

Nasogastric Tube: Inserting and Verifying Placement in the Adult Patient

What is Involved in Inserting and Verifying Placement of a Nasogastric Tube in the Adult Patient?

- › A nasogastric tube (NGT) is a flexible tube that provides access to the stomach through the nose. This topic focuses on the steps involved in inserting and verifying placement of the two most commonly used types of NGTs: the Levin tube (**Figure 1**), which has a single lumen, and the Salem-sump (**Figure 2**), which has two lumens—one for drainage and a smaller one that is left open to the atmosphere to provide ventilation. For information about the types of NGTs, see *Nursing Practice & Skill ... Nasogastric Tube: an Overview*

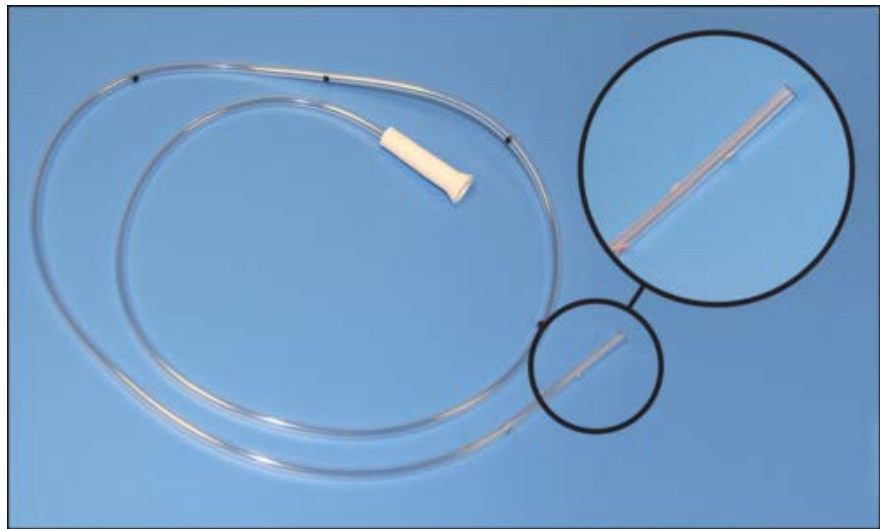


Figure 1: Levin nasogastric tube. Copyright© 2014, EBSCO Information Services.

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March 25, 2016

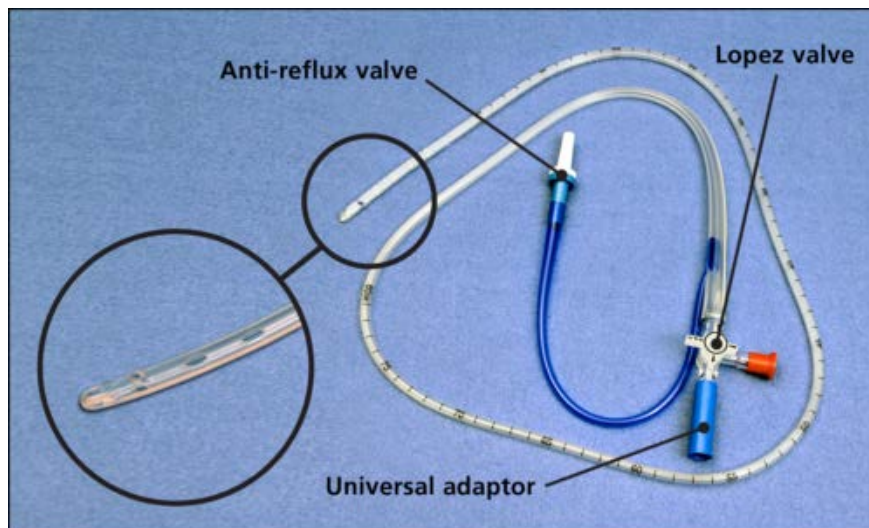


Figure 2: Salem-sump nasogastric tube with anti-reflux valve attached to the vent lumen and a Lopez adaptor set in the instillation/suction lumen. Copyright© 2014, EBSCO Information Services.

- *What:* Although inserting an NGT is a commonly performed procedure, it is not without significant risk if done improperly. Inserting an NGT in the adult patient involves assessing the patient to confirm he/she meets the criteria for placement (see *What You Need to Know Before Inserting and Verifying Placement of a Nasogastric Tube in the Adult Patient*, below), teaching the patient about the procedure and what is expected of him/her during the NGT insertion process, measuring the NGT for insertion, inserting the NGT, confirming placement, and monitoring the patient for complications following insertion
- *How:* Insertion of an NGT is usually a “blind” procedure (i.e., inserted without direct observation) using clean, not sterile, technique. Insertion involves passing the tube through the nose, along the nasal floor, through the pharynx and down the esophagus until the proximal tip of the tube rests in the patient’s stomach. The nurse is responsible for verifying the NGT has been placed properly prior to initial use and before each use thereafter. Standard precautions should be observed throughout each of the steps
- *Where:* NGTs are used in all patient care settings for diagnostic and therapeutic purposes (see *Why is Inserting and Verifying Placement of a Nasogastric Tube in the Adult Patient Important?*, below). However, they are found most frequently in inpatient facilities because NGTs are used primarily as a short-term method of providing nutrition, administering medication, decompressing the stomach, relieving gastric bloating, or following surgery to reduce the risk of vomiting. **Note: Effective 2016, The Joint Commission (TJC) requires that all enteral feeding tubes be outfitted with a ENFit-type connector to prevent inadvertent connection of tubes with different functions (e.g., connecting a feeding administration set to a tracheostomy tube, or an intravenous (I.V.) tube to epidural tubing** (TJC, 2014)
- *Who:* Typically, NGTs are inserted and removed by registered nurses, physicians, and registered dietitians. Registered nurses are principally responsible for providing the daily care of NGTs, as well as the administration of nutritional formulas, medications, and other substances. Due to the invasive nature of the placement process, it is generally not advisable to have visitors present during placement or removal of the NGT

What is the Desired Outcome of Inserting and Verifying Placement of a Nasogastric Tube in the Adult Patient?

- › The desired outcome of inserting an NGT is to establish safe and effective enteral access with minimal patient discomfort, trauma, or other complications. The tube is removed when its diagnostic or therapeutic function is no longer needed

Why is Inserting and Verifying Placement of a Nasogastric Tube in the Adult Patient Important?

- › Insertion and use of the NGT is important to
 - provide nutrition to patients with functional gastrointestinal tracts who cannot meet their nutritional needs through the oral route
 - Candidates for NGT feeding include patients with impaired swallowing; altered level of consciousness (see **Red Flags**, below); limited oral intake due to disease-related symptoms such as anorexia, early satiety, or fatigue; or other medical conditions that prevent safe and adequate oral intake

- Inadequate nutrition is associated with increased morbidity and mortality (e.g., infection, poor skin integrity, delayed wound healing, impaired catabolic response), and increased length of hospital stay
- Compared with parenteral nutrition, NGT feeding has been linked to favorable clinical outcomes, including
 - maintaining GI structure and function, which reduces the risk of GI atrophy during disuse
 - moderating metabolic response
 - preventing bacterial translocation (i.e., passage of viable indigenous bacteria from the intestinal tract through the epithelial mucosa to the mesenteric lymph nodes, and then to systemic circulation)
 - supporting blood flow to abdominal organs
 - enhanced absorption and digestion of nutrients
 - decreased rate of infection
 - cost savings
- administer fluids, medication, and other substances (e.g., activated charcoal, radiological contrast agents) when oral administration is not viable
- remove stomach contents (e.g., in cases of GI bleeding, gastric lavage [“stomach pump” or washing] for medication overdose)
- decompress the stomach to prevent aspiration of stomach contents when peristalsis is impaired
- treat gastric or esophageal hemorrhage
- manage patients with vomiting refractory to medical management or severe pancreatitis—suctioning acidic gastric fluid can result in reduced pancreatic secretions
- provide diagnostic information (e.g., to evaluate for diaphragmatic rupture, to collect gastric contents for analysis)

Facts and Figures

- › The reported error rate in NGT placement—in which the tube is misplaced into the bronchi, inserted through the lung parenchyma into the intrapleural space, or coiled/knotted upward—varies between 0.3–20% (Peter et al., 2009)
- › The American Association of Critical-Care Nurses (AACN) endorses the practice of confirming the position of NGTs by X-ray. Observing this recommendation is critical if the patient is using proton pump inhibitors or acid-reducing medications or is receiving ongoing enteral feeding, all of which can alter the pH of gastric contents (Bourgault, 2009)
 - Investigators conducted a research study in 2008 which concluded that a pH measurement of gastric aspirate ≤ 4.0 is sufficient to verify NGT placement in the stomach (Stock et al., 2008)
 - A 2013 study that evaluated the accuracy of using the pH of gastric aspirate to evaluate NGT placement reported that using a pH threshold of 4.0 increases the rate of inaccurate analysis, encourages excess X-ray use and misinterpretation, and leads to delays in feeding; however, a threshold > 5.0 was shown to result in failure to detecting pulmonary, esophageal, or intestinal placement (Taylor, 2013)
 - In a recent study examining the insertion of 127 NGTs, investigators determined that use of electromagnetic trace-guided insertion (i.e., NGT insertion guided by an electromagnetic tracking device) resulted in 100% agreement with X-ray confirmation and/or placement confirmation using gastric aspiration with a pH threshold ≤ 5 (Taylor et al., 2014)

What You Need to Know Before Inserting and Verifying Placement of a Nasogastric Tube in the Adult Patient

- › Prior to inserting or removing an NGT, the clinician should be familiar with the following:
 - Anatomy and physiology of the nose, nasal cavity, and pharynx, including the nasopharynx and laryngopharynx (**Figure 3**)

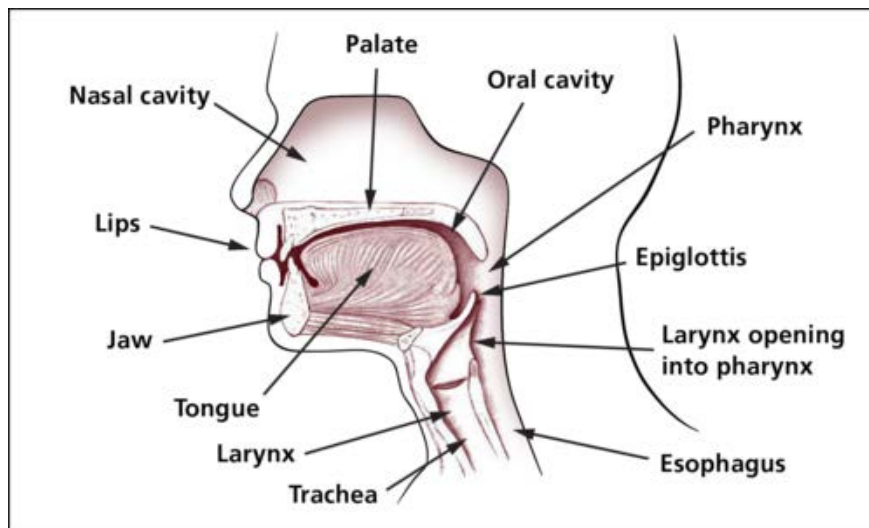


Figure 3: Nose, nasal cavity, and pharynx. This image is in the public domain in the United States

- The anterior nares form the exterior opening to the nasal cavity. Usually one nare is larger than the other. A septum, comprised of bone and cartilage, divides the right and left nasal cavities
- The nasal floor is parallel to the roof of the mouth. The end of the nasal cavity is narrow and ends at the juncture of several bones, including a portion of the cribriform plate, which is a very thin bone that, if fractured, could provide a direct portal into the brain. **Use great care when performing NGT placement in patients with suspected head trauma**
- The nasopharynx is a muscular passageway at the beginning of the pharynx, located behind the nasal cavity. It curves to extend behind the oral cavity to become the oropharynx
- The epiglottis is a cartilaginous flap of connective tissue located at the entrance to the larynx. During swallowing, the larynx moves upward and the epiglottis bends forward to close over the glottis to prevent aspiration of food and fluid into the trachea. Many clinicians exploit this natural movement during NGT insertion by asking patients to swallow ice chips or water once the NGT passes beyond the oropharynx (back of the oral cavity)—the movement of larynx (rising and falling of the larynx) and the opening and closing of the epiglottis can assist passage of the NGT beyond the laryngopharynx (i.e., portion of the throat that connects to the esophagus at approximately the 4th to 6th cervical vertebrae) toward the esophagus
- Physical assessment skills for the respiratory and GI systems
 - Be especially alert to *hyperactive* borborygmi sounds (i.e., stomach “growling” caused primarily by contractions of the muscles of the stomach and small intestine). Physical obstruction can be suspected if the sounds are particularly prominent and are accompanied by cramping abdominal pain
- Levin and Salem-sump NGTs
 - In general, NGTs are typically made of silastic and polyethylene compounds that are sufficiently flexible to avoid injury to the patient—the larynx, esophagus, and stomach are vulnerable to tearing or erosion during tube insertion. Some tubes have graduated markings at 10 cm/4 in intervals on the lumen that permit the clinician to measure the length of the tubing being inserted into the patient and monitor the external tubing length, which can indicate a change in placement — **monitoring the external length alone is insufficient to confirm original placement** because retrograde movement can occur (i.e., the tip of the tube can knot or coil upward). The proximal (gastric) end of most NGTs includes multiple drainage holes (perforations) and a radiopaque line that permits radiographic confirmation of the tube’s position
 - The Levin tube, the most commonly used NGT, has a single lumen, is typically 90–110 cm/35–43 in long, and is commonly available in sizes 12 Fr (small) to 18 Fr (large) for adults. Note: Investigators reported a significantly higher incidence of middle ear infections among ICU patients with NGTs having a diameter of 12 Fr and 16Fr, as compared to 18 Fr (González et al., 2013). Smaller sizes are available for pediatric patients (for more information, see *Nursing Practice & Skill ... Nasogastric Feeding Tube: Insertion and Placement Verification in the Pediatric Patient*). Caution must be observed when suction is applied to this tube because the negative air pressure can create a vacuum (if the proximal tip of the tube rests against tissue) and injure the stomach lining through trauma or erosion—intermittent suction < 40 mm Hg is commonly ordered
 - The Salem-sump, also called the gastric sump or ventral tube, is the second most commonly used NGT. It has two lumens: the smaller lumen (colored blue) is left open to the atmosphere for ventilation and the sump or larger lumen is used for suction or instillation of oral agents. The two-lumen design permits continuous suction because the smaller lumen vents the tube to atmospheric pressure to reduce the risk that a vacuum will form within the stomach and cause

the NGT to adhere to the gastric mucosa. Although the Salem-sump NGT permits continuous suction, many clinicians prefer to use intermittent suction at levels ≤ 120 mm Hg. The recommended level of continuous vacuum is 30–40 mm Hg with slight increases until flow is observed

- Typically, the Salem-sump is packaged with an anti-reflux valve that should be seated firmly in the vent lumen—the blue end of the valve is inserted into the lumen. This valve prevents excess fluid from being ejected through the vent lumen
- The Salem-sump is most commonly used for evacuation due to its larger caliber
- Proper use of adaptors when NGTs are accessed for multiple purposes in order to avoid the need to disconnect the distal end of the NGT. The Salem-sump usually contains a 5-in-1 adaptor that should be fitted into the instillation/suction lumen and the suction tubing. Many facilities utilize a stopcock-type valve (e.g., Lopez valve) instead of the 5-in-1 adaptor (see discussion below for more information). Note: **Effective 2016, current use of these adaptors will be superseded by ENFit adaptors** (see *What is Involved in Inserting and Verifying Placement of a Nasogastric Tube in the Adult Patient?*, above)
- The Lopez valve is a 3-way stop-cock device that permits access to the enteral system (for delivery of oral agents and for suction) without disconnecting the instillation/suction lumen **(Figure 4)**. Some Lopez valves include a cap that is tethered to the device

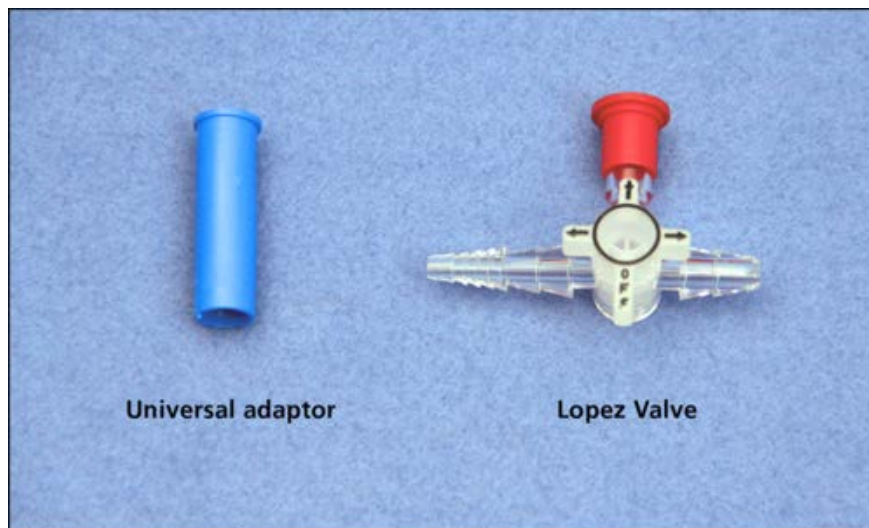


Figure 4: Lopez valve with universal adaptor. Copyright© 2014, EBSCO Information Services.

- Other types of adaptors that can be inserted into the instillation/suction lumen include “Y”-adaptors with several flexible ports that can be clamped when not in use (e.g., Viasys Y-adaptor, Kangaroo Y-site adaptor, GiENTRI port with selector knobs that permit suction, irrigating, and medicating through a single closed port)
- Use of vasoconstrictive agents and topical anesthetic agents
 - Vasoconstrictive sprays (e.g., phenylephrine hydrochloride 1%, oxymetazoline) are commonly used to reduce the size of the nasal mucosa, especially the inferior turbinate and nasal septum, prior to insertion. Temporarily shrinking the superficial blood vessels in these areas increases the size of the nasal passageway and reduces the risk of epistaxis (i.e., nosebleed)
 - Anesthetizing medication (e.g., benzocaine or tetracaine/benzocaine/butyl spray, 2% viscous lidocaine either applied to the tube itself or 10 mL via syringe into the more patent nostril and asking the patient to sniff and swallow) is used to decrease patient discomfort during NGT insertion
 - Lidocaine 4% nebulized through a face mask (≤ 4 mg/kg, not to exceed 200 mg per dose in adults)
 - **Be aware that airway protection (e.g., gag reflex, cough) can be compromised by administration of excessive topical anesthesia**
 - See **Red Flags**, below, regarding information about the risk of using benzocaine topical sprays; methemoglobinemia (i.e., blood disorder characterized by production of an abnormally high level of methemoglobin, a form of oxidized hemoglobin that is unable to bind with and transport oxygen) can occur in the presence of benzocaine
- › Prior to placing an NGT, the patient should be assessed to determine if he/she meets the criteria for NGT placement
 - Check for absence of nasal injuries or anatomy-related conditions that can impede insertion of the NGT, such as patients
 - with a severely deviated septum—oro gastric insertion can be necessary
 - who have sustained maxillofacial trauma that may have fractured the cribriform plate

- at risk for elevated intracranial pressure—the insertion of an NGT can exacerbate the condition
- with esophageal pathology (e.g., recent ingestion of caustic substance, strictures, varices)
- If the NGT will be used for feeding, the patient should have
 - an intact gag reflex—a diminished cough or gag reflex increases the risk of tracheobronchial aspiration
 - no esophageal reflux
 - normal gastric emptying
 - a functional stomach not involved in primary disease
- › Complications associated with use of an NGT range from minor (e.g., nasal irritation, epistaxis, sinusitis) to more severe, which include
 - placement related issues:
 - Inadvertent placement in the trachea leading to pleural injury, pneumothorax, tracheobronchial **aspiration, pneumonia, and death** if fluids or other agents are infused—although some coughing and brief choking are normal responses for some patients when an NGT is inserted (especially if the patient has a sensitive gag reflex). Note that these symptoms, combined to the inability to speak or breathe, are indicative of airway placement
 - Esophageal perforation—evidenced by neck and chest pain, dysphagia, dyspnea, subcutaneous emphysema, hematemesis (i.e., bloody vomiting)
 - Inadvertent intracranial placement through a fractured cribriform plate— **NGT placement in patients with maxillofacial injuries should not be done blindly** , direct visualization using fluoroscopy should be employed
 - Knotting of the NGT around an endotracheal tube or retrograde positioning (i.e., the proximal tip curving upward through the esophagus)
 - trauma to the nares or larynx, esophagus, and/or stomach during insertion
 - trauma to or erosion of gastric mucosa, which is more common if gastric suctioning is prolonged
- › Patients who have an NGT tend to breathe through their mouths, which makes oral care and nasal hygiene more important than usual, with focus on keeping the oral mucous membranes moist to prevent infection (e.g., parotitis). Provide lubricant for lips and the external nares. Check to confirm the NGT is not pressing against the nares or septum, as this could lead to skin breakdown
- › Preliminary steps that should be performed before inserting and verifying placement of an NGT include the following:
 - Review the facility/unit-specific protocol for inserting and verifying placement of an NGT, if one is available
 - Review the treating clinician’s orders regarding the NGT
 - Note the type and size of the NGT to be inserted and the purpose for which it has been ordered (e.g., suction; decompression; administration of nutrition, medication, or other agents)
 - Verify completion of facility informed consent documents, if appropriate. Typically, the general consent for treatment executed by patients at admission to a healthcare facility includes standard provisions that encompass insertion and use of an NGT
 - Review the patient’s medical history/medical record for
 - history of any related surgery or injury to the nose, nasal cavity, pharynx, esophagus, stomach, or head
 - any allergies (e.g., to latex, medications, or other substances); use alternative materials, as appropriate
 - laboratory test results to check for coagulopathies or blood dyscrasias (e.g., CBC, PTT if the patient is receiving heparin, or PT if the patient is using warfarin)

- Assess the patient for knowledge deficits and anxiety regarding insertion of the NGT
- Determine if the patient requires special considerations regarding communication (e.g., due to illiteracy, language barriers, or deafness); make arrangements to meet these needs if they are present
 - Use a professional certified medical interpreter when a communication barriers exists
- Explain the procedure and its purpose; answer any questions and provide emotional support as needed
 - Advise the patient that he/she may feel some discomfort as the tube moves through the nose, but that the tube will be lubricated to ease its passage. In addition, prescribed topical anesthetic and nasal vasoconstriction will be administered
 - Explain that he/she will be given a cup of water to sip or ice chips to swallow once the tube reaches the pharynx. The swallowing action will facilitate passage of the tube and minimize the natural tendency to gag
 - Ask the patient to identify a signal he/she will use to communicate with you if it is necessary to stop briefly during the insertion
- › Observe standard precautions throughout the procedure
- › Assess the patient to determine if the patient meets the criteria for NGT placement (see *What You Need to Know Before Inserting and Verifying Placement of a Nasogastric Tube in the Adult Patient*, above). Also assess
 - mental status (Will the patient be able to cooperate with the tube placement?)
 - the patient's nares
 - Use a penlight to inspect for anatomical abnormalities
 - Ask the patient to breathe through his or her nose and occlude one nostril at a time to determine patency
 - Clinical Tip: In most patients, one nare is usually larger than the other—select the larger nare to ease insertion. Examine each nare in order to determine the most patent opening and check for lesions or obstruction. This can also be accomplished by asking the patient to occlude each nostril separately and advise which permits greater air flow during respiration
- › Check the condition of the NGT for defects (e.g., rough edges); use the catheter to flush water through the lumen to verify it is intact and patent
 - Clinical Tip: The flexibility of the tube can be adjusted by placing it in ice water (if it is too soft) or in warm water (if it is too rigid). This can be particularly useful if the curve of the NGT does not track the natural curve of the nasopharyngeal passage
- › Because you will use your dominant hand to insert the tube, stand on the patient's right side if you are right-handed or on the patient's left side if you are left-handed
- › Obtain the patient's verbal consent prior to beginning the procedure
- › Position and drape the patient for privacy and accessibility
 - If possible, the patient should be placed in a high-Fowler's position or, at minimum, the patient's upper body should be elevated at a 45° angle
 - Assist the patient in positioning his or her head in a neutral position, neither tilted forward nor backward
 - Place a towel or waterproof linen-saver across the patient's chest as a protective barrier and place the emesis basin and facial tissues within the patient's reach
- › Clear the nares. Ask the patient to gently blow his or her nose. Alternatively, use the cotton-tipped swabs to remove debris
- › There are two methods commonly used to measure the length of the NGT to be inserted into the patient
 - Method #1:
 - Use the distance from the nares to the earlobe or tragus (i.e., the projection on the inner side of the external ear that partially covers the opening of the ear canal) to the xiphoid process (i.e., the pointed cartilage attached to the lower end of the breastbone or sternum) to determine the insertion length: While holding the gastric end of the NGT next to the tip of the patient's nose, extend the tube to the tragus or earlobe. Hold the tube at the tragus or earlobe and extend the tube downward to the xiphoid process (Point X) **(Figure 6)** **(Figure 7)** . Mark this distance (Point X), plus another inch or two (2.5–5.1 cm/1–2 in), on the tube with a permanent marker or use the smaller strip of precut tape to indicate how far the tube should be inserted



Figure 6: Measuring the distance from the tip of the earlobe or tragus to the nare. Copyright© 2014, EBSCO Information Services.



Figure 7: Measuring the distance from the tip of the nose to the xiphoid process. Copyright© 2014, EBSCO Information Services.

- Method #2: Measure 50 cm/19.7 in from the gastric end of the NG tube (Point A). Repeat the steps of Method #1, above. Mark Point B- the distance of the tube to be inserted into the patient, which is the midpoint between Point A and Point X (Figure 8)

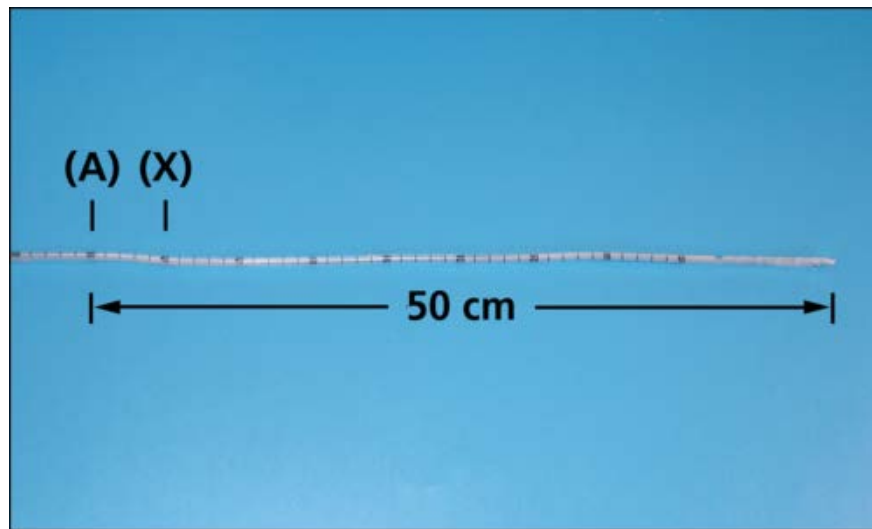


Figure 8: Measuring the length of the nasogastric tube for gastric placement. Copyright©2014, EBSCO Information Services

–Note: The length of the tube inserted into the patient should be recorded in the patient’s chart in the event the tube becomes dislodged or there is suspicion that the tube has migrated from the stomach

- › Administer prescribed medication
 - Vasoconstrictive spray can be administered shortly before insertion
 - Anesthetic agents directed into the selected nares (e.g., 2% lidocaine jelly administered via slip tip syringe or 4% lidocaine administered via an atomizer directed) should be administered 5–10 minutes prior to the procedure. If benzocaine spray is used, administer it into the oropharynx immediately prior to insertion
 - Although some clinicians apply the viscous lidocaine directly to the NGT, instilling the medication into the more patent nare and asking the patient to sniff (the medication into the back of the nose) and swallow (to coat the oropharyngeal area) will anesthetize the area prior to insertion and more completely coat the passage
- › Place the emesis basin within the patient’s reach
- › Apply water-soluble lubricant to the last 5–7.5 cm/2–3 in of the proximal tip of the NGT or, if the tube is coated with lubricant, activate the coating by placing the tip of the tube in sterile water
- › Encourage the patient to hold his or her head upright; you may wish to support the patient’s head with your nondominant hand while inserting the NGT
- › Hold the NGT so that its curve (most tubes are curved when they are first removed from the packaging) follows the anatomical curve of the nasal cavity and nasopharynx
 - Clinical tip: Because fluid/material in a patient’s stomach can pour from the NGT immediately after insertion, it is prudent to attach a Lopez valve (or other adaptor to close the lumen) to the distal lumen of the NGT prior to inserting the tube. If inserting a Salem-sump, apply an anti-reflux valve to the sump lumen
- › Insert the gastric end of the NGT into the selected nostril
- ›
- › To avoid damaging the nasal turbinates (i.e., the spongy and well-vascularized bones in the upper portion of the nasal passage), aim downward toward the tip of the ear— **remember the passageway from the external nares to the nasopharynx is relatively flat and parallel to the patient’s mouth (Figure 9)**. Clinicians new to the procedure often make the mistake of inserting the NGT upright following the angle of the exterior nose instead of maintaining a horizontal angle, parallel to the mouth. *Slowly* guide the tip of the NGT into the nose until the tube appears at the back of the oral cavity (oropharynx)
 - If resistance is felt, it can help to change the direction of the tip of the tube by rotating the tube slightly

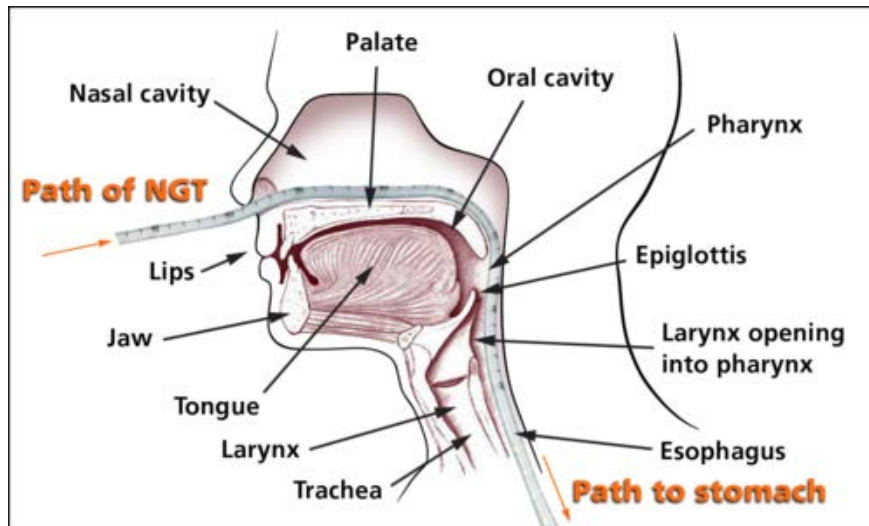


Figure 9: Aim the nasogastric tube downward toward the tip of the ear toward the nasopharynx. This image is in the public domain in the United States

- › Resistance may be felt when the NGT reaches the posterior pharyngeal wall because the passageway is curved to extend behind the oral cavity—bending the NGT so that it tracks the natural curve of the nasopharynx will promote easier insertion. Ask the patient to flex his or her head toward the chest to open the esophagus. Rotate the NGT to avoid pushing the curved tip into the patient’s mouth
- › If the patient’s diet permits and he/she sufficiently alert and oriented, offer the patient sips of water or ice chips. Gently advance the NGT with each patient swallow until the measured mark reaches the nare (**Figure 10**). If water or ice is contraindicated, ask the patient to swallow as you advance the NGT—feel for the characteristic tug on the tube as the epiglottis closes during swallowing
 - If the patient appears cyanotic or begins coughing severely during advancement of the tube, pull the NGT back until normal breathing resumes. Severe coughing during tube insertion can indicate inadvertent pulmonary placement. Reattempt to advance the tube once the patient begins breathing normally
 - **Never advance the NGT against resistance**

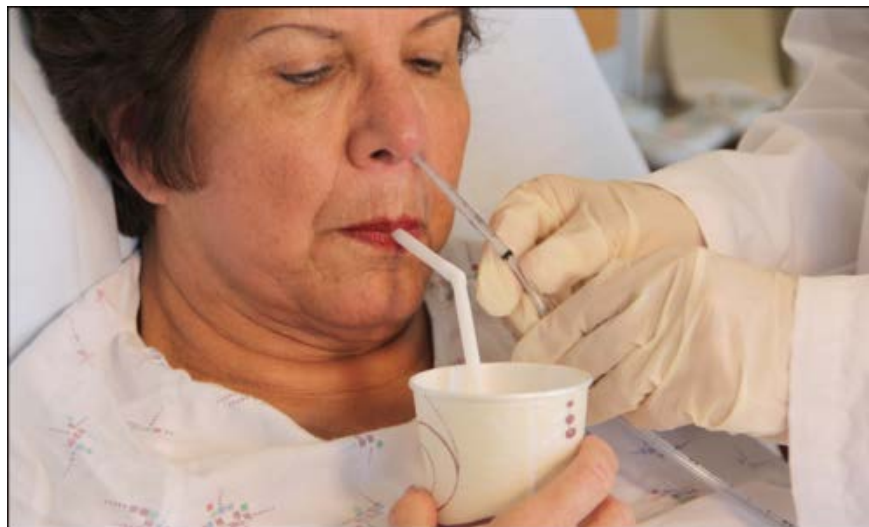


Figure 10: Advance the nasogastric tube with each swallow. Copyright© 2014, EBSCO Information Services.

- › Following insertion, clean excess lubricant from the patient’s skin
 - Secure the NGT to the patient’s nose with the strips of tape . Some facilities, especially those which care for patients with facial burns, use a specific device to secure the NGT to the patient’s nose (e.g., nasal bridle [i.e., a device which anchors the NGT by nonadhesive tape that has been looped through one nostril and past the nasal septum before exiting the opposite nostril]); however, tape or a commercially manufactured holder is most commonly used
 -
 - Verify the skin is clean and dry. If available, apply Benzoin or other type of skin preparation to stabilize and promote better tape adhesion to the skin

- If using the strips of tape, place the intact half of the split strip over the bridge of the patient's nose
- Wrap one of the split ends ("tails") around the NGT 1.3 cm/0.5 in beyond the point where it exits the nare—wrap the tape so that it does not permit the NGT to press tightly against the nare tissue
- Wrap the other tail in the opposite direction around the NGT
- Place the other strip of tape over the bridge of the nose horizontally
 - When securing the NGT, use care to avoid applying undue pressure to facial tissue to reduce the risk of pressure ulcers



Figure 11: Secure the nasogastric tube to the patient's nose with tape. Copyright© 2014, EBSCO Information Services.

- › Assess the patient by
 - checking the mouth to confirm the NGT has not coiled in the esophagus—use the tongue blade and penlight to check the oropharynx (i.e., back of the mouth)
 - asking the patient to talk to check for normal respiration and to confirm preliminarily that the NGT has not entered the trachea
- › Position the NGT so that the distal end is facing upward and attach it to the patient's gown or clothing using a rubber band and safety pin. Place the rubber band over the NGT. Wrap one end of the rubber band behind the NGT and up through the open half of the rubber band—continue to pull the end so that the band is tightened around the tube. Use the safety pin to attach the rubber band and NGT to the patient's gown



Figure 12: Secure the nasogastric tube to the patient's gown. Copyright© 2014, EBSCO Information Services.

- › Follow facility/unit-specific protocol to verify correct placement of the NGT. Some commonly used methods include:
 - Radiographic verification: Arrange for a chest/abdomen X-ray to verify correct position of the feeding tube. If a stylet was used for placement, leave it in place until placement is verified. **Radiographic confirmation is the most definitive method of establishing placement but only if it shows the full course of the tube and the location of all the ports**

- Due to the expense of routine X-rays and the concerns regarding exposure to radiation, some facilities recommend several bedside methods for ongoing verification (prior to each instance of instilling fluids, medications, nutrition) after the initial radiological confirmation
- Capnography and colorimetric capnometry are devices that measure the relative concentration of CO₂ in expired air. The devices can be connected to the end of the NGTs to detect CO₂, which would confirm inadvertent airway cannulation. In several trials, both devices have demonstrated high agreement with radiological examination (Burns, n.d.; The Joanna Briggs Institute, 2010). In a meta-analysis of 9 published studies investigators concluded the use of capnography or colorimetric capnometry to measure the absence of end-tidal carbon dioxide emissions from the NGT to be an effective method to confirm the NGT has not been placed in the lungs (Chau et al., 2011) :
 - Capnography has been used to effectively distinguish between NGT located in the esophagus, bronchus, and stomach
 - Colorimetric capnometry is an effective method for use in differentiating between gastrointestinal and respiratory tube placement in adult patients
- Aspiration for visual check and pH analysis: Attach the syringe to the drainage lumen of the NGT and attempt to aspirate stomach contents. Check gastric contents visually—gastric secretions typically appear clear and colorless or pale yellow or green, while small bowel secretions are often brown colored due to bile; a pH ≤ 4.0 is *usually* indicative of gastric acid unless the patient is receiving proton pump inhibitors, H₂-receptor antagonists (H₂RA), or acid-reducing medications, or is receiving a continuous enteral feeding infusion. However, the pH of gastric contents can occasionally be elevated and respiratory and small bowel secretions are typically ≥ 6, all of which underscores the importance of radiographic confirmation of placement following blind insertion or whenever dislodgement is suspected
 - Clinical Tip: Reposition the patient to his or her left side to maximize potential for withdrawing gastric secretions into the catheter
 - If unable to aspirate gastric secretions, advance the NGT slightly and re-attempt aspiration
- AACN recommends that a variety of methods (e.g., capnography, patient assessment for signs of respiratory distress, observe for visual characteristics and pH of gastric aspirate) be used to confirm NGT placement and that prior to initial use radiographic confirmation be obtained for all blindly inserted NGTs (i.e., NGTs inserted without visual guidance) (Bourgault, 2009)
- **While commonly used, the following two methods are unreliable and should not be used to confirm placement** (Bourgault, 2009):
 - Water bubbling method (i.e., the end of the NGT is placed in a cup below water level to check if bubbling occurs, which indicates the NGT has been placed in the pulmonary system). Use of this method can result in the patient aspirating water if the NGT rests in the trachea or in a bronchus during inhalation
 - Air auscultation method (i.e., using a stethoscope to auscultate over the abdomen while insufflating a bolus of 20–30 mL of air into the NGT with a syringe. A “swish” should be heard as air passes into the stomach) is the most widely practiced method. The reliability of this method is questionable because the auscultatory method cannot distinguish between NGT placement in the esophagus, stomach, or duodenum.
- › Once correct placement is confirmed, notes the external length of the tube. This information is useful in the event the tube becomes dislodged or there is suspicion the tube has migrated from the stomach
 - **DO NOT instill any liquids through the NGT or connect it to suction until correct placement has been confirmed**
- › Dispose of used supplies and perform hand hygiene
- › Unless clinically contraindicated, elevate the patient’s upper body by raising head of the bed or by placing the entire bed in a reverse Trendelenburg position (i.e., head of the bed higher than the feet of the bed) a minimum of 30° to reduce the risk of pulmonary aspiration
- › Assess the patient’s status and comfort level; reposition as necessary
- › Update the patient’s plan of care, as appropriate, and document the following information in the patient’s medical record:
 - Time and date of the procedure
 - Type and diameter of the NGT, including the external length of the tube or the internal length (i.e., from the gastric end to the point at which it exits the nare)
 - Method(s) used to verify tube placement
 - Following initial placement, include information about the date and time position was checked, if aspirate was obtained, pH value, and the external or internal length of the tube
 - Patient assessment information including the patient’s tolerance of the procedure
 - Any unexpected patient events or outcomes, interventions performed, and whether or not the treating clinician was notified
 - Patient/family education, including topics presented, response to education provided/discussed, plan for follow-up education, and details regarding any barriers to communication and/or techniques that promoted successful communication

Other Tests, Treatments, or Procedures that Can Be Necessary Before or After Inserting and Verifying Placement of a Nasogastric Tube in an Adult Patient

- › Due to the risk of tube displacement, **always confirm tube placement prior to each intervention**
- › CBC count, and PTT and PT if applicable, because coagulopathies and blood dyscrasias place patients at risk for excessive bleeding during NGT insertion (e.g., secondary to epistaxis or erosion of esophageal tissue)
- › An abdominal/chest X-ray is the definitive method used to verify correct position after tube insertion or whenever migration or dislodgement of the NGT is suspected
- › Many facilities require
 - the position of the NGT be confirmed by pH testing at least once each nursing shift or prior to every medication administration and feeding, if feeding is by bolus or is intermittent. Note: Continuous feeding will distort the pH of gastric contents. Note: AACN recommends that tube position be monitored at 4-hour intervals using a variety of bedside techniques
 - that gastric emptying be evaluated at least once every nursing shift; delayed gastric emptying is associated with poor tolerance for feeding or impaired gastrointestinal function and is characterized by symptoms of bloating, nausea, and vomiting
 - Delayed gastric emptying can be evaluated by aspirating and measuring the total volume of gastric contents against the hourly infusion
- › Inspect the insertion site for skin breakdown. Thoroughly clean nasogastric feeding equipment (e.g., catheter tip syringe) after each use and store in a clean, dry place. Many facilities require that equipment be changed every 24 hours to minimize bacterial growth

What to Expect After Inserting and Verifying Placement of a Nasogastric Tube in an Adult Patient

- › The NGT
 - is placed without causing trauma, is secured, and its correct placement is verified according to facility/unit specific protocol
 - remains in place, is patent, and functional for the duration of therapy

Red Flags

- › Insertion and removal of an NGT from patients recovering from gastric, nasal, or craniofacial surgery should be limited to advance practice clinicians and physicians due to the risk of interrupting a suture line. Notify the surgeon if the NGT becomes dislodged
 - Patients who have a basilar skull fracture must have feeding tubes placed with visual guidance (e.g., fluoroscopically), never blindly, due to the risk of the tube passing into the cranial cavity and causing trauma to the brain
- › Due to the need to verify the NGT has been placed in the stomach, **DO NOT instill any liquids through the NGT or connect it to suction until placement has been confirmed**
- › Be alert to the risk of tracheobronchial aspiration, nasal erosion, esophagitis, and/or gastric ulcers
 - Patients who have an NGT and who have an altered level of consciousness and are unable to protect their airway should be monitored carefully due to the high risk for aspiration
- › The placement and patency of the NGT should be checked in patients
 - who complain of epigastric pain—the tube could be occluded or can have migrated
 - have vomited or been coughing vigorously
 - following moving or transfer
- › Be alert to the possibility of dehydration and electrolyte imbalance that can occur as a result of aggressive suctioning
- › Incidents of methemoglobinemia have been reported to the U.S. Food and Drug Administration (FDA) after a single use of benzocaine topical sprays

What Do I Need to Tell the Patient/Patient's Family?

- › The presence of an NGT can be mildly uncomfortable but should not be painful or cause breathing difficulties, coughing, choking, vomiting, or skin breakdown; alert the primary clinician if these signs/symptoms occur
 - › Request assistance when changing patient position or getting patient out of bed in order to avoid dislodging the tube
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References

1. Bourgault, A. M., & Halm, M. A. (2009). Feeding tube placement in adults: Safe verification method for blindly inserted tubes. *AJCC: American Journal of Critical Care*. Retrieved March 8, 2016, from <http://ajcc.aacnjournals.org/content/18/1/73.full>
2. Burns, S. M. Keeping patients safe: Assuring that feeding tubes stay out of the lung. *Safe Practices in Patient Care*, 2, 3. Retrieved March 8, 2016, from <http://www.safe-practices.org/pdf/SafePractice6.pdf>
3. Chau, J. P., Lo, S. H., Thompson, D. R., Fernandez, R., & Griffiths, R. (2011). Use of end-tidal carbon dioxide detection to determine correct placement of nasogastric tube: A meta-analysis. *International Journal of Nursing Studies*, 48(4), 513-521. doi:10.1016/j.ijnurstu.2010.12.004
4. Curtis, K. (2013). Caring for adult patients who require nasogastric feeding tubes. *Nursing Standard*, 27(38), 47-56.
5. González, P. M., Figuerola, M. E., Hernández Gutiérrez, P., & Rello Condomines, J. (2013). Middle ear effusion in mechanically ventilated patients: Effects of nasogastric tube. *Respiratory Care*, 58(2), 273-278. doi:10.4187/respcare.01911
6. The Joint Commission. (2014, August 20). Sentinel event alert issue 53: Managing risk during transition to new ISO tubing connector standards. Retrieved February 25, 2016, from http://www.jointcommission.org/assets/1/6/SEA_53_Connectors_8_19_14_final.pdf
7. Methods for determining the correct nasogastric tube placement after insertion in adults. (2010). *Best practices: Evidence-based information sheets for health professionals*, 14(1), 1-4.
8. Nasogastric tube insertion. (2015, October 2). *Lippincott procedures*. Retrieved February 25, 2016, from <http://procedures.lww.com/Inp/view.do?pld=792454>
9. Peter, S., & Gill, F. (2009). Development of a clinical practice guideline for testing nasogastric tube placement. *Journal for Specialists in Pediatric Nursing*, 14(1), 3-11. doi:10.1111/j.1744-6155.2008.00161.x
10. Shlamovitz, G. Z. (2015, August 17). Nasogastric intubation. *Medscape*. Retrieved February 25, 2016, from <http://emedicine.medscape.com/article/80925-overview#a01>
11. Stock, A., Gilbertson, H., & Babl, F. E. (2008). Confirming nasogastric tube position in the emergency department: pH testing is reliable. *Pediatric Emergency Care*, 24(12), 805-809. doi:10.1097/PEC.0b013e31818eb2d1
12. Taylor, S., Allan, K., McWilliam, H., Manara, A., Brown, J., & Toher, D. (2014). Confirming nasogastric tube position with electromagnetic tracking versus pH or X-ray and tube radio-opacity. *Intensive & Critical Care Nursing*, 23(7), 352-358. doi:10.12968/bjon.2014.23.7.352
13. Taylor, S. J. (2013). Confirming nasogastric feeding tube position versus the need to feed. *Intensive & Critical Care Nursing*, 29(2), 59-69. doi:10.1016/j.iccn.2012.07.002
14. Worthington, P. H. (2014). Enteral nutrition. In A. G. Perry, P. A. Potter, & W. R. Ostendorf (Eds.), *Clinical nursing skills & techniques* (8th ed., pp. 777-785). St. Louis, MO: Elsevier Mosby.