**Nasogastric tube insertion in adults who require enteral feeding**


*Summary*

This article, part of *Nursing Standard*’s clinical skills series, describes the process of inserting a nasogastric tube in adults for enteral feeding. The article discusses patient assessment, choosing which tube to use, positioning and strategies to deal with complications that arise.

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**Keywords**

Clinical skills; Enteral feeding; Nasogastric tube

These keywords are based on the subject headings from the British Nursing Index. This article has been subject to double-blind review. For author and research article guidelines visit the *Nursing Standard* home page at [www.nursing-standard.co.uk](http://www.nursing-standard.co.uk). For related articles visit our online archive and search using the keywords.

The nasogastric route is a relatively common method of providing access for short-term enteral feeding. It provides the means by which a nutritionally adequate diet can be provided directly into the stomach bypassing the oral route. It is usually the first route to be considered if a patient’s oral intake is inadequate or contraindicated.

**Choosing a tube**

A fine-bore nasogastric tube should be used in preference to a wide bore or Ryles tube for enteral feeding. The fine bore is a more comfortable option for the patient and minimises the risk of developing rhinitis, pharyngitis or oesophageal erosion. Dewar (1997) recommends the use of a 6Fr tube with a minimum length of 90cm, while Rollins (1997) suggests that standard feeds can be administered through a 6Fr tube with ease but an 8Fr may be required for patients receiving a fibre feed. NICE (2006) recommends the use of a 5–8Fr tube.

Fine-bore nasogastric tubes are made from either polyvinylchloride (PVC) or polyurethane. The PVC tubes are one option for feeding for up to ten days. Beyond this period the PVC tube begins to break down as chemical plasticisers designed to keep the tube flexible gradually leach out, leaving the tube brittle and at risk of cracking. This rigidity increases the risk of the patient developing nasal or oesophageal erosion. The polyurethane tube remains soft and flexible throughout use and is, therefore, the tube of choice for most patients.

**Patient assessment**

Before attempting to insert a nasogastric tube the nurse should be aware of possible complications associated with the procedure (Box 1). A detailed patient history should be obtained to identify any problems that would make insertion technically difficult or impossible, such as previous nasal fractures or surgery, nasal polyps or other blockages. The nurse should be aware of the rationale for nasogastric feeding and the projected length of time that feeding will be required. Nasogastric feeding is usually undertaken in patients who require short-term enteral feeding, that is, four to six weeks, and who have a functioning gastrointestinal tract. There are cases where nasogastric feeding is continued for longer periods, for example, patient preference or where alternative methods are deemed unsafe.

Nasogastric feeding may not be a suitable option for patients who have:

- A high risk of aspiration.
- A gastro-oesophageal reflux (NICE 2006).
- New base of skull fractures.
- Poor gastric emptying, an ileus or intestinal obstruction (NICE 2006).

Where these complications exist, or if long-term feeding is required, other routes of enteral feeding should be considered.

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When deciding what nasogastric tube to use a number of issues need to be considered. All nasogastric tubes should be radio-opaque and have clear centimetre or line markers to aid measurement during the insertion procedure and bedside checks. Additional factors that should be considered include (in alphabetical order):

- Cost.
- Ease of aspiration/flushing.
- Ease of insertion.
- Length.
- Material.
- Number of ports.
- Patient comfort and/or preference.
- Size (Fr) and internal lumen.
- Type of feed to be administered.

Preparing the patient

The patient should be positioned in a semi-upright position in a bed or chair. The head should be supported with pillows (Dougherty and Lister 2004) and not be tilted forward or backwards (Rollins 1997). If patients cannot sit upright, the procedure can be carried out by lying them on their side (Bowling 2004).

Clearly explain the proposed insertion procedure to the patient and avoid using technical jargon. Clarify with the patient what is expected of them during the procedure, for example, the need to agree a signal, such as raising a hand so that the patient may stop the procedure at any time if he or she feels uncomfortable or unsafe. The patient’s verbal consent must then be obtained. Where this is not possible, for example, in a patient who is unconscious, the nurse should hold discussions with the medical team and patient’s family or carers to ensure that nasogastric tube insertion is in the best interest of the patient. Consent issues should be clearly documented in the nursing and/or medical notes.

Agree with the patient in which nostril the nasogastric tube is to be inserted. Alternate nostrils should be used if repeated nasogastric tube insertions are necessary. Ask the patient to blow his or her nose to clear the nasal passages. Check that the oral cavity is clear. Finally, where appropriate provide the patient with a glass of water.

Box 2 lists the equipment necessary to undertake nasogastric tube insertion.

The procedure

Nasogastric tube insertion should be attempted a maximum of three times. If still unsuccessful after the third attempt seek assistance (Cannaby et al 2002). This is a clean procedure so gloves and apron should be worn.

- Remove the nasogastric tube from packaging, stretching gently to remove any kinks or bends. Ensure guide wire is firmly secured.
- Check all access ports on the tube are closed.
- Estimate the length of the nasogastric tube required. This measurement is used to provide an indication of when the tube reaches the stomach. To estimate the length of tube needed hold the proximal (stomach) end of the nasogastric tube loosely at the tip of the patient’s nose. Extend the tube to the ear lobe and down to the xiphoid process. At this point the closest depth mark on the tube should be noted or the tube marked directly with a pen (Burnham 2000) (Figure 1).
- Activate lubricant on tip of the tube by dipping the end in freshly run tap water. Extra lubricating jelly can be used, if required.
- Gently insert the tube into the agreed nostril sliding it slowly backwards, along the floor of the nasopharynx to the oropharynx (Burnham 2000).
- Never advance the tube against any resistance.
- Stop immediately if the patient begins to cough, has difficulty in breathing or becomes cyanosed.
- If there are no signs of distress ask the patient to breathe through his or her mouth and swallow. As the patient swallows gently advance the tube through the oesophagus. If the patient can drink, a sip of water may help the patient to swallow the tube at this point.
- Continue passing the tube until the measured depth mark is reached. Do not push the nasogastric tube beyond the agreed depth mark.

BOX 1

Potential complications of the insertion procedure

Potential complications that may arise during the insertion procedure include (in alphabetical order):
- Bronchial placement.
- Intracranial insertion.
- Nasal trauma.
- Pharyngeal or oesophageal pouch perforation.
- Precipitation of variceal bleeding.

(NICE 2006)
Secure tube loosely to nose or cheek.
Confirm correct position of the tube. It is advisable not to remove the guide wire before confirming the position because it may then be difficult to change the position of the tube. However, leaving the guide wire in situ for extended periods of time if waiting for an X-ray to confirm position may be uncomfortable for the patient. To decide whether or not to remove the guide wire assess the patient on an individual basis.

**Confirming the position**

The practitioner inserting the nasogastric tube is responsible for confirming that the tip of a nasogastric tube is situated in the stomach before beginning a feed regimen or administering medications (Box 3). Incorrect positioning in the bronchial tract or oesophagus could result in aspiration of feed or fluid. In the patient safety alert published in February 2005, the National Patient Safety Agency (NPSA) cited 11 deaths and one case of serious harm during a two-year period due to misplaced nasogastric tubes.

Historically nurses have used different methods to confirm nasogastric tube position, some of which have in recent years been shown to be unsafe (Box 4). In an attempt to minimise the risk of injury caused by misplaced tubes the NPSA (2005) produced guidelines indicating which methods to use to check tube position. They also cited the need to report any incident involving the feeding of a patient via an incorrectly positioned nasogastric tube as a clinical incident.

**Methods of confirming the position**

Initial tube position must be confirmed using one of the following methods:

- Aspiration of gastric contents.
- X-ray.

**Aspiration of gastric contents**

Testing gastric aspirate with pH indicator strips should be the first method used to confirm tube position on initial placement. It is possible to aspirate gastric contents through most fine-bore nasogastric tubes with the guide wire still in situ. The ability to aspirate gastric acid through a nasogastric tube may be influenced by the size, length and material of the nasogastric tube used. Aspiration is easier through an 8Fr tube compared with a 6Fr and through shorter (90-95cm) tubes rather than longer (110cm) tubes.

Ensure all access ports are closed before attaching a syringe. Although 50ml syringes are usually used when administering fluid via enteral tubes, it may be useful to consider using a 20ml syringe to aspirate gastric contents. Attach the syringe to the main feeding port and inject a small amount of air into the tube to clear the exit points of debris and move the tip of the tube away from the gastric mucosa. Using the same syringe aspirate a specimen of stomach contents back through the tube gently. Less than 1ml of aspirate is sufficient to check tube position (NPSA 2005). It may take more than one attempt to aspirate gastric fluid, particularly if the patient has not received nutrition for more than a week, but be prepared to persevere if you are not successful the first time.

Once aspirate is obtained, test its acidity with pH specific indicator strips. A pH of 0-5.5 indicates gastric placement. For patients receiving acid-inhibiting drugs, Metheny et al. (1993, 1994) record readings of between pH 4.0-6.0. Bronchial placement should be suspected if the aspirate has a pH of 6.0-8.0 (Metheny et al. 1993, 1994, Colagiovanni 1999) even if signs of respiratory distress are not always present.

**Equipment required for nasogastric tube insertion**

- Fine-bore nasogastric tube.
- 50ml syringe.
- pH indicator strips.
- Receiver.
- Lubricating jelly (if required).
- Glass of water with drinking straw (if the patient is not nil by mouth).
- Tissues.
- Hypoallergenic tape and scissors.
- Freshly run tap water from a drinking source – for flushing.
- Non-sterile gloves and apron.
Strategies for dealing with complications that may arise when obtaining gastric aspirate

If problems are experienced obtaining gastric aspirate have patience and try working through the following measures:

The introduction of air into the nasogastric tube that is discussed is not used to indicate gastric placement – as in the ‘whoosh’ test – but is used to assist the nurse in gauging the position of the tube during the insertion process.

- Suspected oesophageal placement. If the patient belches almost immediately when air is injected in the tube the tip is probably sitting in the oesophagus (Metheny et al 1993).

Nursing action Advance the tube to agreed measurement and repeat aspiration attempts.

- The tip of the tube may be situated in the air space above the aspirate level in the stomach.

Nursing action Advance the tube 5-10cm and repeat aspirate test (Metheny et al 1994).

- The distal port may be resting against the gastric mucosa.

Nursing action Inject 3-5ml of air into the stomach to push the aspiration port away from the gastric mucosa.

- Suspected intestinal placement.

Nursing action Withdraw the tube 5-10cm and repeat the aspirate test.

- Suspected bronchial placement, for example, the patient shows signs of respiratory distress or aspirate is pH 6.0-8.0.

Nursing action Remove the tube and re-pass.

- If the patient can drink ask him or her to drink an easily identifiable fluid, for example, blackcurrant squash, and then aspirate this back through the nasogastric tube. If the liquid is successfully aspirated through the nasogastric tube, pH testing is not required.

- Position the patient on his or her left side to adjust the fluid level in the stomach. Repeat the aspirate test one hour later (NICE 2006).

If the aspirate obtained has a pH of <5.5 feeding can begin without the need for further confirmation. If the aspirate obtained has a pH of >5.5 or aspirate cannot be obtained, feeding should not begin and the tube position should be confirmed using X-ray.

X-ray

Radiography is not recommended as a routine method of checking nasogastric tube position (NICE 2006). Therefore, this method should only be used to confirm position on initial placement. An X-ray will confirm tube position at the time the X-ray is carried out but, by the time the patient has left the department, the nasogastric tube may have become displaced. For this reason other methods of checking tube position – that is, aspirate checks – should be used at the bedside.

Local policy will indicate precisely when an X-ray should be used but guidance may indicate its use for patients who are unconscious and/or on a ventilator or if, after repeated attempts, no aspirate has been obtained or the pH of aspirate is >5.5.

All X-rays must be reviewed by a competent practitioner and gastric placement confirmed before feeding can begin. Confirmation of positioning should be clearly documented in the patient’s nursing/medical notes.
Capnography

Capnography is a method of detecting carbon dioxide (CO2) levels and is used to highlight possible inadvertent bronchial placement (Tyco Healthcare UK Ltd 2007). The nasogastric tube is placed to approximately 30-35cm and a detector secured onto the end of it. A small bellows is attached to the detector and air is sucked through the system. If the detector changes colour, the presence of CO2 is indicated. This system provides a clear visual indication of the tube’s position and acts to minimise patient trauma by blind advancement of a tube into the bronchial tract. This method of checking the position of the nasogastric tube is in its infancy but may be used more frequently in the future.

Securing the tube

Once tube placement is confirmed the guide wire can be removed and the tube flushed with 20-30ml of water to clear it of debris built up during the insertion procedure. The guide wire must not be reinserted into the nasogastric tube while the tube remains in the patient. The nasogastric tube should then be secured at the nose to avoid inadvertent displacement. Some companies supply a plaster with the nasogastric tube, but for those that do not, the use of a soft pliable adhesive tape is recommended. If the patient has oily skin or perspires readily the adhesive tapes may need to be replaced regularly. In such cases using a protective dressing wipe to increase adhesion may be of use. Once secure at the nose the remaining length of tube should be loosely taped to the cheek out of the patient’s line of vision and tucked behind his or her ear when not in use.

Where there is a risk of tube displacement the use of a nasal bridle or loop may be appropriate. This device enables the nasogastric tube to be secured using a length of white cotton tape passed behind the septum from one nostril to another (Applied Medical Technology Inc 2004.) It is also useful where there are technical difficulties in placement or where there is a need to maintain access while decisions are made about long-term feeding options.

Documentation

Once the insertion procedure is complete the type and size of nasogastric tube used and method of confirming tube position should be clearly documented in the nursing and/or medical notes.

Conclusion

Responsibility for the insertion of a fine-bore nasogastric tube for enteral feeding lies mainly with nurses. Skilled and appropriate insertion can reduce patient anxiety and discomfort and ensure that the patient receives nutrition with the minimum of delay. With this in mind nurses need to gain confidence in using their clinical judgement to interpret the pH of gastric aspirate and be aware of what actions are necessary if gastric aspirate cannot be obtained immediately to reduce the need for referral for X-rays – and the inevitable delay which will occur in the delivery of nutrition NS.

References