NHS National Patient Safety Agency

How to confirm the correct position of naso and orogastric feeding tubes in babies under the care of neonatal units.

Gastric tube feeding, both naso and orogastric, is used extensively in neonatal units. Thousands of these 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 testing methods to check the placement of nasogastric feeding tubes in adults and children can be inaccurate.[1-5]

The following advice informs staff about which methods should and should not be used to check the position of gastric feeding tubes in neonates. The British Association of Perinatal Medicine has worked with the NPSA on developing this advice, and the Neonatal Nurses Association and the Royal College of Paediatrics and Child Health have also agreed it.

Traditionally, in neonatal units, litmus paper has been used to check the position of the nasogastric tube. However, recent alerts (MHRA /2004/026 and NPSA Patient Safety Alert 05) have recommended the use of pH indicator strips or paper[8] rather than blue litmus. There is no evidence that use of litmus paper has resulted in harm in neonates, although it may be that serious incidents have been under reported. Further research is being commissioned to develop an evidence base for neonatal pH values. In the interim it is recommended that neonatal units' guidelines for testing the position of tubes do not fall below the standards set out in this document.

Testing the position of gastric feeding tubes

We recommend only the following tests for gastric tube placements:

- neonatal units and carers of babies in the community change to using pH indicator strips or paper following competency based training and education by 1 January 2006;
- radiography should NOT be used 'routinely' but can be used if the baby is being x-rayed for another reason. Tubes with markings to enable accurate measurement of depth and length should be used.

The limitations of pH testing and radiography

There are many factors in neonates that affect the results from pH indicator strips or paper[8,17] including:

- gestation;
- postnatal age;
- small volumes of aspirate;
- medications that affects the gastric pH;
- continuous and frequent feeding.

Additionally, gaining aspirate from the feeding tube can be difficult, particularly when using fine bore tubes.

The most accurate method for confirming correct tube placement is radiography. However, x-ray for the sole purpose of confirming gastric tube position in a neonate is not recommended. Minimising the number of x-ray exposures avoids unnecessary exposure to radiation, loss of feeding time and increased handling of small babies. If it is possible, a baby that is going to have an x-ray as part of their care management, should have the gastric tube in place beforehand. Tube position can then be checked at the same time as the x-ray.

Risk Assessment

Staff should consider the factors for each patient that may contribute to a high gastric pH (pH 6 or above). Possible factors include:

- the presence of amniotic fluid in a baby under 48 hours old;[10,12]
- milk in the baby's stomach, particularly if they are on one to two hourly feeds;[11]

- use of medication to reduce stomach acid.[12]

Even though aspirates testing pH 5.5 and below should indicate correct placement in most babies, including the majority of those receiving acid suppressants, some babies will consistently have pH values of 6 and above.

It is important that staff work through the flowchart in this document and record their findings prior to making any decisions. The multidisciplinary care team should then discuss possible actions to take, and again record how they reached their decision. These must be based on balancing the risks between not feeding a baby, in the short term, with feeding when there is the possibility of the tube being in the lungs.

Recommended pH levels and what pH paper and strips should be used

We recommend that the cut-off level for feeding to commence should be pH 5.5 or below. Senior advice should be sought if pH values are 6 or above. Indicator strips or paper should be used that have:

- a range from 0 to 6 or 1 to 11;
- a resulting colour change that is easily distinguishable, particularly between the pH 5 and 6 range;
- colour change within 10 to 15 seconds.

For recommended products go to: **www.pasa.nhs.uk/medsurg/shared/medicaldiagnostics/lab_cons.stm**

Trusts should choose a product suitable for their purposes and make sure that only one type is available on the neonatal unit at any one time. This will reduce the risk of misinterpreting the colour changes through using different brands.

When to check the tube position

The tube position should be checked:

- following initial insertion;
- before administering each feed;
- before giving medication;
- following vomiting, retching or coughing. However, the absence of coughing does not rule out misplacement or migration;
- if there is evidence of tube displacement. For example, if the tape is loose or the visible tube appears longer or kinked.

If the baby is on continuous feeds, tube checking should be synchronised with the syringe changes. When continuous feeding has stopped, wait 15 to 30 minutes to allow the stomach to empty of milk and the pH level to fall.

Reporting misplaced tube incidents

NHS organisations should 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 gastric feeding tube misplacements and inform our understanding of the problem.

Flowcharts and additional information

The flowcharts and rationale on the next two pages set out clinical advice on how to obtain sufficient aspirate and what to do when the pH level is 6 or above.

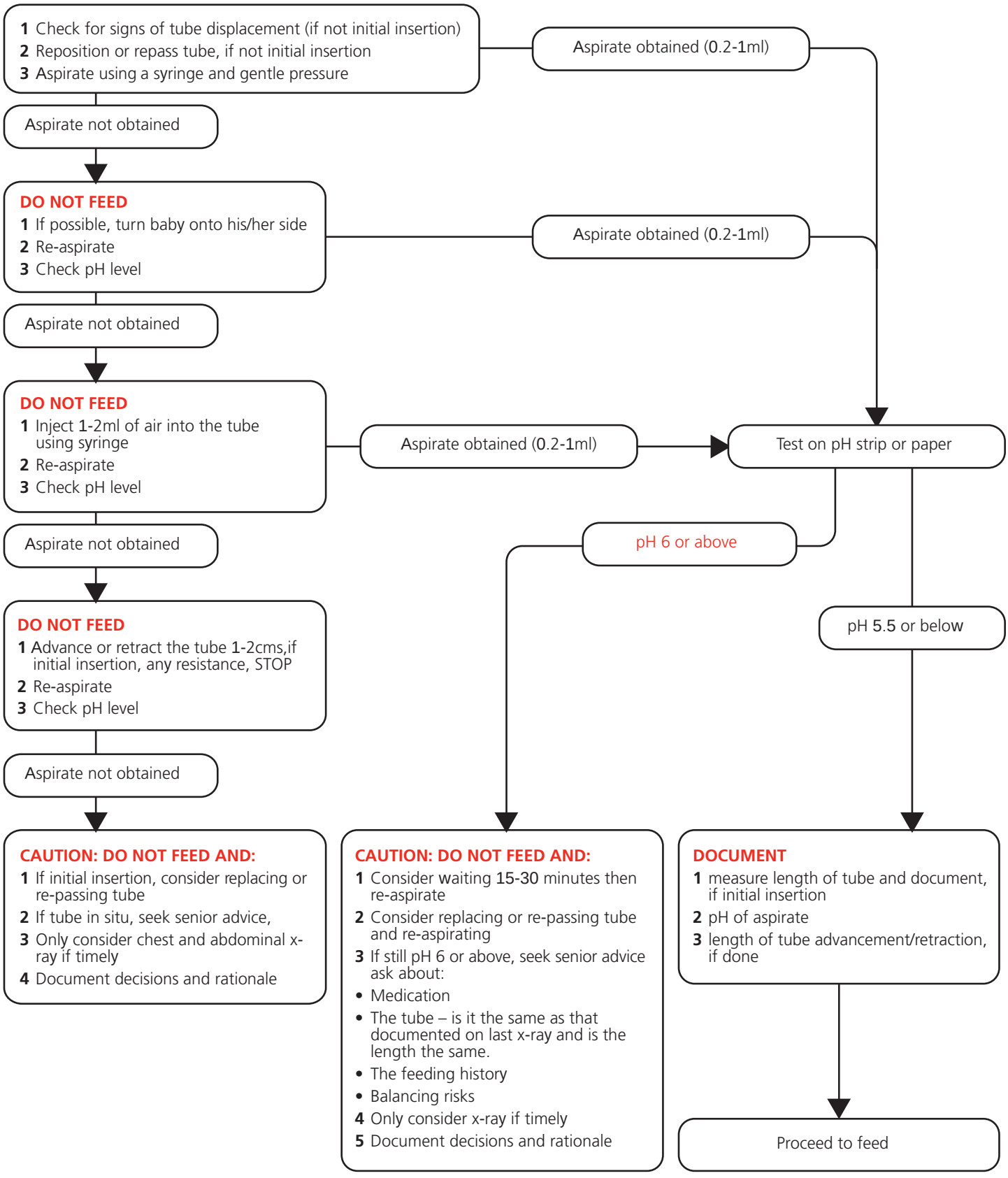
The recommended procedure for checking the position of the naso and orogastric feeding tube in babies under the care of neonatal units

Use this flowchart as a basis for decision making

Action	Rationale
Check for signs of tube displacement (if not initial insertion)	The tube may have coiled up in the mouth or if there is more tube visible than previously documented, the tube may have kinked. Loose tape may indicate movement. If tube has been displaced, it will need repositioning or re-passing before feeding.
Aspirate 0.2–1ml gastric fluid and allow ten to 15 seconds for any colour change	0.2 to 1ml of aspirate will cover an adequate area on single, double or triple reagent panels of pH testing strips or paper.
Aspirate using a syringe	It is safe practice to use gastric tubes and enteral syringes that have non luer lock connectors (*Building a Safer NHS for Patients: Improving Medication Safety* published 22/01/2004 available at **www.dh.gov.uk**).
Aspirate is pH 5.5 or below PROCEED TO FEED	Aspirates testing pH 5.5 and below should indicate correct placement in most babies (including the majority of those receiving acid suppressants) and rule out the possibility of respiratory tract placement.[13] Always match the pH indicator strip or paper colour change with the colour code chart on the booklet or box. If there is ANY doubt about the position and/or clarity of the colour change on the pH indicator strip or paper, particularly between pH5 and 6, DO NOT commence feeding.
Aspirate is pH6 or above CAUTION – STOP FEED: if clinically safe, consider waiting 15–30 minutes before aspirating again. Consider replacing and/or re-passing the tube and re-aspirating If still pH 6 or above, seek advice IT IS IMPORTANT THAT STAFF FOLLOW THE FLOWCHART, RECORD THE OUTCOMES AND MAKE DECISIONS BASED ON THIS INFORMATION	The most likely reason for failure to obtain gastric aspirate pH 5.5 or below is the dilution of gastric acid by enteral feed. Waiting gives time for the stomach to empty and the pH value to fall. If pH is still 6 and above after waiting and replacing or re-passing the tube, seek advice and consider the following questions: • is the baby on medication? • is the baby only 24 to 48 hours old? • is the tube in the same position as previously documented on an x-ray? • Is the visible length of the tube the same as previously documented? • what is the trend in pH values? • what is the volume of aspirate? It is important that actions and their rationale are documented. Clinical staff should balance the risks of not feeding a baby, in the short term, with feeding when there is the possibility of the tube being in the lungs. Only consider x-ray if timely, e.g. if the baby is due for an x-ray for other reasons, and/or it is clinically safe to do so. If an x-ray is done, the radiographer should know this advice has been followed and the reason for the request should be documented.
Document all information	Documenting helps the clinical decision-making process. The tube size and length should be recorded each time the tube is passed. A record should also be made each time measurements of the pH level of the aspirate and the length of the tube's advancement or retraction, are done.
Problems obtaining aspirate: suggest using larger size tubes with multiple ports. Turn baby onto his/her side	This may facilitate the tip of the nasogastric tube entering the gastric fluid pool.
Inject 1–2ml of air using a syringe This is NOT a testing procedure	Injecting air through the tube may dislodge the exit-port of the feeding tube from the gastric mucosa. Care must be taken when using large syringes on neonates to ensure that the correct amount of air is inserted, i.e., no more than 2ml.
Advance or retract the tube by 1–2cm Stop if there is any resistance or obstruction	If the tube is in the oesophagus, advancing it may allow it to pass into the stomach. If the tube has been inserted too far, it may be in the duodenum. Consider withdrawing a few centimetres and re-aspirating. The position of the tube at the nose should already have been recorded and marked, if the tube is in situ. If the mark has not moved then advancing or retracting may not make a difference. Document the length of tube if moved.
If you still cannot obtain aspirate	If this is an initial insertion then consider replacing or re-passing the tube. If the tube has been in situ already, seek advice. Consider whether the length of the tube has changed and discuss options as outlined under the action point on aspirate of pH 6 and above. Record all decisions and their rationale.

Reducing the harm caused by misplaced gastric feeding tubes in babies under the care of neonatal units

Interim advice for healthcare staff – August 2005



CAUTION: If there is ANY query about position and/or the clarity of the colour change on the pH strip, particularly between ranges 5 to 6, then feeding should not commence.