

Nutritional Support for Children and Young People; Nasogastric Tubes (NGT) at a glance.

Abstract

The need to offer nutritional support to children and young people is a commonly experienced practice for healthcare professionals. The 'Nutritional Support; at a glance' series of articles will explore the different methods of delivering nutritional support to children and young people in practice. This article explores the use and indication of Nasogastric Tubes (NGT) in children and young people, before explaining the process of inserting NGTs and the ongoing management of this method of nutritional support.

Introduction

Nutritional support may be required when Children and Young People (CYP) are unable to independently meet their own nutritional needs. This nutritional support can often be provided through the use of a Nasogastric tube (NGT); which is a thin plastic tube, inserted through the nose and into the stomach, via the oesophagus. The ability to "insert, manage and remove" NGTs is a standard of proficiency for Registered Nurses according to the Nursing and Midwifery Council (NMC, 2018, p34).

(Please insert diagram on NGT tube location here)

In 2006, the National Institute for Clinical Excellence (NICE) published a guideline for healthcare professionals, advising on nutritional support for adults. No such guideline exists from NICE, for paediatric patients, instead guidance is only available recommending NGT nutritional support to patients with individual conditions (NICE, 2009; NICE, 2015). However, the Guidelines and Audit Implementation Network (GAIN) did recognise this lack of guidance on NGT use in CYP and published a resource in 2016. This resource offers useful advice for healthcare professionals regarding NGT use in CYP, as well as identifying training needs for patients, parents/carers and staff who use NGTs (GAIN, 2016).

Whilst the use of NGTs is commonly seen in CYP nursing, the risk of harm from incorrect placement and management of NG tubes has been a concern for the NHS for many years and has been the focus of a number of National Patient Safety Agency alerts (NPSA, 2005; NPSA, 2005b; NPSA, 2011a; NPSA, 2012). The NHS has declared the introduction of fluids into the respiratory tract, from a misplaced NGT, a 'never event', which would require investigation under the Serious Incident framework if it were to occur (NHS Improvement, 2018).

In 2016, NHS Improvement published a resource set to advise healthcare professionals of the necessary checks for NGT placement. The NHS Improvement (2016) resource set highlights that though an NGT, which is incorrectly placed into the respiratory tract, will not normally cause the patient any pain or direct harm, the introduction of liquids into the respiratory tract via that NGT could be fatal.

It is additionally important, for healthcare professionals inserting NGTs, to appreciate that patients who do have liquids introduced into the respiratory tract via an incorrectly placed NGT, would not usually display signs of coughing or choking, as these reflexes are stimulated by the sensation of fluids at the back of the throat, not lower down in the respiratory tract (NHS Improvement, 2016).

The above safety concerns therefore support the need for nurses using NGTs in CYP to have a sound understanding of when it is appropriate for an NGT to be inserted and the management of NGTs. This 'at a glance' article will address the indications for inserting an NGT when caring for CYP, before discussing the safety considerations when caring for this group of patients.

There are numerous reasons why CYP may need nutritional support, but this support does not always occur through an NGT. It is important that nurses caring for patients requiring nutritional support are able to understand when an NGT would be appropriate and when other methods should be considered. The companion articles in this 'Nutritional Support at a glance' series will address the value of Percutaneous Endoscopic Gastrostomy's (PEGs) and Parenteral Nutrition (PN) as alternative methods of providing nutritional support.

Indications

NGTs are usually inserted as a short-term or medium-term method of feeding for CYP, as patients who require longer-term support would usually have a PEG inserted (NHS Improvement, 2016). Whilst NGT's can also be used for the purposes of aspirating from the stomach and the delivery of medications (GAIN, 2016), this article will focus on the use of NGTs solely for nutritional support. Figure 1 displays the indications and contraindications for the use of NGTs for nutritional support.

Figure 1 - The indications and contraindications for the use of NGTs for nutritional support.

Indications for NGT insertion



- A patient is physically unable to swallow
- A medical condition means the patient is unable to take in nutrition orally (Nausea, Anorexia, Bronchiolitis)

Contraindications for NGT insertion



- Severe facial trauma
- Altered anatomy
- Abnormal clotting
- Skull fracture

(NHS Improvement, 2016; BAPEN, 2012).

As figure 1 identifies, an NGT may be required for nutritional support if a patient is physically unable to swallow, this may be due to a physical condition such as a Cerebrovascular Accident (stroke) or loss of consciousness from trauma (NHS Improvement, 2016). An NGT may be used in the above conditions for short or medium-term nutritional support as the patient may recover from this illness. Additionally, the short-term use of NGTs is recommended in conditions such as bronchiolitis, where

the patient has a medical condition that affects their ability to take on nutrition orally, though the patient is still able to physically swallow. NGT insertion due to poor feeding is common with infants with bronchiolitis, as infants are often unable to coordinate swallowing milk, alongside the increased work of breathing caused by the bronchiolitis without compromising their efficacy of breathing (NICE, 2015). Conversely, long-term conditions such as Duchene’s Muscular Dystrophy, where a patient will not regain their swallow, are likely to be better managed through the insertion of a PEG (NHS Improvement, 2016). Figure 2 displays the different methods of NGT feeding used in CYP, including the advantages and disadvantages of each method.

Figure 3. Methods of administering enteral feeds		
Feeding regime	Advantages	Disadvantages
Continuous feeding via a pump	Easily controlled rate Reduction of gastrointestinal complications	Patient connected to feed for majority of the day May limit patient mobility
Intermittent feeding via gravity or a pump	Periods of time free from feeding Flexible feeding routine May be easier than managing a pump for some patients	May have increased risk of gastrointestinal symptoms e.g. early satiety Difficult if outside carers are involved with the feed
Bolus feeding	Reduces time connected to feed Very easy Minimum equipment required	May have increased risk of gastrointestinal symptoms Can be time consuming

The British Association for Parenteral and Enteral Nutrition (BAPEN, 2012) guide healthcare professionals on the decision to insert an NGT. They state a number of contraindications to NGT insertion (figure 1) and identify that the gastrointestinal tract must be functioning adequately in order to absorb nutrients, or patients may require consideration of other feeding methods such as TPN (BAPEN, 2012). A nurse caring for a child or young person with any of the contraindications listed in Figure 1, should seek expert specialist advice before inserting an NGT for nutritional support (BAPEN, 2012).

The decision to insert an NGT must be made taking into account the wishes of the child/young person and their parent/carer, ensuring that consent is gained (NMC, 2018b). Studies have demonstrated that parents are often averse to the idea of their child having an NGT inserted (Nir et al, 2013). Though oral rehydration is the NICE (2009) recommended treatment for mild dehydration, 75% of parents identified that they would refuse an NGT as a treatment option for dehydration (Nir et al, 2013). This therefore necessitates that the nurse, caring for children and young people requiring nutritional support, be able to justify the recommendation to insert an NGT when compared to other treatment options.

Safety Considerations

There are many important safety considerations for healthcare professionals caring for CYP who have NGTs inserted which are identified below. Some potential complications associated with NGT feeding are identified in figure 4, alongside strategies to resolve the problem.

Figure 4. Complications that may occur during enteral feeding		
Complication	Cause	Solution

Aspiration	Regurgitation of feed due to poor gastric emptying Incorrect placement of tube	Medication to improve gastric emptying Check tube placement Ensure patient has head at 45 degrees during feeding
Nausea and vomiting	Disease or treatment related Poor gastric emptying Rapid infusion of feed	Antiemetic Reduce infusion rate Change from bolus to intermittent or continuous feeding
Diarrhoea	Medication Radiotherapy Disease related Gut infection	Antidiarrhoeal agent If possible discontinue medications responsible Send stool sample to check for infection
Constipation	Inadequate fluid intake Immobility Use of opiates or other medication Bowel obstruction	Check fluid balance Administer laxatives / bulking agents Where possible encourage mobility If in bowel obstruction discontinue feed
Abdominal distension	Poor gastric emptying Rapid infusion of feed Constipation / diarrhoea	Reduce rate of infusion Gastric motility agents Where possible encourage mobility Treat constipation or diarrhoea
Blocked tube	Inadequate flushing or failure to flush feeding tube Administration of medication via the tube	Prevent by flushing 30-50mls water before and after feeds / medication Use liquid / finely crushed medications If blocked, try warm water, soda water, sodium bicarbonate, fizzy soft drink, pancreatic enzymes.
Dougherty, L. and Lister, S. (2011)		

Important Practices

Always use pH test paper to test an NGT

Blue litmus paper may have been used in some areas to test stomach contents for acidity, but this is not sensitive enough to distinguish between bronchial and gastric secretions. Stomach pH is approximately 1-3 when empty and approximately 4-5 after food consumption where the pH in healthy lungs is between 7.38 and 7.42.

A PH in the 'safe range' of 1 to 5.5 must be established as the first line test to exclude placement of the NGT in the respiratory tract. To improve the reliability of test results falling between a pH of 5 and 6, a second competent nurse should independently check the result (NPSA, 2011a). Figure 5 identifies when NGT should be tested.

Figure 5. When to test an NGT in a CYP

- Following insertion of the NGT
- Before the administration of each feed
- Before giving medication (If feed not already in progress)
- At least once a day during continuous feeding and prior to changing syringe feeds in infants and neonates
- Following episodes of vomiting, retching or coughing
- Following evidence of tube displacement, e.g. visible external tube length is longer / shorter / kinked than previously recorded, loose tapes

Do not use the 'whoosh test'

The whoosh test is an unsafe method of determining whether an NGT is correctly positioned in the stomach (NPSA, 2011a). The test is unsafe as healthcare professionals are unable to precisely locate the origin of the 'whoosh' sound, as anatomically the lungs and stomach are in proximity.

The absence of respiratory distress is not an indicator of correct positioning

It is a myth to say that if an NGT was incorrectly placed in the lungs, then children would show respiratory distress as some children, due to their diagnosis, might not react to having an NGT misplaced in their respiratory tract. Nasogastric tubes can enter the respiratory tract without causing any symptoms and the introduction of fluid through these in any volume can be harmful (NHS Improvement, 2016).

Know the patient's medication/feeding regime

There is great value in healthcare professionals being aware of the impact of a CYPs usual medication and feeding routine as some medications and formulas may affect the pH reading. If the patient is receiving medication, which is known to alter pH readings, it is important to identify the patients unique care requirements within their care plan notifying those involved in their care.

Do not introduce any type of fluid through the tube until placement is confirmed

PH testing for gastric placement relies on collecting aspirate via the NGT tube; any fluid introduced down the tube before placement is confirmed, will contaminate this aspirate, potentially leading to false positive pH readings. Any flush in an NGT could cause aspiration pneumonia if the tube is misplaced in the lungs.

If the NGT won't test

Inability to aspirate an NGT can indicate displacement, however, it is worth considering if the tip of the NGT is incorrectly placed in relation to gastric contents. Assisting the CYP to lie on his or her side may allow the tip of the tube to become immersed in gastric contents and facilitate an accurate test (NPSA, 2011b).

If this is unsuccessful, it is recommended to measure the patient (using a new NGT) to establish if the NGT is sitting at the correct length. Advancing the NGT could help reach any gastric fluid present as the tip of the tube could be sitting in the oesophagus instead of the stomach. Additionally, if the tube is inserted too far, it could be placed in the duodenum where pH values are higher (pH 6-8) and aspiration is more difficult. This can be resolved by withdrawing the tube 10-20cm.

The tip of NGTs can sometimes sit against the gastric mucosa causing occlusion on aspiration. Gently injecting 1-5mls of air can help clear debris (Newcastle upon Tyne Hospitals NHS Trust, 2017) and move the tube away and allow aspiration (NPSA, 2005). **This technique is not the whoosh**

test. Caution, however, should be exercised when injecting air into a newly inserted nasogastric tube as this may damage the pleura.

Record every pH test in the patient notes

To assist investigation in the event of respiratory feeding following initial placement of an NGT, healthcare professionals should record every pH test in the patients notes (NPSA 2011a).

X-ray can be used to confirm placement

Whilst it is not routine practice due to the exposure to radiation, an X-ray on an NGT will be required, if aspirate in the 'safe range' cannot be obtained. This X-ray will verify that the NGT is correctly inserted in the stomach (NPSA 2011a).

Therapeutic holding

Young children may need to be 'swaddled' during the process of NGT insertion to ensure correct positioning of the patient and ease of insertion. Guidelines for therapeutic holding should be followed in these circumstances and parents/carers can be involved if they are comfortable and able. Play can also be a useful distraction technique and should be utilised if appropriate (Drape and Greenshields, 2020).

Infection control

It has been demonstrated that poor feed preparation, storage and administration can be causative factors in feed contamination (Best, 2008; NICE, 2012; Malhi, 2017). Using aseptic non-touch technique, effective hand decontamination and the wearing of personal protective equipment such as non-sterile gloves and aprons are key infection control measures (Best, 2008; DH, 2010; NICE, 2012; GAIN, 2016). Pre-packaged, sterile ready-to-use feeds should be favoured over reconstituted feeds (DH, 2010; NICE, 2012). Hang time for ready-to-use feeds is a maximum of 24 hours and no more than four hours for reconstituted feeds.

Oral hygiene

If the CYP is not having any oral fluids, then additional oral hygiene maybe required to keep the mouth moist, to prevent gum disease and stimulate saliva and gastric secretions (GAIN, 2016). Tooth brushing should be encouraged twice daily in all patients to ensure optimum oral hygiene (Greenshields, 2019).

NGT insertion during the COVID-19 Pandemic

NGT insertion is not currently listed as an aerosol generating procedure on Public Health England's most recent list of 'COVID-19 infection prevention and control guidance: aerosol generating procedures' (2020a). As such, standard Personal Protective Equipment (PPE) for healthcare professionals inserting NGTs should include gloves, an apron and a fluid resistant surgical face mask (FRSM Type IIR) as a minimum (Public Health England, 2020b).

BAPEN (2020) is currently lobbying for the insertion of NGT's to be recognised as an aerosol generating procedure. If this was successful, this would mandate that healthcare professionals wear; gloves, a full body gown or fluid repellent coveralls, eye or face protection (including full-face visors) and a fluid resistant surgical face mask (FRSM Type IIR) as a minimum (Public Health England, 2020b). Healthcare professionals should ensure that they are appropriately protected with the minimum PPE outlined by Public Health guidance whilst also practicing in accordance with their local policies and procedures.

Summary

In conclusion, caring for CYPs who require nutritional support through an NGT requires the healthcare professional to have a clear understanding of the benefits and risks of this method of feeding. Liquid which is introduced to the lungs through a misplaced NGT could be fatal and healthcare professionals need to ensure they are proficient in caring for NGTs to prevent this 'never event' from occurring.

References

Best, C. (2008) Enteral tube feeding and infection control: how safe is our practice? *British Journal of Nursing* 17(16) pp. 1036-1041.

British Association for Parenteral and Enteral Nutrition (BAPEN). (2012). 'Naso Gastric (NG) Tube Insertion – Decision Tree'. [Online]. Available from <https://www.bapen.org.uk/pdfs/decision-trees/naso-gastric-tube-insertion.pdf>. Accessed on 29/08/2019.

British Association for Parenteral and Enteral Nutrition (BAPEN). (2020). 'An overview of opinions on nasogastric tubes as aerosol generating procedures during the Covid-19 crisis.' Available from <https://www.bapen.org.uk/pdfs/covid-19/ngt-and-agp-and-ppe-15-04-20.pdf>. Accessed on 27/10/2020.

Dougherty, L. and Lister, S. (2011) *The Royal Marsden Hospital of Clinical Nursing Procedures* (2004) 8th Edition. Wiley Blackwell

Drape, K. and Greenshields, S. (2020). 'Using play as a distraction technique for children undergoing medical procedures'. *British Journal of Nursing*. 29(3), pp142-143.

Greenshields, S. (2019). 'Oral health care in children'. *British Journal of Nursing*. 28(15), pp980-981.

Guidelines and Audit Implementation Network (GAIN). (2016). 'Guidelines for caring for an infant, child, or young person who requires enteral feeding'. Available from <https://rqia.org.uk/RQIA/files/4f/4f08bb34-7955-49ea-adf1-9de807d3da66.pdf>. Accessed on 20/08/2019.

Institute for Health and Care Excellence (NICE) (2006). 'Nutrition support for adults: oral nutrition support, enteral tube feeding and parenteral nutrition'. Available from <https://www.nice.org.uk/guidance/CG32>. Accessed on 20/08/2019.

Malhi, H. (2017) Enteral tube feeding: using good practice to prevent infection. *British Journal of Nursing* 26(1), pp. 8-13.

National Institute for Health and Care Excellence (NICE). (2009). 'Diarrhoea and vomiting caused by gastroenteritis in under 5s: diagnosis and management'. Available from <https://www.nice.org.uk/guidance/cg84>. Accessed on 20/08/2019.

National Institute for Health and Care Excellence (2012) *Healthcare associated infections: prevention and control in primary and community care*. Clinical guideline 139. <http://tinyurl.com/pguqymm>. Accessed on 10/06/2020

National Institute for Clinical Excellence (NICE). (2015). 'Bronchiolitis in children: diagnosis and management'. Available from <https://www.nice.org.uk/guidance/ng9>. Accessed on 20/08/2019.

National Patient Safety Agency (NPSA). (2005). 'Reducing the harm caused by misplaced nasogastric feeding tubes'. Available from <https://webarchive.nationalarchives.gov.uk/20180501173402/http://www.nrls.npsa.nhs.uk/resources/search-by-audience/hospital-doctor/?entryid45=59794&p=1>. Accessed on 20/08/2019.

National Patient Safety Agency (NPSA). (2005b). 'Reducing the harm caused by misplaced naso and orogastric feeding tubes in babies under the care of neonatal units'. Available from <https://webarchive.nationalarchives.gov.uk/20180501175756/http://www.nrls.npsa.nhs.uk/resources/clinical-specialty/critical-care/?entryid45=59798&cord=ASC&p=1>. Accessed on 20/08/2019.

National Patient Safety Agency (NPSA). (2011a). Reducing the harm caused by misplaced nasogastric feeding tubes in adults, children and infants'. Available from <https://webarchive.nationalarchives.gov.uk/20121107133346/http://www.nrls.npsa.nhs.uk/alerts/?entryid45=129640>. Accessed on 20/08/2019.

National Patient Safety Agency (NPSA). (2011b). 'Decision tree for nasogastric tube placement checks in CHILDREN and INFANTS'. Available from <https://webarchive.nationalarchives.gov.uk/20121107133346/http://www.nrls.npsa.nhs.uk/alerts/?entryid45=129640>. Accessed on 15/06/2020.

National Patient Safety Agency (NPSA). (2012). 'Harm from flushing of nasogastric tubes before confirmation of placement'. Available from <https://webarchive.nationalarchives.gov.uk/20121107133346/http://www.nrls.npsa.nhs.uk/alerts/?entryid45=129640>. Accessed on 20/08/2019.

NHS Improvement. (2016). 'Resource set: Initial placement checks for nasogastric and orogastric tubes'. Available from https://improvement.nhs.uk/documents/193/Resource_set_-_Initial_placement_checks_for_NG_tubes_1.pdf. Accessed on 20/08/2019.

NHS Improvement. (2018). 'Never Events list 2018'. [Online]. Available from https://improvement.nhs.uk/documents/2899/Never_Events_list_2018_FINAL_v7.pdf. Accessed on 20/04/2020.

Nir, V., Nadir, E., Schechter, Y., Kline-Kremer, A., Caselli, D., and Gozal, D. (2013). 'Parents' Attitudes toward Oral Rehydration Therapy in Children with Mild-Moderate Dehydration'. The Scientific World Journal. DOI: 10.1155/2013/828157.

Nursing and Midwifery Council (NMC). (2018). 'Standards of Proficiency for Registered Nurses'. [Online]. Available from <https://www.nmc.org.uk/globalassets/sitedocuments/education-standards/future-nurse-proficiencies.pdf>. Accessed on 16/8/2019

Nursing and Midwifery Council (NMC). (2018b). 'The Code; Professional standards of practice and behaviour for nurses, midwives and nursing associates'. Available from <https://www.nmc.org.uk/standards/code/>. Accessed on 21/08/2019.

Newcastle upon Tyne Hospitals NHS Foundation Trust (2017) After your child's Nasogastric Tube: Discharge information. Available from http://www.newcastle-hospitals.org.uk/downloads/Childrens%20Services/NG_tube_discharge_information.pdf

Public Health England. (2020a). 'COVID-19 infection prevention and control guidance: aerosol generating procedures'. Available from <https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control/covid-19-infection-prevention-and-control-guidance-aerosol-generating-procedures>. Accessed on 27/10/2020.

Public Health England. (2020b). 'COVID-19: Guidance for the remobilisation of services within health and care settings: Infection prevention and control recommendations'. Available from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/910885/COVID-19_infection_prevention_and_control_guidance_FINAL_PDF_20082020.pdf. Accessed on 27/10/2020.