How to insert a nasogastric tube and check gastric position at the bedside


Rationale and key points
A nasogastric tube (NG tube) can be used to aspirate stomach contents or to administer feed, medication or fluid into the stomach.
- A blind technique is used to insert the NG tube through the nostril, along the nasopharynx, through the oesophagus and into the stomach.
- It is important for nurses to be able to recognise problems that may arise when inserting a NG tube blindly, and to know what actions to take if it is suspected that the distal tip of the NG tube is not sitting in the stomach, or they are unable to identify its location.
- Misplacement and subsequent use of a NG tube to administer feed, medication or fluid is a 'never event' (NHS England Patient Safety Domain 2015).

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Preparation and equipment
- Undertake a thorough assessment of the patient, including the reason for the nasogastric (NG) tube, the type and size (French (Fr)) of NG tube required and the patient suitability to undergo the procedure at the bedside. Assessment should include previous nasal injuries and history of a pharyngeal pouch or oesophageal strictures, since these may make blind placement of the NG tube more difficult. It should also be decided which nostril it is best to use for the NG tube placement.
- Explain the procedure to the patient and what is expected of them. The patient must provide verbal consent. Where the patient is unable to give their consent, a capacity assessment should be undertaken. Multidisciplinary discussion is essential to ensure the procedure is undertaken in the patient's best interest.
- Assist the patient to sit in a semi-upright position in a bed or chair. Support the patient's head with pillows and adjust the height of equipment to avoid overstretching.
- Ensure all necessary equipment is functioning, in date and in reach.
- Adhere to local and national infection control policies and NG tube insertion guidance. The nurse should ensure that all equipment for the procedure is available, including:
  - Non-sterile gloves and an apron.
  - Sterile dressing pack.
  - Appropriate size NG tube. A 6-10Fr is used for enteral feeding and 10Fr or above is inserted for aspiration.
  - 60mL enteral syringe.
  - Receiver.
  - Glass of water with a drinking straw (if the patient is not nil by mouth).
  - Tissues or a damp cloth.
  - Hypoallergenic tape and scissors.
  - CE-marked pH indicator strips, with a range covering pH 1-6.
  - Freshly run tap water from a drinking source or sterile water.
  - Marker pen.
  - Bile bag.

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Note: The use of an electromagnetic tracking device for checking the position of a nasogastric tube and use of a nasal bridle to secure a nasogastric tube will not be discussed, since both require specialist equipment and training, and are beyond the scope of this article.

**Procedure**

1. Insertion of a NG tube is a clean procedure, so the nurse must wash their hands before the procedure and put on non-sterile gloves and an apron (National Nurses Nutrition Group (NNNG) 2012).
2. Create a clean area by opening a sterile dressing pack and placing a 60mL enteral syringe, scissors and CE-marked pH indicator strips on it.
3. Gently remove the NG tube from its packaging by holding both ends of the tube before they spring apart. Carefully unwind the tube.
4. If using a polyurethane tube with a guidewire, ensure the guidewire is firmly secured at the tip of the tube. Ensure any additional ports are closed.
5. Check the patient is in a semi-upright position and has a glass of drinking water with a drinking straw if the patient is not nil by mouth, and that tissues are within their reach. A receiver should also be placed nearby in case the patient vomits.
6. Estimate the length of NG tube to be inserted into the patient to reach the stomach using the nose-earlobe-xiphisternum (NEX) measurement as a guide (Figure 1) (National Patient Safety Agency (NPSA) 2011). Hold the exit port of the NG tube at the tip of nose (N), extend the length of the tube to one of the earlobes (E) and then, holding the tube at the earlobe, extend the remaining length of the NG tube to the xiphisternum (X).
7. Record the NEX measurement or mark the NG tube with a marker pen at the NEX measurement, to indicate the minimum length of tube required to reach the stomach. It is important to remember that this measurement is only a guide. It is likely that the NG tube will need to be advanced beyond the measurement indicated to ensure it sits within the lower body of the stomach.
8. Ask the patient to blow their nose into a tissue. Where this is not possible, clean the external area around the nostrils with a damp cloth.
9. Activate the lubricant at the tip of the NG tube by dipping the end in water, or adhering to the manufacturer’s guidance. The water should be sterile or freshly run tap water, according to local policy. Do not use lubricating jelly.
10. Gently insert the tip of the NG tube into the agreed nostril, sliding it slowly along the floor of the nasopharynx, into the oropharynx and hypopharynx, through the oesophagus and into the stomach (Figure 2).
11. If resistance is encountered, withdraw the NG tube slightly and advance it again. Never push the NG tube against resistance.

12. If the patient begins to cough persistently or has difficulty breathing, withdraw the NG tube to a position where the patient appears more comfortable. If possible, avoid pulling the NG tube out completely. Some patients may initially react to the NG tube being advanced along the nasopharynx by sneezing or coughing. If so, holding the NG tube still and asking them to breathe through the mouth may help to reduce this, enabling the procedure to continue.

13. If the patient shows no signs of distress, ask them to breathe through the mouth and swallow when they feel the NG tube reach the back of the throat. This action can be supportive even if the patient does not have an intact or effective swallow. If the patient can drink, encourage them to take a sip of water as this may assist with the passage of the NG tube.

14. As the patient swallows, gently advance the tube through the oesophagus and into the stomach.

15. Continue passing through the tube until the measured depth mark is reached or slightly beyond this.

16. Attempt to retrieve gastric aspirate by attaching the 60mL enteral syringe to the end of the NG tube. Before attempting to withdraw aspirate, flush it gently with 10-20mL air to remove any debris collected during the insertion procedure.

17. Attempt to withdraw gastric aspirate into the syringe. 1mL of fluid will be sufficient to check the pH.

18. It may be necessary to advance or withdraw the NG tube slightly until the fluid level in the stomach is reached. This may take several attempts. It may take time and multiple changes in tube or patient position to reach and withdraw gastric aspirate.

19. If using the NG tube for aspiration of stomach contents only, attach a 60mL enteral syringe and attempt to withdraw aspirate. If aspirate is withdrawn, remove the guidewire if present, and secure the NG tube to the nose and cheek using hypoallergenic tape. It may be necessary to attach a bile bag to enable the contents of the stomach to drain freely.

20. If the NG tube is to be used for the administration of fluid, medication or enteral feeding, it is essential to confirm its distal position before use.

21. If a polyurethane NG tube with an internal guidewire has been used, it is advised not to remove the guidewire before confirming gastric position as changing the position of the NG tube becomes more difficult without the guidewire.

22. Test the pH of the gastric aspirate obtained using CE-marked pH indicator strips. Gastric position is indicated with a pH of 5.5 or below.

23. Where gastric aspirate cannot be obtained, or the fluid obtained has a pH greater than 5.5, an X-ray is required to confirm the position of the distal end of the NG tube. At this point, the NG tube must not be used to administer any feed, fluid or medication.

24. Once the gastric position is confirmed, remove the guidewire and secure the NG tube to the nose and cheek using hypoallergenic tape. Flush the NG tube with 20-30mL water to...
clear any debris built up during NG tube insertion and checking procedures. Freshly run tap water or sterile water should be used, according to local guidelines.

25. Record the procedure, the nostril used, NG tube length, pH recordings and any difficulties in the bedside documentation and the patient’s notes.

### Evidence base

National guidance is available from the National Patient Safety Agency (NPSA 2005, 2011, 2012) and the National Nurses Nutrition Group (NNNG 2012) to promote safe insertion of a NG tube at the bedside. Nurses are the main group of healthcare professionals responsible for the insertion of a NG tube at the patient’s bedside.

Insertion of an NG tube at the bedside does not require anaesthesia, specialist equipment or surgical intervention. Therefore, it is the first-line route to provide enteral feeding. NG tubes are inserted daily without incident (NNNG 2012). However, complications have been reported (Adeyemo et al 2007, Lyske 2011, Paul 2013). One risk associated with bedside placement is the inadvertent misplacement of the NG tube into the bronchial tract (Figure 3). If NG tube misplacement is detected and the NG tube is removed, it should cause the patient no harm. There is potential to cause patient harm or death where misplacement is not detected and the NG tube is subsequently used. Use of a misplaced NG tube became a ‘never event’ in 2009 (NPSA 2005). National advice is available to guide the insertion of NG tubes and checking procedures (NPSA 2011, NNNG 2012), and to prevent the use of a NG tube placed outside the stomach.

Between 2005 and 2012, the NPSA released three safety alerts relating to NG tubes. The first safety alert was released in 2005 in response to a number of patient deaths caused by inaccurate placement and use of NG tubes. The NPSA (2005) safety alert recommended:

- The discontinuation of:
  - The ‘whoosh’ test, which involved injecting air into the NG tube while simultaneously listening for sounds of gurgling through a stethoscope placed on the abdomen. This should not be confused with the correct technique of inserting 10–20mL air to clear the length of the NG tube, prior to checking position.
  - Using litmus paper to check the pH of aspirate.
  - Using the absence of respiratory distress as an indicator that the NG tube is not misplaced in the lungs.
- All NG tubes should be radio-opaque throughout their length and have clear external measurement markers to assist checking procedures.
- The use of pH indicator strips to check the pH of aspirate at the bedside should be the first-line means of checking NG tube position.
- Avoiding routine use of X-ray to confirm NG tube position on initial placement.

A second NPSA (2011) safety alert was issued to strengthen the advice from the NPSA (2005) alert, because further patients had been harmed or died as a result of misplaced NG tubes (NPSA 2011). This second alert reiterated the 2005 advice and added further recommendations, including:

- Staff inserting NG tubes should be trained and assessed as competent to insert a NG tube and check gastric position safely. Doctors checking X-rays to confirm gastric placement should also be trained and assessed as competent.
- pH indicator paper used to check gastric aspirate should be CE-marked for use on human aspirate.
- An ongoing programme of audit should be implemented to monitor practice.
- Organisational policies and clinical guidance should reflect the advice from both NPSA (2005, 2011) alerts.

A third NPSA alert (2012) was released in response to reported incidents of patient harm as a result of NG tubes that had been flushed with water before confirming gastric position. It was reported that in some NG tubes, activating the inner lubricant (coating the inner lumen of the tube which ensures easier guidewire removal) by flushing the tube with water resulted in fluid being withdrawn that gave a pH reading of under 5.5 (NNPG 2012). Therefore no fluid should be inserted into a NG tube until gastric position has been confirmed.

The accuracy of the NEX measurement has been questioned (Taylor et al 2014) and considered to be misleading. Some authors recommend using the NEX and adding 10cm to the measurement to reach the body of the stomach (Taylor et al 2014). The NEX measurement only takes the tube to the tip of the xiphisternum; it may be a suitable measure for some patients, but it should not assumed to be an appropriate measure for all patients. When using the NEX measure, it may still be necessary to manipulate the tube to obtain gastric aspirate. Use of the NEX measurement remains the advice given by the NPSA.

The most important point to remember is that if it cannot be confirmed that the tip of the NG tube is in the stomach, it must not be used to administer any type of fluid.
On June 1 2012, the key functions and expertise for patient safety developed by the National Patient Safety Agency (NPSA) transferred to the NHS Commissioning Board Special Health Authority (www.england.nhs.uk/patientsafety).

Disclaimer: please note that information provided by Nursing Standard is not sufficient to make the reader competent to perform the task. All clinical skills should be formally assessed at the bedside by a nurse educator or mentor. It is the nurse’s responsibility to ensure their practice remains up to date and reflects the latest evidence.

References


