

How to confirm the correct position of nasogastric feeding tubes in infants, children and adults

This information does NOT apply to neonates (preterm to 28 days)

Nasogastric tube feeding is common practice and thousands of tubes are inserted daily without incident. However, there is a small risk that the tube can become misplaced into the lungs during insertion, or move out of the stomach at a later stage. Studies have shown that conventional methods to check the placement of nasogastric feeding tubes can be inaccurate. The National Patient Safety Agency (NPSA) has put together this information to advise staff which methods should and should not be used to check the position of nasogastric feeding tubes.

Note that this information does not replace clinical judgement. Local written policies may vary slightly as long as they do not fall below the standards set out in this document.

Testing the position of nasogastric feeding tubes

Methods that should be used:

- measuring the pH of aspirate using pH indicator strips/paper;
- radiography.

Methods that should NOT be used:

- auscultation of air insufflated through the feeding tube ('whoosh' test);
- testing the acidity/alkalinity of aspirate using blue litmus paper;
- interpreting absence of respiratory distress as an indicator of correct positioning;
- monitoring bubbling at the end of the tube;
- observing the appearance of feeding tube aspirate.

What are the limitations of pH testing and radiography?

One of the limitations with the pH testing method is that the stomach pH can be affected by, for example, medication and frequency of feeds. Additionally, gaining aspirate from the feeding tube can be difficult, particularly when using fine bore tubes. For post-operative patients where the tube has been positioned under direct vision, tube replacement or removal should only be done on the advice of the surgeon.

The most accurate method for confirming correct tube placement is radiography. However, there have been multiple reports of x-rays being misinterpreted by physicians who are not trained in radiology. Minimising the number of x-rays is also important in order to avoid increased exposure to radiation, loss of feeding time and increased handling of

seriously ill patients. Outside of the acute care setting, access to radiology is difficult, particularly if the patient requires transportation from the community.

Radiography should therefore not be used 'routinely' and local policies are recommended for particular groups of patients, for example, those on intensive care units and neonates. Fully radio-opaque tubes that have markers to enable accurate measurement, interpretation and documentation of their position should be used.

The flowcharts attached to this document set out actions to take to: gain sufficient aspirate; what to do when pH is above 5.5; and when radiography should be considered. The table provides the rationale behind this advice. Prior to feeding each patient, a risk assessment needs to be carried out. This should balance the potential risks with the need to feed. Patients who are comatose or semi-comatose, have swallowing dysfunction or recurrent retching or vomiting, have a higher risk of placement error or migration of the tube, whereas patients on antacid medication are more likely to have pH levels of 6 and above. Actions to reduce risks and the rationale behind the actions should be documented prior to feeding. This information will support staff in making the correct clinical decisions.

What pH paper/strips should I use?

We recommend that pH indicator strips with 0.5 gradations or paper with a range of 0 to 6 or 1 to 11 should be used. It is important that the resulting colour change on any indicator or paper is easily distinguishable, particularly between the pH 5 and 6 range.

When should I check the tube position?

The tube position should be checked:

- following initial insertion;
- before administering each feed;
- before giving medication (see BAPEN guidance at www.bapen.org.uk/drugs-enteral.htm);
- at least once daily during continuous feeds;
- following episodes of vomiting, retching or coughing (note that the absence of coughing does not rule out misplacement or migration);
- following evidence of tube displacement (for example, loose tape or visible tube appears longer).

Ensure that all staff report misplaced feeding tube incidents through their local risk management systems. The NPSA will automatically receive this information through the National Reporting and Learning System (NRLS). This will enable both local and national monitoring of nasogastric feeding tube misplacements and inform our understanding of the problem.

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The recommended procedure for checking the position of nasogastric feeding tubes in infants, children and adults

Action	Rationale
Check whether the patient is on medication that may increase the pH level of gastric contents	Medication that could elevate the pH level of gastric contents are; antacids, H ₂ antagonists and proton pump inhibitors. For those patients who are regularly on antacids, the initial risk assessment needs to identify actions that staff should take in this scenario, and document them in the care plan. The initial pH of the aspirate should also be documented in the case notes.
Check for signs of tube displacement	Documenting the external length of the tube initially and checking external markings prior to feeding will help to determine if the tube has moved. The documentation will also assist radiographers if an x-ray is needed.
Sufficient aspirate (0.5 to 1ml) obtained	0.5 to 1ml of aspirate will cover an adequate area on the single, double or triple reagent panels of pH testing strips/paper. Allow ten seconds for any colour change to occur.
Aspirate is pH 5.5 or below	Commence feed. There are no known reports of pulmonary aspirates at or below this figure. The range of pH 0 to 5.5 balances the risk between increasing the potential problems for clinical staff e.g. removing tubes that are actually in the stomach, increased use of x-ray, with the as yet, unreported possibility of feeding at pH 5.5 when the tube is in the respiratory tract.
Aspirate is pH 6 or above	DO NOT FEED. Possible bronchial secretion; leave up to one hour and try again. The initial risk assessment should identify actions for staff to take in this scenario for each patient. The actions should be documented in the care plan and/or in local policies. If there is ANY doubt about the position and/or the clarity of the colour change on the pH indicator strip/paper, particularly between the ranges pH 5 and 6, then feeding should NOT commence – seek advice.
Wait up to one hour before re-aspirating to check pH level	The most likely reason for failure to obtain gastric aspirate below pH of 5.5 is the dilution of gastric acid by enteral feed. Waiting for up to an hour will allow time for the stomach to empty and the pH to fall. The time interval will depend on the clinical need of the patient and whether or not they are on continuous or bolus feeds.
Problems obtaining aspirate?	
Turn patient onto their side	This will allow the tip of the nasogastric tube to enter the gastric fluid pool.
Inject air (1-5ml for infants and children, 10-20ml for adults) using a 20ml or 50ml syringe. Wait for 15-30 minutes and try again This is NOT a testing procedure: DO NOT carry out auscultation of air ('whoosh' test) to test tube position	Injecting air through the tube will dispel any residual fluid (feed, water or medicine) and may also dislodge the exit-port of the nasogastric feeding tube from the gastric mucosa. Using a large syringe allows gentle pressure and suction; smaller syringes may produce too much pressure and split the tube (check manufacturers guidelines). Polyurethane syringes are preferable to other syringes. It is safe practice to use nasogastric tubes and enteral syringes that have non luer connectors (<i>Building a Safer NHS for Patients: Improving Medication Safety</i> published 22/01/2004 available at www.dh.gov.uk)
Advance the tube by 1-2cm for infants and children or 10-20cm for adults	Advancing the tube may allow it to pass into the stomach if it is in the oesophagus.
Consider x-ray All radiographs should be read by appropriately trained staff	X-ray should not be used routinely. The radiographer will need to know that this advice has been followed, what the problem has been and the reason for the request. The radiographer should document this. Fully radio-opaque tubes with markings to enable measurement, identification and documentation of their external length should be used.
Additional tip	If the patient is alert, has intact swallow and is perhaps only on supplementary feeding and is thus eating and drinking during the day, ask them to sip a coloured drink and aspirate the tube. If you get the coloured fluid back then you know the tube is in the stomach.

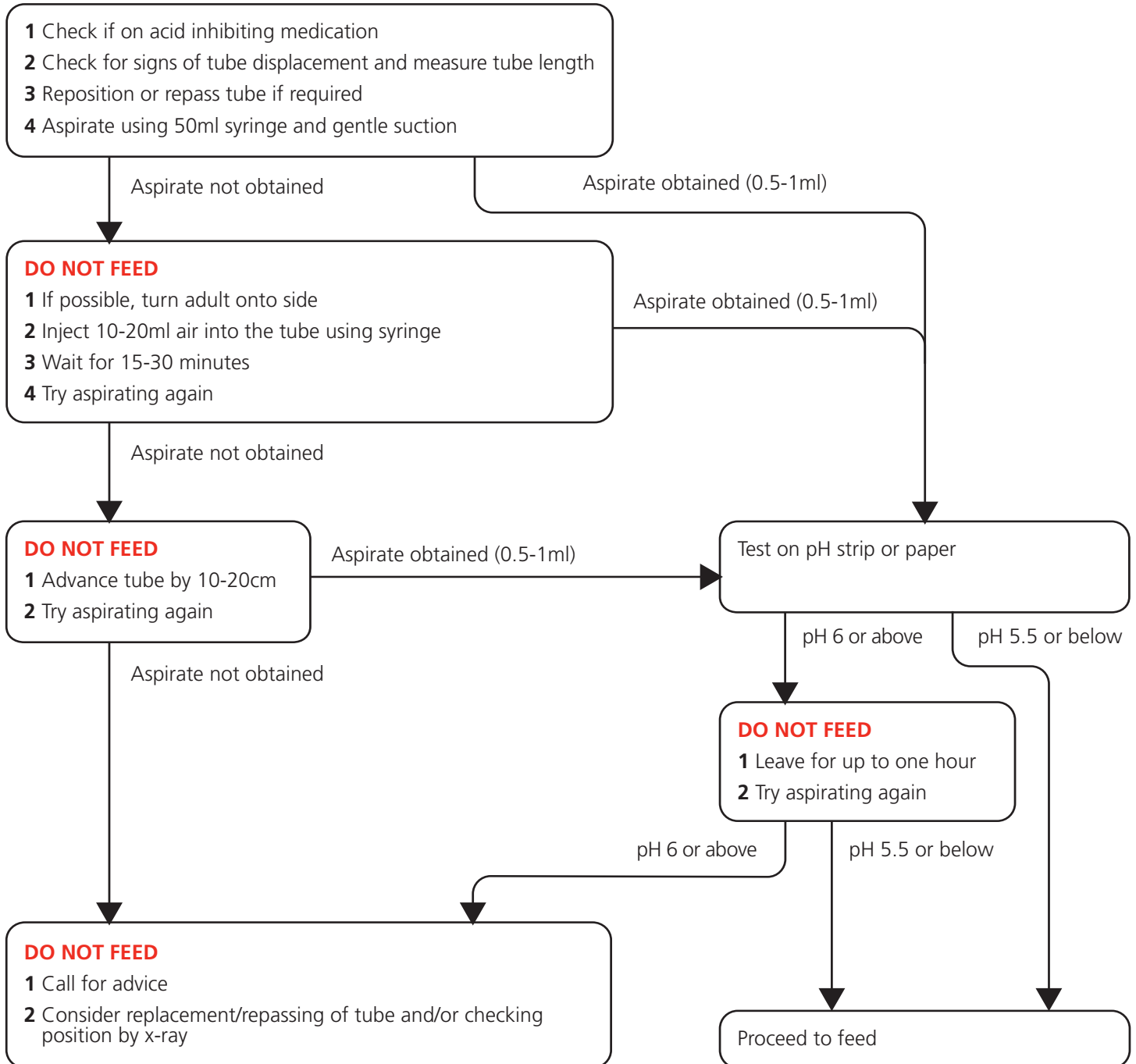
For more information about the safety issues involved, or for details of references used, please see www.npsa.nhs.uk/advice

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Confirming the correct position of nasogastric feeding tubes in **ADULTS**



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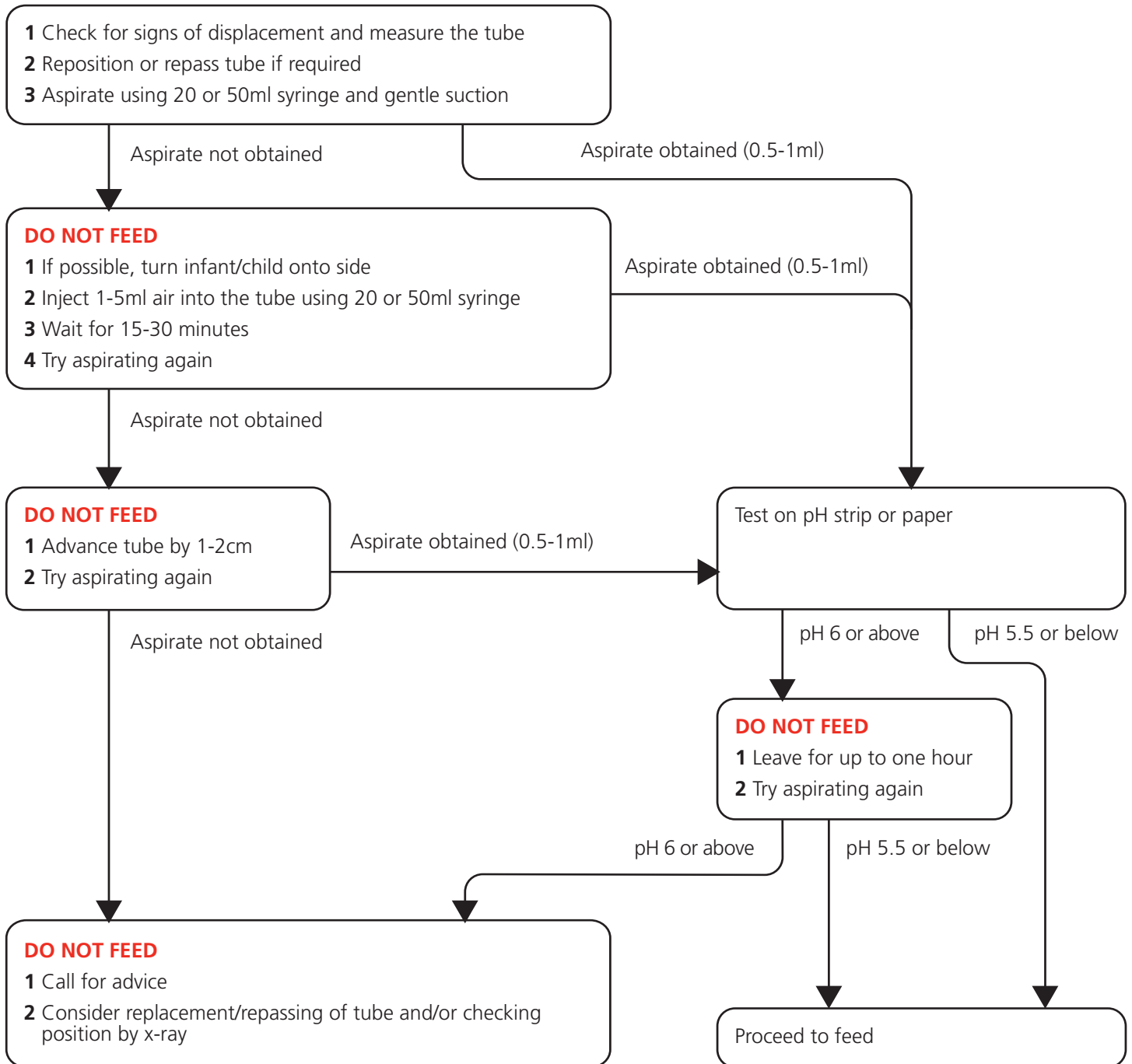
The information in this document was originally developed by the National Nurses Nutrition Group (NNG) and further developed in collaboration with the Medicines and Healthcare products Regulatory Agency (MHRA), the National Patient Safety Agency (NPSA), NHS clinicians, risk managers and other leading experts in the field. The Patient Safety Research Programme at the University of Birmingham has commissioned additional research to assess these methods further. This advice may therefore be revised following the outcome of this work.

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Confirming the correct position of nasogastric feeding tubes in **INFANTS and CHILDREN**



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