Alert

Patient Safety Alert

NPSA/2011/PSA002
10 March 2011

NHS
National Patient Safety Agency

Reducing the harm caused by misplaced nasogastric feeding tubes in adults, children and infants

This Alert updates and strengthens Patient Safety Alert 05 (*Reducing the harm caused by misplaced nasogastric feeding tubes*) and is based on national learning since then. It does not replace *Reducing the harm caused by misplaced naso and orogastric feeding tubes in babies under the care of neonatal units*, issued in August 2005.

Patient Safety Alert 05 provided guidance for the NHS on checking and confirming that a nasogastric tube had been inserted into the right place, i.e. the stomach.

This followed reports to the NPSA's National Reporting and Learning System (NRLS) of patient death as a result of feeding into the lung through misplaced nasogastric tubes.

Since the completion date for that Alert's actions (1 September 2005), the NRLS has received reports of a further **21 deaths** and **79 cases of harm** due to feeding into the lungs through misplaced nasogastric tubes. The main causal factor leading to harm was misinterpretation of x-rays. This was found in 45 incidents, 12 of which resulted in the death of the patient. The focus for this new Alert therefore supports safe x-ray interpretation.

Other causes of harm related to failure to follow the guidance in Patient Safety Alert 05 including: feeding despite obtaining aspirate between pH6 and pH8 (seven incidents including two deaths), instilling water down the tube before obtaining aspirate (two incidents), no checking of tube placement by any method (nine incidents including one death). A repeated finding in local investigations was that no written record was made of pH obtained or of x-ray interpretation before feeding commenced[1,2,3].

This Alert does not change the advice given in Patient Safety Alert 05 that pH testing remains the first line test, and x-ray checking remains the second line test.

For the purpose of this Alert the definition of 'to feed' and 'feeding' includes the introduction of any feed, liquid or medication through the nasogastric tube.

This Alert must be read in conjunction with the Supporting Information, available at www.nrls.npsa.nhs.uk/alerts

Action for the NHS

For action by all organisations in the NHS and independent sector where nasogastric feeding tubes are placed and used for feeding patients.

An executive director, nominated by the chief executive, working with relevant medical and nursing staff should ensure, through reviewing policies, procedures and staff training that by **12 September 2011:**

1. A named clinical lead is assigned to have responsibility for implementing all actions in this Alert.
2. All policies, protocols, and bedside documentation are reviewed to ensure compliance with steps (a) to (j) outlined on page 2 every time a nasogastric tube is inserted and used to administer medication, fluids or feed.
3. An ongoing programme of audit is put in place to monitor compliance.
4. Staff training, competency frameworks and supervision are reviewed to ensure that all healthcare professionals involved with nasogastric tube position checks have been assessed as competent. Competency training should include theoretical and practical learning. An example eModule training tool for x-ray interpretation of nasogastric tube position is available at **www.trainingngt.co.uk** (in addition refer to guide to interpretation on page 3 of this Alert).
5. Purchasing policies are revised and old stock systematically removed to ensure all nasogastric tubes used for the purpose of feeding are radio-opaque throughout their length and have externally visible length markings.
6. Purchasing policies are revised and old stock systematically removed to ensure all pH paper is CE marked and intended by the manufacturer to test human gastric aspirate[4].

1. National Patient Safety Agency. *Reducing harm caused by the misplacement of nasogastric feeding tubes;* Patient Safety Alert 05; Feb. 05. www.nrls.npsa.nhs.uk/resources

2. National Patient Safety Agency. *Misplaced naso or orogastric tube not detected prior to use.* www.nrls.npsa.nhs.uk/resources

3. National Patient Safety Agency. *Never Events Annual Report 2009-2010.* www.nrls.npsa.nhs.uk/resources

4. Medicines and Healthcare products Regulatory Agency. Medical Device Alert: Medical devices in general and non-medical products (MDA/2010/001). www.mhra.gov.uk/Publications/Safetywarnings/MedicalDeviceAlerts/CON065771

5. Metheny NA, Meert KL, Clouse RE. Complications related to feeding tube placement. *Curr Opin Gastroenterol.* 2007 Mar; 23(2):178-82

6. Hanna G. *Improving the safety of nasogastric feeding tube insertion. Developing guidelines for the safe verification of feeding tube position - a decision analysis approach.* A Report for the NHS Patient Safety Research Portfolio, July 2010.

7. Bankhead R, Boullata J, Brantley S, Corkins M, Guenter P, Krenitsky J, Lyman B, Metheny NA, Mueller C, Robbins S, Wessel J; A.S.P.E.N. Board of Directors. Enteral nutrition practice recommendations. *JPEN J Parenter Enteral Nutr.* 2009; 33(2):122-67

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Action for healthcare professionals

Healthcare professionals should ensure that:

a. Before a decision is made to insert a nasogastric tube, an assessment is undertaken to identify if nasogastric feeding is appropriate for the patient, and the rationale for any decisions is recorded in the patient's medical notes.

b. Placement is delayed if there is not sufficient experienced support available to accurately confirm nasogastric tube placement (e.g. at night), unless clinically urgent, and that the rationale for any decisions made is recorded in the patient's medical notes.

c. Nasogastric tubes used for the purpose of feeding are radio-opaque throughout their length and have externally visible length markings.

d. pH indicator paper is CE marked and intended by the manufacturer to test human gastric aspirate.

e. Nasogastric tubes are not flushed, nor any liquid/feed introduced through the tube following initial placement, until the tube tip is confirmed, by pH testing or x-ray, to be in the stomach.

f. pH testing is used as the **first line test method**, with pH between 1 and 5.5 as the safe range, and that each test and test result is documented on a chart kept at the patient's bedside.

g. X-ray is used only as a second line test when no aspirate could be obtained or pH indicator paper has failed to confirm the position of the nasogastric tube and that:

   i) X-ray request forms clearly state that the purpose of the x-ray is to establish the position of the nasogastric tube for the purpose of feeding.

   ii) The radiographer takes responsibility to ensure that the nasogastric tube can be clearly seen on the x-ray to be used to confirm tube position.

   iii) Documentation of the tube placement checking process includes confirmation that any x-ray viewed was the most current x-ray for the correct patient, how placement was interpreted, and clear instructions as to required actions. Any tubes identified to be in the lung are removed immediately, whether in the x-ray department or clinical area.

h. Any individual involved with nasogastric tube position checks has been assessed as competent through theoretical and practical learning.

i. 'Whoosh' tests, acid/alkaline tests using litmus paper, or interpretation of the appearance of aspirate **are never used** to confirm nasogastric tube position as they are not reliable.

j. A full multidisciplinary supported risk assessment is made and documented before a patient with a nasogastric tube is discharged from acute care to the community[5,6,7].

Further information

For further information visit **www.nrls.npsa.nhs.uk/alerts**

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Nasogastric tubes: x-ray interpretation aid

a. Is nasogastric tube feeding the right decision for this patient?
b. Is this the right time to place the nasogastric tube and is the appropriate equipment available?
c. Is there sufficient knowledge/expertise available at this time to test for safe placement of the nasogastric tube?

To confirm gastric position of the nasogastric tube, ask:

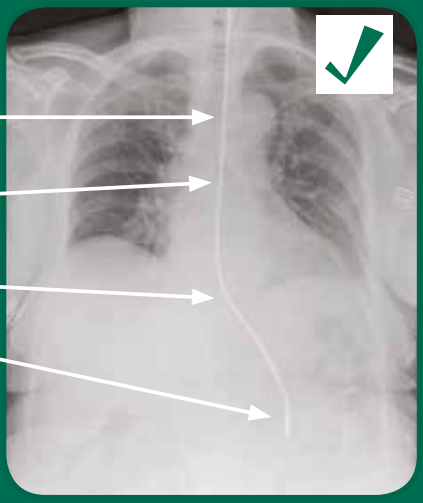
Does the tube path follow the oesophagus/avoid the contours of the bronchi?

Does the tube clearly bisect the carina or the bronchi?

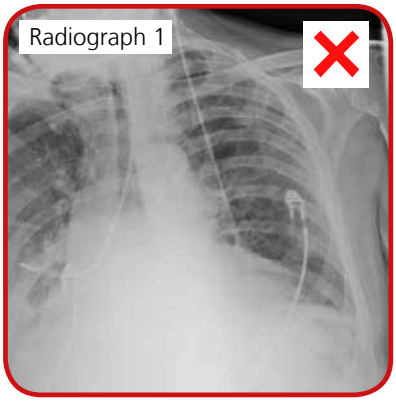
Does it cross the diaphragm in the midline?

Is the tip clearly visible below the left hemi-diaphragm?

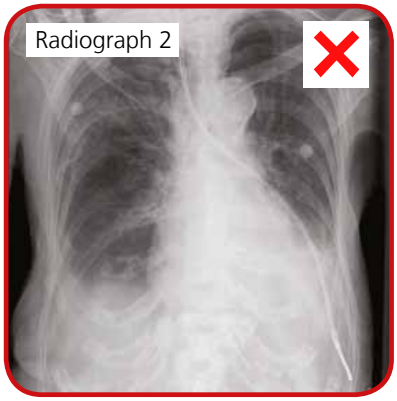
Proceed to feed only if all criteria are met. If in any doubt repeat x-ray or call for senior help.



Below are two examples where the nasogastric tube has been incorrectly identified as being in the stomach:



Radiograph 1 shows the tip of the nasogastric tube above the diaphragm and on the right-hand side of the thorax. The presence of ECG leads make interepretation of the radiograph more difficult.



Radiograph 2 shows the tip of the nasogastric tube apparently below the left hemidiaphragm but the tube clearly follows the contours of the left bronchus. In fact, the tube is positioned in the left lower lobe of the lung.

X-rays must always be interpreted by someone assessed as competent to do so, and the decision to feed a patient must be documented in the patient's medical notes, dated, timed and signed by that person.

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