A multidisciplinary approach and a change in culture to recognise and act on the risks involved in placing nasogastric feeding tubes improved patient safety

Nasogastric feeding tube placement: changing culture

In this article...
- Guidance on safe placement of nasogastric feeding tubes
- Changing the culture of nasogastric feeding tube insertion
- Impact of the new approach

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The Department of Health recognises that feeding through a misplaced nasogastric feeding tube is largely preventable if appropriate steps are taken, and lists it as a “never event” – a serious avoidable event that could lead to a significant financial penalty for trusts if confirmed (Mayor, 2011).

Guidance on safe placement of nasogastric feeding tubes

First-line testing for correct placement of an nasogastric tube is pH testing.

X-rays are performed when pH testing cannot confirm placement, and should be read by clinicians trained in X-ray interpretation.

Nasogastric feeding carries a risk and should not be started out of hours where possible.

Insertion of a tube and confirmation of position should be documented accurately.

Ongoing tube care should be supported by a care plan to ensure correct position every time a tube is used for feeding.

Any patients have nasogastric (NG) feeding tubes inserted to reduce the risk of aspiration during feeding or if they are not meeting their nutritional needs.

An estimated 170,000 of the tubes are supplied to the NHS each year, most of which are inserted without harm to patients (National Patient Safety Agency, 2005). However, if an NG feeding tube is placed into the lungs instead of the stomach, harm or even death can result from unintentional feeding and subsequent infection.

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Safety guidance

In 2005, the NPSA issued guidance to help with the safe placement of NG feeding tubes with the aim of reducing the occurrence of tube misplacements.

The guidance highlighted the unreliability of methods such as the “whoosh” test and litmus paper. It also recommended that checking NG tube position with chest X-rays be reserved for second-line checks (NPSA, 2005), because of the potential for misinterpreting position check imaging. However, 45 serious incidents including 12 deaths reported to the NPSA since 2005

5 key points

1. First-line testing for correct placement of an nasogastric tube is pH testing.
2. X-rays are performed when pH testing cannot confirm placement, and should be read by clinicians trained in X-ray interpretation.
3. Nasogastric feeding carries a risk and should not be started out of hours where possible.
4. Insertion of a tube and confirmation of position should be documented accurately.
5. Ongoing tube care should be supported by a care plan to ensure correct position every time a tube is used for feeding.

Tubes are passed through the nose into the stomach.
have been directly due to misinterpretation of X-rays. As a result, the NPSA issued a further safety alert and guidance on checking the placement of NG feeding tubes (Lamont et al, 2011; NPSA, 2011).

In April 2009, a patient with a known history of severe cardiac valve disease was admitted to our trust with worsening symptoms of heart failure. During admission, he developed a chest infection and was unable to meet his nutritional needs normally so an NG feeding tube was inserted to enable feeding. A chest X-ray confirmed it had been placed in the lungs so it was removed and replaced later that evening.

No aspirate was obtained from the new feeding tube so another X-ray was performed to check its position. The on-call doctor reviewing the image at 4.30am the following morning and interpreted the image as being satisfactory to commence feeding. After the patient’s condition deteriorated, it was found that 400ml of feed had been delivered into his lungs. Despite admission to intensive care, he continued to deteriorate and the decision was made to withdraw treatment.

None of the patients had documented instructions regarding NG feeding tube insertion from the dietetic department. These two measures contributed to the error.

Following this tragic case, a root cause analysis was carried out to see what lessons could be learned and to prevent the occurrence of any further incidents. The causes were found to be multifactorial.

- The junior doctor misinterpreted the X-ray. The medical wards were unusually busy and the doctor was under considerable clinical and time pressures at this point. Although this did not excuse the error, it certainly contributed.

- There was no formal training system in place to ensure doctors could reliably and safely interpret X-rays performed for NG feeding tube placements.

- The second placement check X-ray and subsequent position check took place outside normal working hours, when fewer experienced staff were available.

- There was no formal documentation system to ensure that an accurate record of NG feeding tube insertion and authorisation for feeding had been made.

Our first step was to try to understand whether the circumstances that led to this never event were an isolated sequence of events or whether these problems were widespread, fostering an environment where further errors could take place.

We therefore undertook an audit to establish current practice at the trust. Key findings were:

- Over six months, 1,425 feeding tubes were purchased (as an estimate of the number placed);
- In 138 patients, 192 X-rays were made to check the position of the tube;
- There were 43 errors of interpretation in the 192 position-check X-rays;
- Of these 43 errors, seven were interpreted as being unsafe when they were in a safe position, and five were in the lungs, which would have led to a never event had feeding been started;
- Thirty-one (72%) of the 43 errors in interpretation were made outside normal working hours;
- The estimated mean time between the X-ray being requested and it taking place was four hours;
- Documentation on the interpretation of the image was missing from the notes in 41% of cases;
- Where there was documentation, 26% of all image reviews were undertaken by foundation year 1 (FY1) doctors – the most junior doctors in the hospital.

Changing the culture

It was clear that a multifaceted and multidisciplinary team approach was needed to change the culture of NG feeding tube insertion and prevent further never events.

A team of senior clinical and nursing staff, radiographers, dietitians and medical educational staff were involved in tackling the causes of the problem.

There was no standardised training in the interpretation of position-check images for junior doctors. We therefore immediately stopped any doctor below registrar grade from interpreting these X-rays until we had developed training that they had then undertaken. This immediately changed the culture regarding NG feeding tube insertion from being a casual everyday occurrence to a clinical procedure that had serious consequences if performed incorrectly.

A compulsory electronic learning module on the practice of image interpretation was created for junior doctors with input from senior clinical and radiology staff and experienced medical educators. After working through the module, clinicians undertake a test and are required to obtain a 100% pass mark before they are allowed to interpret position-check X-rays. A survey of junior doctors who had passed the module found they were more confident and more competent to interpret a position-check X-ray for feeding.

We also addressed trust systems related to NG tube use. Two different tubes were being used at both hospital sites and the most radio-opaque was chosen as standard. Placement of NG tubes outside normal working hours was stopped – except in high-risk areas – by educating staff; in the majority of cases, NG feeding tube insertions could wait until the morning. The priority of position-check images in the radiology department was increased so that positioning could be corrected under X-ray guidance if necessary before the patient returned to the ward.

Finally, the lack of documentation was addressed by developing a standardised NG feeding tube care plan (Fig 1) and an NG feeding tube insertion sticker (Fig 2) to be placed in the patient’s notes every time the tube was inserted by senior nurses and the dietetic department. These two measures ensured there was always an accurate and
Nursing Practice

Innovation

Nasogastric Tube Care Plan (for all types of NG tube)
Reason for Nasogastric Tube
Type of tube ____________________________ Referral to dietitian _________________
Affix patient label ____________________________ Sign ____________________________
Date inserted ____________________________ Date ____________________________
Limiting mark ____________________________
Referral to speech and language therapist _________________
Reason for NG tube insertion ____________________________
Tube limiting mark ____________________________
Proposed date for tube replacement ____________________________

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<tr>
<th>Date</th>
<th>Action</th>
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<td></td>
<td>Hand hygiene</td>
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<td>Wash hands and wear non-sterile gloves prior to manipulating tube</td>
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<td>Patient hygiene and comfort</td>
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<td>Inspect mouth and provide regular mouth care</td>
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<td>Clean nostrils daily and change adhesive tape if soiled</td>
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<td>Ensure tube is well secured in place on face/cheek/nose</td>
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<td>Rotate external position of the tube and check for pressure damage</td>
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<td>Tube position</td>
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<td></td>
<td>Check limiting mark on tubes is in correct position and record this in cm here every shift. Refer to policy if evidence of malposition</td>
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<td></td>
<td>Check position of NG tube prior to administration of feed, drugs, at least once during each continuous feeding episode and after violent coughing or obvious tube movement</td>
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<td>Check gastric aspirate 4 hourly to confirm stomach position, and indicate which confirmation method below is used</td>
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<td>a. pH less than or equal to 4</td>
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<td>b. pH less than or equal to 4 after patient drank half-diluted orange squash</td>
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<td>c. pH less than 5 and aspirate is “grass green” or more than 10ml</td>
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<td>d. pH less than 5 and patient on ranitidine/omeprazole/lansoprazole</td>
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Fig 1. Page 1 of the nasogastric tube care plan

ADULT NASOGASTRIC TUBE INSERTION RECORD

<table>
<thead>
<tr>
<th>Type of NG tube</th>
<th>Manufacturer</th>
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<tbody>
<tr>
<td>Batch no</td>
<td>Date inserted</td>
</tr>
<tr>
<td>Reason for NG tube insertion</td>
<td>Tube limiting mark</td>
</tr>
<tr>
<td>Proposed date for tube replacement</td>
<td></td>
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</tbody>
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| Inserted by |
| Signature |
| Time |
| Date |

X-ray taken: Yes/No (delete as appropriate)
X-ray date | Time |
Correct tip position confirmed by a competent practitioner |
Decision taken to feed yes/no |
Competent practitioner role |
Name |
Signature |
Date |
Time |

Fig 2. The sticker used to document nasogastric intubations

This project won a 2011 Patient Safety Award in the Changing Cultures category

References


standardised record of every tube insertion, that position had been confirmed before every feed and, importantly, who had authorised tube feeding.

All these changes took at least a year to develop and apply and the new system has been in place fully for just under a year. A recent re-audit is encouraging:

- The mean time delay between X-rays being requested and taking place was reduced to two hours 10 minutes – just over half the average in the initial audit;
- Documented misinterpretation of check imaging was found in only one case;
- Poor or no documentation in clinical notes was reduced to 26% of audited cases – a significant improvement;
- Nearly 80% of requests for check imaging were handled by the radiology department within normal working hours, and there was a significant increase in the number of tubes being adjusted under X-ray guidance in the department by experienced and trained radiographers, rather than on the wards.

Changing the culture to one that promotes safety in a large organisation such as an NHS trust is inevitably difficult. Specific challenges for us were: ensuring that staff involved felt they had a stake in the project; ensuring senior staff engaged with all levels of health professionals in the trust; and standardising practices across the two very different hospital sites.

By making sure the team included members from different specialties in the trust, as well as a mix of senior and junior members, everyone felt involved and their voice was heard. Where there were differences of opinion, the whole team decided on the path to follow, avoiding the problem of health professionals feeling the project was too top-down or being forced on them.

Likewise, initially tackling the multiple differing causes of the underlying problem head-on and simultaneously seemed daunting, but ensured that systems were changed rapidly and effectively.

When patient safety is at stake, politics and inefficiency cannot be allowed to interfere with the changes needed to address them, and tackling the root cause and all of the contributory factors proved to be the best way to achieve this.

Conclusion

The changes we have instigated have certainly taken us in the right direction, although there is some way to go before we have a completely safe environment for the placement of NG feeding tubes.

For example, poor uptake of the NG feeding tube sticker continues to be a specific challenge and continual reliance on X-ray imaging rather than initial aspirate pH testing as first line in a few areas will require further work to address.

However, our trust will endeavour to use its multifaceted and multidisciplinary approach to achieve our aim of a safe environment for NG tube placement.

Changing culture to improve safety takes time, resources and, above all, enthusiasm but, in the end, the result is well worth attaining: reduced harm and better care for all our patients. NT