neck trauma is not suspected; see Fig. 2-3). If spinal trauma is suspected, assist in maintaining the head in a neutral position with in-line spinal immobilization. *This is performed by manually immobilizing the head and neck by placing your hands on either side of the patient's head, with thumbs along the mandible and fingers behind the head on the occipital ridge. Use gentle but firm stabilization throughout the procedure.*[3,10] **(Level D*)**	Allows for visualization of the vocal cords with alignment of the mouth, pharynx, and trachea.	The ear (external auditory meatus) and sternal notch should be aligned when patient is examined from the side. This allows for flexion of the cervical spine.[15] Placement of a small towel under the occiput elevates it, allowing for proper neck flexion. *Do not flex or extend neck of patient with suspected spinal cord injury; the head must be maintained in a neutral position with manual in-line cervical spine immobilization.*[3]

*Level D: Peer-reviewed professional and organizational standards with the support of clinical study recommendations.

Procedure for Performing Endotracheal Intubation—*Continued*

Steps	Rationale	Special Considerations
8. Check the mouth for dentures and remove if present.	Dentures should be removed before oral intubation is attempted but may remain in place for nasal intubation.	
9. Suction the mouth and pharynx as needed if copious secretions are visualized.	Provides for a clear view of the posterior pharynx and larynx.	
10. Insert oropharyngeal airway if indicated (see Procedure 9).	Assists in maintenance of upper airway patency. Helps to improve ability to ventilate during bag-valve-mask ventilation.	Use only in unconscious patients with an absent gag reflex.
11. Preoxygenate for 3–5 minutes, with 100% oxygen via a nonrebreather mask if ventilations are adequate or via a self-inflating manual resuscitation bag-valve-mask device (see Procedure 31) if ventilations are inadequate. **(Level D*)**	Helps prevent hypoxemia. Gentle breaths reduce incidence of air entering stomach (leading to gastric distention, aspiration), decrease airway turbulence, and distribute ventilation more evenly within the lungs. Preoxygenation ensures that nitrogen is washed out of the lungs and will extend the allowable apneic time until the oxygen in the lungs is used up.[4,15]	Bag-valve-mask ventilation may not be needed in the spontaneous breathing patient. Avoid aggressive positive-pressure ventilation with a self-inflating manual resuscitation bag because this may increase the risk for gastric vomiting.
12. Premedicate patient as directed by the practitioner intubating the patient.	Sedates and relaxes the patient, allowing easier intubation.	This may require a second assistant to administer and document medications given before, during, and after intubation.
13. Remove oropharyngeal airway if present.	Clears the airway for advancement of the laryngoscope blade and endotracheal tube.	
14. Have self-inflating manual resuscitation bag-valve-mask device connected to 100% oxygen source and face mask ready for hyperoxygenation and manual ventilation.	Intubation attempts should not take longer than 30 seconds. Patients need to be hyperoxygenated and ventilated between intubation attempts.[3,4]	If intubation is unsuccessful within 30 seconds, or the patient's oxygen saturations falls below 90% during the attempt, remove the tube.[15] Ventilate with 100% oxygen with a bag-valve-mask device before another intubation attempt is made. Before reattempting intubation, correct problems related to positioning, procedure, or equipment
15. Apply external laryngeal manipulation (BURP) and/or cricoid pressure **ONLY** as directed by the practitioner performing the intubation.	External laryngeal manipulation (BURP) may assist with visualization of the vocal cords.[3] Apply BURP on the thyroid cartilage to move the larynx to the right while the tongue is displaced to the left by the laryngoscope blade.[3] Cricoid pressure moves the trachea toward the posterior, which may provide better visualization of the vocal cords by the practitioner.	In some cases, the intubator may perform BURP manipulation by him- or herself to initially visualize the vocal cords. The assistant should be prepared to take over for the intubator once the cords are visualized. Once cricoid pressure (Sellick maneuver) is applied, it must be maintained until the intubation is completed. The intubator may request the assistant to retract the corner of the patient's right lip to increase the field of view.

*Level D: Peer-reviewed professional and organizational standards with the support of clinical study recommendations.

Procedure continues on following page

Procedure for Performing Endotracheal Intubation—*Continued*

Steps	Rationale	Special Considerations
16. Once the tube has been correctly placed, assist with cuff inflation as directed. Inflate cuff with 5–10 mL of air depending on the manufacturer's recommendations. Do not overinflate the cuff.	Inflation volumes vary depending on manufacturer and size of tube. Keep cuff pressure between 20 and 30 mm Hg to decrease risk of aspiration and prevent ischemia and decreased blood flow.[11,14]	In adults, decreased mucosal capillary blood flow (ischemia) results when pressure is greater than 40 mm Hg.[4,14] Consider using a manometer to measure cuff pressure and increase or decrease pressure as indicated to achieve cuff pressure of 20–30 mm Hg.
17. Once endotracheal tube has been placed, assist with confirmation of tube placement as directed by the intubator. Continue ventilating with 100% O_2 self-inflating manual resuscitation bag.	Ensures correct placement of endotracheal tube into trachea.	If requested, hold the endotracheal tube securely at the lip, making note of how far tube has been placed into trachea by noting markings on endotracheal tube. Avoid hyperventilation; gently ventilate with 10–12 breaths per minute watching for visible chest rise.[4,14]
A. Auscultate over epigastrium. **(Level D*)**	Allows for identification of esophageal intubation.[4,14]	If air movement or gurgling is heard, esophageal intubation has occurred. The tube must be removed and intubation reattempted. Improper insertion may result in hypoxemia, gastric distention, vomiting, and aspiration.
B. Auscultate lung bases and apices for bilateral breath sounds. **(Level D)**	Assists in verification of correct tube placement into the trachea. A right main-stem bronchus intubation results in diminished left-sided breath sounds.[3,4]	
C. Observe for symmetrical chest wall movement. **(Level D)**	Assists in verification of correct tube placement.[3,4,14]	Absence may indicate right main-stem or esophageal intubation.
D. Attach disposable end-tidal CO_2 detector. Watch for color change, which indicates the presence of CO_2. **(Level B*)**	Disposable CO_2 detectors may be used to assist with identification of proper tube placement.[6,9,18,21] Detection of CO_2 confirms proper endotracheal tube placement into the trachea.[3,4,14]	CO_2 detectors usually are placed between the self-inflating manual resuscitation bag-valve device and the endotracheal tube. CO_2 detectors should be used in conjunction with physical assessment findings. At least five to six exhalations with a consistent CO_2 level must be assessed to confirm endotracheal tube placement in the trachea because the esophagus may yield small but detectable amounts of CO_2 during the first few breaths.[15]
or		
Attach continuous end-tidal CO_2 monitor and watch for detection of CO_2 (see Procedure 14). **(Level B)**	Continuous end-tidal CO_2 is a reliable indicator of proper tube placement and also allows for detection of future tube dislodgment.[14]	At least five to six exhalations with a consistent CO_2 level must be assessed to confirm endotracheal tube placement in the trachea because the esophagus may yield small but detectable amounts of CO_2 during the first few breaths.[15]

*Level B: Well-designed, controlled studies with results that consistently support a specific action, intervention, or treatment.
*Level D: Peer-reviewed professional and organizational standards with the support of clinical study recommendations.

Procedure for Performing Endotracheal Intubation—*Continued*

Steps	Rationale	Special Considerations
Or		
Consider use of esophageal detection device in cardiac arrest. **(Level B*)**	During cardiac arrest (nonperfusing rhythms), low pulmonary blood flow may cause insufficient expired CO_2.[22] If CO_2 is not detected, use of an esophageal detector device is recommended.[2,8,12,18,23]	
E. Evaluate oxygen saturation (Spo_2) with noninvasive pulse oximetry (see Procedure 18). **(Level D*)**	Spo_2 decreases if the esophagus has been inadvertently intubated. The value may or may not change in a right main-stem bronchus intubation.[4,14]	Spo_2 findings should be used in conjunction with physical assessment findings.
18. If CO_2 detection, assessment findings, or Spo_2 reveals that the tube is not correctly positioned, deflate cuff and assist with tube removal as directed by the intubator. Ventilate and hyperoxygenate with 100% oxygen for 3–5 minutes, then assist with reattempt at intubation, beginning with Step 11.	Esophageal intubation results in gas flow diversion and hypoxemia.[4,11]	
19. If breath sounds are absent on the left, cuff should be deflated and withdrawn by 1–2 cm. Reevaluate for correct tube placement (Step 17) as directed by the intubator.	Absence of breath sounds on the left may indicate right main-stem intubation, which is common because of the anatomical position of the right main-stem bronchi.	When correctly positioned, the tube tip should be halfway between the vocal cords and the carina.[2]
20. Connect endotracheal tube to oxygen source via self-inflating manual resuscitation bag-valve device, or mechanical ventilator, using swivel adapter.	Reduces motion on tube and mouth or nares.	
21. Insert a bite-block or oropharyngeal airway (to act as a bite-block) along the endotracheal tube, with oral intubation if indicated.	Prevents the patient from biting down on the endotracheal tube.	The bite-block should be secured separately from the tube to prevent dislodgment of the tube.
22. Secure the endotracheal tube in place as directed (according to institutional standard). **(Level B)**	Prevents inadvertent dislodgment of tube.[1,4,9,14]	Commercial tube holder or tape should not cause compression on sides or front of the neck, which may impair venous return to the brain.[14] Consider manually holding the endotracheal tube when moving the patient to prevent inadvertent dislodgement of the tube.
Use of Commercially Available Endotracheal Tube Holder		
A. Apply according to manufacturer's directions. **(Level M*)**	Allows for secure stabilization of the tube, decreasing the likelihood of inadvertent extubation.	Commercially available tube holders are often more comfortable for patients and easier to manage if the endotracheal tube is manipulated.[15]

*Level B: Well-designed, controlled studies with results that consistently support a specific action, intervention, or treatment.
*Level D: Peer-reviewed professional and organizational standards with the support of clinical study recommendations.
*Level M: Manufacturer's recommendations only.

Procedure continues on following page

Procedure for Performing Endotracheal Intubation—*Continued*

Steps	Rationale	Special Considerations
Use of Adhesive Tape		
A. Prepare tape as shown in Fig. 2-10.	Use of a hydrocolloid membrane on the patient's cheeks helps protect the skin.	
B. Secure tube by wrapping double-sided tape around patient's head and torn tape edges around endotracheal tube.	Secures the endotracheal tube in place.	Tape should not cause compression on sides or front of the neck, which may impair venous return to the brain.[14]
23. Reevaluate for correct tube placement **(Step 17).**	Verifies that the tube was not inadvertently displaced during the securing of the tube.	
24. Note position of tube at teeth or gums (use centimeter markings on tube).	Establishes a baseline for future assessment of possible endotracheal tube migration, in or out.	Common tube placement at the teeth or gums is 20–21 cm for women and 22–23 cm for men.[10,15]
25. Hyperoxygenate and suction endotracheal tube and pharynx (see Procedure 10) as needed.	Removes secretions that may obstruct tube or accumulate on the top of the cuff.	
26. Confirmation of correct tube position should be verified with a chest radiograph. **(Level D*)**	Chest radiograph documents actual tube location (distance from the carina). Because a chest radiograph is not immediately available, it should not be used as the primary method of tube assessment.[3,10,14]	
27. Remove PE.	Reduces transmission of microorganisms and body secretions; Standard Precautions.	
28. HH		

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Expected Outcomes

- Placement of patent artificial airway
- Properly positioned and secured airway
- Improved oxygenation and ventilation
- Facilitation of secretion clearance

Unexpected Outcomes

- Intubation of esophagus or right main-stem bronchus (improper tube placement)
- Accidental extubation
- Cardiac dysrhythmias because of hypoxemia and vagal stimulation
- Broken or dislodged teeth
- Leaking of air from endotracheal tube cuff
- Oral or nasal trauma with bleeding
- Tracheal injury at tip of tube or at cuff site
- Laryngeal edema
- Vocal cord trauma
- Suctioning of gastric contents or food from endotracheal tube (aspiration)
- Obstruction of endotracheal tube

Patient Monitoring and Care

Steps	Rationale	Reportable Conditions
		These conditions should be reported if they persist despite nursing interventions.
1. Auscultate breath sounds on insertion, with every manipulation of the endotracheal tube and every 2–4 hours.	Allows for detection of tube movement or dislodgment.	• Absent, decreased, or unequal breath sounds
2. Maintain tube stability, with use of specially manufactured holder, twill tape, or adhesive tape.	Reduces risk of movement and dislodgment of tube.	• Unplanned extubation
3. Monitor and record position of tube at teeth, gums, or nose (in reference to centimeter markings on tube).	Provides for identification of tube migration.	• Tube movement from original position
4. Maintain endotracheal tube cuff pressure of 20–30 mm Hg.[11,14]	Provides adequate inflation to decrease aspiration risk and prevents overinflation of cuff to avoid tracheal damage.[11,14]	• Cuff pressure less than 20 or higher than 30 mm Hg that persists despite nursing interventions.
5. Hyperoxygenate and suction endotracheal tube, as needed (see Procedure 10).	Prevents obstruction of tube and resulting hypoxemia.	• Inability to pass a suction catheter • Copious, frothy, or bloody secretions • Significant change in amount or character of secretions
6. Assess for pain and inadequate sedation.	Allows identification of pain and/or discomfort related to the intubation.	• Pain not controlled by medications or nursing interventions • Observed ventilator dyssynchrony
7. Inspect nares or oral cavity once per shift while patient is intubated.	Allows for the detection of skin breakdown and necrosis.	• Redness, necrosis, skin breakdown

Documentation

Documentation should include the following:

- Patient and family education
- Vital signs before, during, and after intubation, including oxygen saturation and end-tidal CO_2
- Size of endotracheal tube
- Type of intubation: oral or nasal
- Type and size of blade used
- Depth of endotracheal tube insertion centimeters at teeth, gums, or naris
- Confirmation of tube placement, including chest radiograph, end-tidal CO_2 detector, capnography (method of placement confirmation)
- Clinical confirmation of tube placement including assessment of breath sounds
- Measurement of cuff pressure
- Number of intubation attempts
- Use of any medications
- Patient response to procedure
- Occurrence of unexpected outcomes
- Pain assessment, interventions, and effectiveness

References and Additional Readings

For a complete list of references and additional readings for this procedure, scan this QR code with any freely available smartphone code reader app, or visit http://booksite.elsevier.com/9780323376624.

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