Caring for the patient with a nasogastric tube

Summary

A nasogastric tube enables a nutritionally adequate diet to be delivered directly to the stomach bypassing the oral route. It is the most common route for enteral feeding and nurses play a central role in caring for patients with a nasogastric tube. This article outlines the care required for an adult patient with a fine bore nasogastric tube.

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Aim and intended learning outcomes

This article aims to raise awareness of the care required for an adult patient with a fine bore nasogastric tube for enteral nutrition. After reading this article you should be able to:

- Assess whether the patient is suitable for intubation with a fine bore nasogastric tube.
- Understand the safe and unsafe methods of confirming the correct position of a nasogastric tube.
- Discuss the safe administration of medication through a nasogastric tube.
- Identify the options available to prevent and remove a blockage from a nasogastric tube.

Introduction

Nasogastric feeding is the most common route for enteral feeding and nurses are the main group of healthcare professionals responsible for intubation.

A nasogastric tube enables a nutritionally adequate diet to be delivered directly to the stomach bypassing the oral route (Figure 1). It is usually the first route to be considered if oral intake is inadequate or contraindicated, but the gastrointestinal tract is functioning. The nasogastric route is suitable for the provision of enteral feeding for up to four to six weeks (Bowling 2004).

The nasogastric feeding route is not suitable for all patients, including those with:

- A high risk of aspiration.
- Gastric stasis.
- Gastro-oesophageal reflux.
- Upper gastrointestinal stricture.
- Nasal injuries.
- Base of skull fractures.

Where these complications exist or a long-term feeding option is required, for example, in patients...
polyurethane tube is a more suitable option if enteral feeding is required for two to six weeks, because it remains soft and flexible throughout use (Colagiovanni 2001).

Unlike older nasogastric tubes the newer polyurethane tubes do not need to be placed in the refrigerator to stiffen them up to aid insertion. They contain a guidewire which provides stability during insertion but is removed once correctly positioned to increase patient comfort.

The nurse should ensure that the nasogastric tube selected:
- Is radio-opaque.
- Has clear centimetre or line markers to aid measurement and clinical analysis.
- Has multiple ports to aid aspiration.

Measurements regarding how far down the tube is inserted should be made according to the pre-insertion measurements from ear to nose to tip of xiphisternum by recording centimetre markers on the tube or marking the tube with a pen.

Patient risk assessment

Before insertion of a nasogastric tube, the nurse should be aware of possible complications, including bronchial intubation. The patient should be assessed to identify any history of previous nasal fractures, surgery, polyps or other blockages, which may make intubation technically difficult or even impossible.

The proposed procedure should be explained to patients, including their role, which includes raising their hand if they want the procedure to stop and, if they have a competent swallow, drinking a small amount of fluid as the nasogastric tube is passed down the pharynx to aid its insertion. Their verbal consent must be obtained. Where this is not possible, for example, in a patient who is unconscious, the nurse should hold discussions with the medical team to ensure the insertion is in the patient’s best interest. The patient should be positioned as upright as possible to aid insertion and to reduce the risk of bronchial intubation. Box 1 lists the equipment necessary to undertake nasogastric tube intubation.

No more than three attempts at intubation should be made by any one nurse. If intubation is not technically possible the nurse should refer the patient to another healthcare professional for advice.
Confirmation that the tip of a nasogastric tube is situated in the stomach is essential before initiating feed or administering medications. Incorrect positioning in the bronchial tract could have serious consequences. The National Patient Safety Agency (NPSA) (2005a) cited 11 deaths and one case of serious harm due to misplaced nasogastric tubes during a two-year period.

Historically nurses have used a number of different methods to confirm nasogastric tube position, some of which have been shown to be unsafe. In an attempt to minimise the risk of injury caused by misplaced tubes the NPSA (2005a) has produced guidance indicating which methods should be used.

**Safe methods of checking tube position X-ray**

An X-ray is the most accurate method of identifying the position of the tip of a nasogastric tube following insertion. However, there are certain issues that need to be considered. The NPSA (2005a) highlights reports of X-rays being misinterpreted by physicians not trained in radiography. Occasionally difficulties in positioning patients, for example, after a stroke, make it even more problematic to interpret X-rays. Misinterpretation of X-rays can cause unnecessary delays in initiating feeding, and increase the risk of aspiration or feed being delivered directly into the bronchial tract. This has a negative effect on patient care.

An X-ray will only confirm position of the nasogastric tube at the time it is carried out. The tube may have moved by the time the patient has returned to the ward. It is also important to consider the number of occasions the patient is unnecessarily exposed to radiation, the cost of X-rays and the loss of potential feeding time, because X-rays cannot always be carried out and interpreted immediately. However, in the absence of a positive aspirate test, where pH readings are more than 5.5, or in a patient who is unconscious or on a ventilator (Rollins 1997), an X-ray must be obtained to confirm the initial position of the nasogastric tube.

**Aspiration of gastric contents**

Nurses often state that they are unable to aspirate fluid back through a fine bore nasogastric tube, particularly when the guidewire remains in position. Acknowledgement that aspirate may not be obtained at the first attempt, having patience and using a systematic approach may minimise perceived difficulties (Box 2). If the guidewire is removed following initial placement in an attempt to make aspiration easier, further adjustment of the tube becomes more difficult and may result in the tube being needlessly removed. Once removed, the guidewire cannot be re-inserted into the tube while the tube remains in the patient (Rollins 1997).

When aspirate is obtained it must be tested using pH indicator paper. The NPSA (2005a) suggests that 0.5-1ml of aspirate is sufficient to test pH. There are a variety of pH indicator preparations available commercially, including individual plastic strips or paper rolls. Either option can be used to determine aspirate pH. Some products cover the whole pH range, 1-14, while others only cover pH 1-6. The latter option is adequate, because enteral feeding should not be initiated if aspirate is pH 6 or above. This is because a pH of 6 may indicate bronchial or intestinal placement.

Bronchial placement is usually indicated by a pH of between 6-8, and intestinal placement by a pH of 4-6 and a corresponding change in the colour of aspirate (Metheny et al 1993, 1994, Colagiovanni 1999).

Gastric placement is generally indicated by a pH of less than 4, but may increase to between pH 4-6 if the patient is receiving acid-inhibiting drugs (Metheny et al 1993, 1994).

Guidance from the NPSA (2005a) states that if the aspirate obtained has a pH of 3.5 or less, feeding can be initiated without delay. If, however, the aspirate has a pH of more than 5.5, initial feeding should not be commenced without further investigation. If nasogastric tube position...
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has been confirmed by gastric aspirate, the tube will require flushing with 30ml of water to clear the lumen before initiating feeding.

It is vital that all actions undertaken to insert and confirm position of a nasogastric tube are documented.

Aspiration of visually recognisable gastric contents

This method of confirmation can only be used in patients who have an intact swallow and are able to take a drink orally. The patient is asked to drink a visually identifiable liquid such as milk or blackcurrant juice that indicates gastric placement if aspirated back up through the nasogastric tube.

Unsafe methods of checking tube position The ‘whoosh’ test This involves the insufflation of air into the nasogastric tube while listening with a stethoscope over the abdomen for a distinctive ‘whooshing’ sound. It has been shown to be unreliable because the sound emitted is generalised over the abdomen. Metheny et al (1990) highlighted the difficulty in differentiating between lung, oesophageal or gastric placement.

Observing for air bubbles The proximal end of the tube is placed under water and observed for air bubbles. The assumption is that if the tube has been placed in the lungs the bubbles will be seen on expiration (Colagiovanni 1999). However, gas bubbles may be produced in the stomach. Reliance on this method could falsely indicate respiratory placement (Metheny and Meert 2004) and may result in a correctly positioned tube being needlessly removed.

Absence of respiratory distress Respiratory symptoms are less likely to occur with the use of small bore tubes. The absence of respiratory distress should not be interpreted as an indicator of correct positioning. Patients who are unconscious or do not have an effective gag reflex will not exhibit signs of coughing or cyanosis expected with intubation into the bronchial tract, even in some instances with the use of large bore tubes.

Blue litmus paper The use of blue litmus paper to check the acidity of aspirate is now recognised as being insufficiently sensitive to distinguish between levels of acidity. This is because it changes colour in the presence of acid rather than defining the exact pH value (Khair 2005). A bronchial placement with a pH of 6 will indicate acidity on litmus paper leading to the possible use of an incorrectly placed nasogastric tube with disastrous consequences. The Medicines and Healthcare products Regulatory Agency (2004) issued an alert in June 2004 advising all staff to stop using blue litmus paper to test the acidity/alkalinity of aspirate.

Observing the colour of feeding tube aspirate

Metheny et al (1994) examined the gastric aspirate of 880 patients. They established that gastric aspirates ranged in colour from green to yellow, tan/brown or bloody, while respiratory aspirate was similarly described as tan or yellow/green. With such variable results this measure cannot be used to determine tube placement.

Care required following confirmation of tube placement

The risk of displacement of a nasogastric tube after initial placement is relatively high. Patients may inadvertently knock the tube or attempt
pull it resulting in the tube being displaced into the oesophagus and increasing the risk of aspiration or regurgitation. Tube position may also change following episodes of coughing, retching or vomiting. Metheny et al (1986) demonstrated that 15 per cent of nasogastric tubes became displaced following confirmation of initial placement without the nursing staff being aware. This highlights the need for continued routine bedside monitoring of tube position (Box 3).

In addition to checking the pH of aspirate, nurses can use other measures to monitor tube position (once correct placement is confirmed) and minimise unnecessary movement including:

- Marking the tube with an indelible pen at the nostril.
- Recording the length of the tube at the point of exit from the nostril in the patient’s notes.
- Checking the nasal fixation tapes daily.
- Checking for signs of respiratory discomfort or regurgitation (not always present).

All actions to monitor tube position should be documented in the patient’s notes.

**Securing the nasogastric tube**

Nasogastric tubes should be taped securely at the nose to avoid inadvertent displacement in a manner that is acceptable to the patient. Some companies supply a plaster with the tube, but for those that do not, the use of a soft pliable tape is recommended. Tapes may need to be replaced regularly, especially in patients who sweat profusely or have oily skin. In such cases the use of protective dressing wipes may aid adhesion. Once secure at the nose the tube should be loosely taped to the cheek out of the patient’s line of vision and the remaining length of tube tucked behind their ear when not in use.

A nasal loop may also be used to secure a nasogastric tube. A length of umbilical tape is passed behind the septum from one nostril to another. This method has been used with positive results in dysphasic and critically ill patients with minimal rates of complication (Popovich et al 1996, Anderson et al 2004).

**Flushing the nasogastric tube**

A nasogastric tube should be flushed regularly to prevent the build up of feed and medication on the inner lumen, which if allowed to continue unchecked will lead to occlusion. Additional flushes may be necessary to ensure the patient receives his or her optimal fluid requirements, particularly if oral intake is contraindicated. As a minimum standard a 30-50ml flush should be administered before commencing a feed, on completion of a feed and before and after the administration of medication. A smaller flush of 10-15ml is required between each medication to ensure the whole dose is delivered into the stomach and does not remain in the tube. Where the patient’s fluid intake is restricted adjustments in the number or size of flushes given may be required.

For patients who are not immunocompromised, tap water from a drinking source is usually sufficient, but refer to your trust policy for local guidance because preferences differ from area to area. In patients who are immunocompromised sterile water should be used.

To minimise damage to the nasogastric tube a 30-50ml syringe should be used. The increased pressure exerted by smaller syringes may cause the tube to split (Rollins 1997).

Patients receiving viscous liquid medications or

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**Box 3**

**When to check nasogastric tube placement**

<table>
<thead>
<tr>
<th>Tube position must be checked:</th>
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<tbody>
<tr>
<td>- On initial placement.</td>
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<tr>
<td>- Before the administration of feed following a break or if bolus feeding.</td>
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<tr>
<td>- Before the administration of drugs if the tube is not used for any other purpose.</td>
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<tr>
<td>- After episodes of coughing, retching or vomiting.</td>
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<tr>
<td>- After the use of oropharyngeal suction.</td>
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<tr>
<td>- If the visible part of the tube appears to have changed in length.</td>
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<td>- At least once daily during continuous feeds.</td>
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<tr>
<td>- If the patient complains of discomfort or feed reflux into the throat or mouth.</td>
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<tr>
<td>- If the patient suddenly has signs of respiratory difficulties, including breathlessness, stridor, cyanosis or wheezing.</td>
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<tr>
<td>- If the patient is transferred from one clinical area to another, the receiving clinical area must verify tube position before commencing a feed.</td>
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</tbody>
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**Time out 4**

Consider why you would need to flush a nasogastric tube. What size syringe would you need to use and why? Identify the consequences of flushing from the drug port in the giving set or directly into the nasogastric tube port.
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A fibre feed have an increased risk of particles building up on the inner lumen of the tube. To minimise the risk of blockage, water flushes should be administered directly from the nasogastric tube port at least once a day. Nurses often administer water flushes via the drug port in the giving set which minimises unnecessary breaks in the feeding system and causes less disruption for the patient. However, flushes administered from this point do not always produce the turbulence required to remove the build up of debris within the inner lumen and over a period of time may lead to occlusion.

**Drug administration**

Most medication is not licensed for administration through a nasogastric tube (Smith 1997). This means that if a preparation is altered, for example, opening a capsule or crushing a tablet, and the patient has an adverse reaction, liability does not lie with the pharmaceutical company but with the healthcare professional involved in drug preparation and administration. To minimise the occurrence of possible complications, the pharmacist should be consulted to assess whether the patient is receiving the most appropriate preparation for administration through an enteral tube. Some thicker liquid preparations may require dilution to ensure the patient receives the required dose and to minimise blockages. If tablets are required they should be thoroughly crushed and mixed with water, with the exception of enteric-coated or sustained-release tablets where alternative preparations should be sought.

Each medication should be administered separately to minimise interactions between drugs and/or feed. Interaction with feed may reduce the absorption of some drugs, such as flucloxacillin. Medication should therefore not be administered while the enteral feed is in progress. The feed should be stopped and the nasogastric tube flushed before continuing. Some drugs such as phenytoin, an antiepileptic, will require a planned break in feeding of two hours before and after administration to minimise any interaction with the feed and maximise the absorption of the drug (Smith 1997). Where a patient receives a number of sugar-free liquid preparations, the total sorbitol content of the medicines administered should be considered because it may cause flatulence or diarrhoea. Diarrhoea will in turn affect the level of drug absorbed by the patient.

Nurses should be aware of the position of the tip of the nasogastric tube before administering medication. If the tip has progressed into the small intestine absorption of some drugs may be affected, for example, digoxin, because it is primarily absorbed in the stomach.

The British Association of Parenteral and Enteral Nutrition (BAPEN) (2004) has published posters and information booklets for nurses, patients and GPs to clarify issues surrounding the safe administration of medication through enteral tubes.

**Prevention and removal of blockages**

Some of the most common causes of nasogastric tube blockage include:

- Failure to flush the tube at regular intervals.
- Administration of partially crushed medication.
- Feed/drug interaction.

Polyurethane nasogastric tubes should be changed every four to six weeks. The prevention of a tube blockage is in the interest of the patient and the nurse. Attempting to unblock a nasogastric tube is often time consuming and unless addressed promptly after the blockage occurs may prove unsuccessful necessitating a change of tube, causing unnecessary stress and discomfort to the patient and a further delay in feeding.

Different methods have been suggested to unblock nasogastric tubes with varying degrees of success including flushing the tube with (Colagiovanni 2000):

- Warm water.
- Flat carbonated drinks such as lemonade or cola.
- Pancreatic enzymes.
- Pineapple juice.

Studies have shown that water is as effective as any other solution (Wilson and Haynes-Johnson 1987, Metheny 1988). However, flushing may not be the first action to take when attempting to unblock a nasogastric tube. Rolling the tube gently between the thumb and forefinger from tip to nose may help to break down the blockage in the tube. An attempt should...
then be made to aspirate tube contents into a syringe. Only then should any fluid be inserted into the tube. Under no circumstances should a guidewire be reinserted into a tube to resolve a blockage while the tube remains in the patient.

References


Nursing Standard