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NASOGASTRIC TUBE INSERTION: A SIMPLE AND PRAGMATIC APPROACH TO PRACTICE IMPROVEMENT

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Abstract: Fine bore nasogastric tube insertion for enteral feeding is a common procedure performed in hospitals by health care professionals. It is not without risks. The current recommendation for checking nasogastric tube placement is via the use of pH indicator strips, with chest radiography a second line alternative. The National Patient Safety Agency have highlighted cases of death and serious harm from misplaced nasogastric tubes, and it has been recently deemed as a 'never event' by the Department of Health. We audited the practice of nasogastric tube insertion in the elderly care medicine wards in a district general hospital over a period of 16 months, and found that, following the recommendations from our initial audit, we could demonstrate that, with improved junior doctor education, in addition to the appointment of a Nutritional Specialist Nurse, that pH testing to check tube positioning increased from 0% to 61% for initial insertions and from 4% to 69% for subsequent insertions. The total number of chest radiographs per patient was also reduced from 2.76 to 0.83.

Key words: Nasogastric, enteral feeding, pH confirmation.

Introduction

Despite being a common procedure (1) undertaken in hospitals by health care professionals, the insertion of a nasogastric tube (NGT) for enteral feeding is not without risks. The recommended first line method for confirming NGT placement is the use of pH indicator strips (pH </= 5.5 is acceptable) (2) with chest radiography reserved as a second line alternative where an appropriate pH has not been obtained (2). The routine use of radiological investigations to verify tube positioning is expensive and subjects patients to unnecessary radiation exposure. Over a 6 month period in our hospital 642 chest X-rays (CXRs) were requested to confirm the position of NGTs with a cost of approximately £15000. Other described methods of verifying NGT placement; checking the appearance of the aspirate, litmus testing of the aspirate, and the use of the "whoosh test", are not to be used (2). In 2005, the National Patient Safety Agency (NPSA) in England reported 11 deaths and 1 case of serious harm from incorrectly inserted NGTs over a two-year period (3). Despite this safety alert, a further 21 deaths and 79 cases of harm due to misplaced tubes have occurred (2). The correct verification, once NGTs are inserted, is a matter of paramount importance, and is now described as one of the United Kingdom's Department of Health "never events" published in 2011 (4 ,5). Possible solutions to improve compliance with using correct methods of NGT placement verification include use of checklists and the inclusion of pH indicator strips in NGT packaging (1). Other methods to determine safer use of NGTs are: identifying a clinical lead, reviewing policies and training, ensuring an adequate stock of correct equipment, and avoiding placing tubes outside office hours whenever possible (6). It has been recommended that NGTs are placed only after several key questions have been answered (See box 1).

Box 1
Key questions to ask prior to NGT insertion (adapted from BMJ (6), MPS (7))

1. Is nasogastric feeding suitable for this patient?
2. Is this the right time to insert the NG tube?
3. Are all the necessary equipment available?
4. Is someone suitably qualified to check that the position of the tube is correct?
5. Am I competent to do this?

Background and Aims

Following the large number of requests for X-ray confirmation after NGT insertions, there was concern

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about a lack of awareness of local and national policies amongst health care professionals and concern that the NPSA and National Institute for Health and Clinical Excellence (NICE) guidelines for confirming correct placement of NGTs were not being adhered to (2, 3, 8). The aim of the audit was to determine the methods used for confirming placement of fine bore NGTs. The standards used were those published by the NPSA. Following an education programme for junior doctors and the appointment of a Nutritional Specialist Nurse (NSN), the audit was repeated. During the latter audit, there was a change from the Freka size 8 Fr NGTs to the bigger bore Flocare size 10 Fr tubes in an effort to achieve better pH aspiration rates.

Methods

Two prospective audits were carried out in 3 elderly care medicine wards in a district general hospital over a 16 month period. The information collected included data on demographics, the documentation associated with NGT insertion, the method for checking correct positioning and records of risk/benefit discussions with patients (or relatives). All consecutive patients in the elderly care wards requiring a fine bore NGT over a two month period were selected into the audit, and all new insertions, as well as re-insertions were included.

During the initial audit (Jan 2009 to Mar 2009), a questionnaire was distributed amongst the junior doctors (foundation level and core trainee doctors) to determine their awareness of national and local policies concerning NGT insertion, the correct methods used to assess positioning of the NGT, and also the accepted pH level for the aspirate from an inserted NGT. The NSN was commenced in post in April 2009. Her job description included the assessment of patients at risk of malnutrition, and those requiring alternative feeding routes. This also included both insertion of feeding tubes and education to both junior doctors and nursing staff regarding appropriate management of patients with NGTs. August 2009 saw the introduction of a consultant led junior doctor teaching session on nutrition, including discussion around the indications for and the correct management of NGTs. There was also a change from using the Freka size 8 Fr NGTs to the bigger bore Flocare size 10 Fr tubes to achieve better pH aspiration rates. The second audit was performed between March and May 2010 and comparisons were then made between the methods employed during each audit for confirming correct NGT placement. Descriptive statistics have been displayed and the p values for the differences over the two years were calculated using Fisher's exact test.

Results

The characteristics of the patients involved in both audits are displayed (See table 1). The median number of days taken to insert a NGT was 4 days in both audits although the median time of insertion changed from 18:20hrs (2009) to 14:00hrs (2010).

Table 1
Characteristics of the patients in whom NGTs were inserted

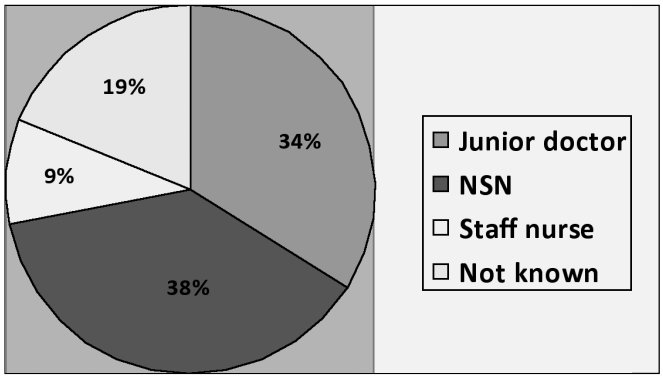
	2009	2010
Number of patients	25	18
Number of males	9 (36%)	7 (39%)
Median age of patients	83	81
Documented initial insertions	19 (76%)	13(72%)
Initial insertions verified by CXR	25 (100%)	6 (33%)
Initial insertions verified by pH	0 (0%)	11 (61%)
Subsequent insertions	46	29
Documented subsequent insertions	29 (63%)	23 (79%)
Subsequent insertions verified by CXR	44 (96%)	6 (21%)
Subsequent insertions verified by pH	2 (4%)	20 (69%)
Total number of NGTs	71	47
Average number of NGTs per patient	2.84 (1-9)	2.61 (1-9)
Total number of CXRs performed on all the patients	69	15

Although 19 of the insertions in the first audit were documented, only in 7 of these were there documented discussions held with the patient or relative, and of these, only 2 included information about the risks and benefits. In our re-audit, 13 of the insertions were documented, but only 3 patients and then 2 patients had a documented discussion for initial and subsequent insertions respectively. There were no documented discussions regarding risks and benefits in either initial or subsequent insertions in the repeat audit. Over the course of the two audits, for the initial NGT insertions, the method of pH testing to check tube positioning increased from 0% to 61% and the number of CXRs performed fell from 100% to 33% ($p < 0.0001$). For subsequent insertions, the use of pH testing increased from 4% to 69% and the number of CXRs performed fell from 96% to 21% ($p < 0.0001$). The total number of chest radiographs per patient reduced from 2.76 to 0.83.

In 2009, 46 doctors completed the questionnaire. Four (9%) were aware of a national policy and 12 (26%) of a local policy regarding the method for checking NGT positioning. Thirty-seven doctors (80%) stated that a CXR was mandatory for checking NGT positioning.

In 2010, completed questionnaires were obtained from 36 doctors. Five (14%) were aware of a national policy and 17 (47%) were aware of the local policy. Ten (27%) doctors on this occasion stated that a CXR was mandatory for NGT position checking.

Figure 1
NGT insertion by profession (Audit 2010)



Discussion

The recommendations following the first audit are summarised (See box 2). Following the appointment of a NSN, the implementation of a junior doctor teaching session on the topic of nutrition and use of larger bore NGTs we found significant improvements in the utilisation of the method of pH testing as first line for confirming accurate placement of NGTs. The improved concordance with the NPSA recommendations for using pH testing as first line reflected a corresponding significant decline in the ordering of radiological tests. There was an overall improvement in the reported knowledge of junior doctors with regards to both national policies (9% to 14%) and local policies (26% to 47%), with a reduction in the number of junior doctors stating that a chest radiograph was mandatory to confirm the positioning of an NGT (80% to 27%).

Box 2
Recommendations from the initial audit

- Improve the documentation associated with NGT insertion
- Insert NGTs earlier in the day
- Use pH testing of aspirate as first line test to confirm correct placement of NGT
- Request radiological confirmation ONLY if pH testing has been inconclusive
- Appointment of nutritional specialist nurse
- Educational session on nutrition as part of the Foundation and Core Trainee teaching programme
- Adoption of a larger size of NGT to aid aspiration
- Repeat audit within 12 months

Although the median time it took for an NGT to be inserted was 4 days during each audit, the median time an NGT was inserted was much earlier in the day (1400 hours as compared with 1820 hours). This would mean that patients would be more likely to have their NGT inserted during office hours, so that feeding could commence in hours when more staff members were around, thus facilitating early and safer feeding.

One aspect that did not show improvement with the re-audit was that of documentation regarding NGT insertion with only 76% (2009) and 72% (2010) of patients having their procedure recorded in their medical notes. There was also great variety in the detail of the documentation with only 2 patients in 2009 having a clear documented discussion about the risks and benefits of their NGT. In the 2010 re-audit none of the patients had this discussion.

In 2010, there was a trend towards improved documentation for subsequent NGT insertions compared to initial ones. This could be because the majority of initial NGT insertions were performed by junior doctors (50% by doctors, 33% by NSN) whereas the majority of subsequent insertions were performed by the NSN (NSN 41%, doctors 24%, staff nurses 14%).

Following the re-audit, an additional change has been the implementation of a checklist sticker for the notes to improve documentation.

Conclusion

This audit cycle has shown that the appointment of a NSN along with the improved education of junior doctors and use of a larger size NGT can be effective ways of improving compliance with the recommended national guidelines for the appropriate checking of NGT positioning. This improved compliance with national guidelines will lead to a reduction in radiological investigations which in turn will lead to cost savings and prevention of unnecessary radiation for patients whilst maintaining patient safety. Further work needs to be done to stress the importance of appropriate documentation and discussions around risk and benefit when patients have NGTs inserted. This audit should be repeated to verify that the improvements noted in 2010 are continuing and to ensure that there has been improvement in documentation.

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