Guidelines for testing the placing of nasogastric tubes

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The National Patient Safety Agency has produced guidance on the safe testing of nasogastric tubes. This article outlines the recommendations and discusses their rationale and background.

The recent interest in the safest and most convenient method of checking the position of a nasogastric tube (NGT) began following the circulation of a 2004 report by the coroner for Yorkshire. This made several recommendations, such as an immediate alert cautioning against use of the ‘whoosh’ test and on the risks of using blue litmus paper to check for aspiration of gastric content.

While it is appreciated that the current edition of the Royal Marsden Manual may shortly be replaced, it is suggested that an immediate alert is issued by the Department of Health clarifying the wording used and in particular whether checking for a bubbling sound is to be regarded for practical purposes as equivalent to the whoosh test (and if so to cease forthwith). Clarification might also be given on the reference to waiting for an hour before using litmus paper.

Hospitals have been advised that the misplacement of nasogastric tubes should be reported to the Medicines and Health Care products Regulatory Agency so that the incidence can be monitored nationally. Although little or none of the information given in these recommendations will have come as any surprise to nutrition nurses, it is clear that a large number of centres have been unaware of the potential problems.

Despite these problems, nasogastric feeding remains such a quick, convenient and relatively non-invasive method of providing nutrition for many patients, that we must now work towards ensuring that we carry out this procedure as safely and effectively as possible.

Testing the position of an NGT

The ‘gold standard’ test for confirming the position of an NGT is still carrying out an X-ray (Tait, 2001) (showing the tube-tip below T12) but this is obviously not suitable for frequent or routine use. Auscultation while injecting air (the whoosh test) is not suitable as a single, reliable test because bowel or chest sounds may be misinterpreted as gastric tube placement (Colagiovanni, 1999). This leaves the aspiration of gastric fluid by syringe and the testing of this aspirate for acidity as the only reasonable option.

Selecting a pH range

In terms of selecting a suitable pH range for NGT testing, aspirates at pH 5.5 or below will indicate correct placement of NGTs in most patients (adults, children, infants and neonates – including most of those receiving acid suppressants) and rule out the possibility of respiratory tract placement (Khair, 2003; Metheny et al, 1994). The selection of this pH range is based largely on the work of Professor Norma Metheny in the US, who has conducted exhaustive studies of nasogastric tube placement and testing.

Metheny has shown that in a small number of patients pulmonary aspirate, obtained from inadvertently misplaced nasogastric tubes, suctioning or thorocentesis, can provide an acidic pH value. The initial recommendations on the basis of this finding were that a value of pH 3 to pH 4 or below (Rollins, 1997) should be used to confirm correct NGT placement.

Metheny et al also reported that of 219 patients receiving acid suppression therapy (H2-receptor antagonists or proton pump inhibitors), 37.7 per cent had gastric aspirates greater than pH 4 (17.8 per cent had over pH 6). Using the initial recommendations, these patients would all require X-ray confirmation of the position of their nasogastric tubes each time they were used. A similar problem is likely to occur in continuously fed patients since residual milk in the stomach may reduce the acidity of gastric aspirates.

A significant issue in paediatric and neonatal practice is that the newborn has a transient raised gastric pH (due to swallowing amniotic fluid) and that infants (particularly pre-term) have a reduced ability to produce gastric HCl. In fact, it has been reported that gastric acidity in children may not reach adult levels until the age of two or three (Gideon, 1997). This phenomenon is referred to as a ‘relative achlorhydria’. In addition, the gastric fluid volume (GFV) in infants is very small, which can lead to difficulties in obtaining enough aspirate for testing.
Despite the difficulties, it is important to agree a safe and practical method of testing NGTs both in the hospital and in the community. Since no pulmonary aspirates have been reported below pH 5.99, the available evidence would suggest a pH value of pH 5.5 or below will exclude 100 per cent of pulmonary placements and more than 93.9 per cent of placements in the small intestine (Metheny, 2004).

**Choosing a testing method**

There are concerns regarding the use of blue litmus paper, the traditional method of testing (Burnham, 2000), because it changes colour in the presence of acid, rather than defining the exact pH value. There is a risk, therefore, that mildly acidic pulmonary or intestinal aspirates may be mistaken for gastric fluid. There have been recommendations in the literature for some time that universal pH testing paper or strips should be used in preference to litmus paper (Rollins, 1997).

A variety of pH testing products are commercially available, as either rolls of reagent paper or plastic strips, each with a defined pH range – some reading in single pH units, others in half unit increments. None of the available products carries a CE mark since they have been defined by the MHRA as not being within the category of ‘medical devices’.

**What if the test fails?**

The most likely problems are failure to obtain sufficient aspirate for testing or aspirate reading greater than pH 5.5.

Where it is not possible to obtain sufficient aspirate it is important to remember that the stomach is never completely empty and that any infant weighing over 1kg should have enough gastric residual volume (GFV) to gain at least 0.5ml of aspirate. This may require advancing the nasogastric tube, 1cm at a time, to ensure that the exit port/s enter the fluid pool. Injecting air through the NGT can also be useful (Metheny and Meert, 2004) by dislodging the NGT exit port from the gastric mucosa and expelling.

If aspirates fail to test within the acceptable range, the likelihood is that the gastric fluid is diluted with a significant quantity of residual feed. If this is the case, there is no urgent need to feed the patient and the simplest solution would be to wait for 30 minutes to one hour for the gastric pH to reduce naturally and then re-test. Patients who are receiving continuous feeds are likely to have a gastric pH greater than 5.5. This should not present a problem because it is unlikely that an NGT will require testing while the feed is actually being delivered.

In the future, a testing technique combining pH value with CO2, pepsin, trypsin or bilirubin concentrations may provide a definitive bedside method of tube-testing. It is important to be open to making some minor changes to practice in order to ensure patient safety.

**Box 1. The National Patient Safety Agency recommendations**

- Staff, carers and patients in the community should be provided with information on correct and incorrect testing methods
- pH measuring of aspirate should use pH indicator strips/paper
- Radiography is recommended, but should not be used ‘routinely’
- Fully radio-opaque tubes with markings to enable accurate measurement, identification and documentation of their position should be used
- DO NOT use the ‘whoosh’ test – this practice must cease immediately
- DO NOT test acidity/alkalinity of aspirate using blue litmus paper
- DO NOT interpret absence of respiratory distress as an indicator of correct positioning
- Individual risk assessment should be carried out prior to nasogastric tube feeding
- All misplacement incidents should be reported via local risk management reporting systems

Price is of course an important consideration but the choice of product should be based on ease of use, reliability and the specificity of the pH range. Some products, for example, measure pH 1–14, while others measure pH 1–6, a more useful range for identifying gastric fluid.

The choice will depend largely on the age of patients within the clinical area. Most adults, for example, should provide gastric aspirate below pH 4, therefore products reading in single pH increments would be adequate. However, many infants may have a gastric pH above pH 4, so a product that measures in 0.5pH increments will allow use of the full range (up to pH 5.5).

*References*


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