Clinical Guideline: Gastric tube feeding Guideline for Staff on Neonatal units

Author: East of England Benchmarking group
For use in: EoE Neonatal Units
Guidance specific to the care of neonatal patients.

Used by:

Key Words:

Date of Ratification: September 2021

Review due: September 2024

Registration No: NEO-ODN-2021-5

Approved by:

Neonatal Clinical Oversight Group	
Clinical Lead	

Ratified by ODN Board:

Date of meeting	**September 2021**

Audit Standards:
100% of babies will have documented evidence of placement of tube. 100% of babies will have a record of the length and pH at time of insertion
100% of babies will have documented evidence of assessment of tube position

Audit points

Audit will be through annual benchmarking activity and consequent action planning using infant's records to assess quality outcomes and guideline adherence. Poor scores may necessitate more frequent audits to ensure progress is being made.

Purpose:
To provide guidance on insertion, testing and feeding of infants on neonatal units and ensure patient safety for all infants fed with gastric tubes, either via the Naso-gastric or Orogastric insertion method.

Target Population:
Nurses, nursery nurse, health care assistants and medical staff; students, under direct supervision of a competent person, undertaking practice placements caring for infants on Neonatal units.

Background:
Historically incidents have been recorded relating to the use of misplaced Nasogastric tubes[1] and inappropriate use of medical equipment[2]. Even after alerts were sent out to highlight these issues, incidents still occurred in significant numbers to necessitate a further alert,[6,7] to highlight the dangers surrounding the use of Enteral tubes.

Recommendations were also given relating to training of staff and the safe use of gastric tubes[7]. Implementing a guideline to be used throughout the network ensures care practices are standardised and monitored for compliance to best practice throughout the region.

Introduction:
Within the neonatal environment passing & using gastric tubes is an integral part of care and daily routine for many of the babies. It provides a vital method of delivering nutrients to the infant, with minimal energy expenditure, thus supporting growth and development. It is a blind procedure, meaning that we cannot visually confirm the exact placement of the tube when in use. Therefore the need to follow a clinical procedure to confirm the position of the tube on insertion or prior to use is essential to minimise the risk of using a misplaced gastric tube. Documentation of competency to perform this vital skill for staff is necessary for units to be able to evidence adherence to quality and safety through auditing/ benchmarking processes.

Objectives:

- To provide guidance on insertion of gastric tubes
- To provide guidance on how to test gastric tubes for correct tube position
- To provide guidance on the administration of gastric feeds and medicines
- To provide guidance on how to vent air from the stomach for patients who I. Have had bag and mask ventilation
  - II. Are on nasal CPAP
  - III. Have abdominal distension

CONTRAINDICATIONS:

There is an increased risk of causing trauma or misplacing a Gastric Tube in patients who have the following contraindications. The competent practitioner passing the tube should determine the safest method of placement. If there is any doubt, this should be highlighted to the nurse in charge or medical team for clarification.

- Anatomical deformity
- Trauma
- Recent oral, nasal or oesophageal surgery (caution should be used if enteral tube is dislodged)

Exclusion of congenital anomalies: [10]

The inability to pass a nasogastric tube beyond the nares is indicative of Choanal atresia and is a medical emergency.
Resistance to passage of a gastric tube beyond the oropharynx is indicative of oesophageal atresia.
A gastric tube should be inserted prior to chest or abdominal x-ray to facilitate differential diagnosis.

Equipment:

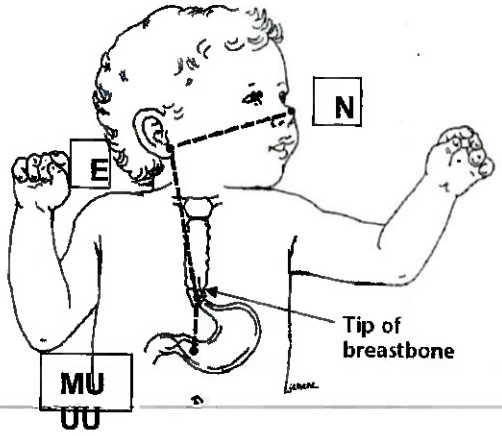
Radio Opaque NG Tube with externally visible length markings
An enteral safe [2, 12] Syringe 5mls[13] for aspiration depending on the size of the Infant.
PH Indicator strips CE marked reflecting 0.5 increments
Hydrocolloid skin protection and adhesive to secure the Tube
Gloves
Oxygen, bag and mask and Suction should be checked, working and accessible throughout the procedure

Determining length of the tube:

A fine bore gastric tube ranging from size 4 to 6 can be used depending on the size of the Neonate and density of the feed.[9] A Larger bore gastric tube should be used for babies requiring gastric drainage.

The following technique should be used to determine the length of gastric tube placement[5].

Measure the length of the gastric tube using NEMU (Nose, Ear, and Mid-Umbilicus)



If passing a naso-gastric tube: Measure from the tip of the infants' nose to the earlobe and from the earlobe to the point midway between the xiphoid process (tip of breast bone) and umbilicus

If passing an oro-gastric tube: Measure from the midline of the infants' mouth to the earlobe and from the earlobe to the point midway between the xiphoid process (tip of breast bone) and umbilicus

Make a note of the length to be inserted.

1. In the first action and rationale, include that the rationale for explaining procedure to parent and giving information, is not only about alleviating stress and co-operation, it is about involving them in the care decisions of their babies.

   2. We think there should be an action that states, "Wherever possible, encourage parents to be present during the procedure" and then the rationale would be 2-fold - firstly, as above it is to ensure families are involved in as much of their baby's care as possible; and secondly, as per pain management evidence, parental presence (comfort holding/speaking to baby etc) can minimise pain for the baby.
   We realise that gastic tube insertion isn't necessarily "painful" but it is certainly uncomfortable and so we would suggest that parent comfort during the procedure is beneficial.

   3. It would be good to have a section about how to involve and educate families so that they can deliver tube feeds for their babies.

The goal of FICare is to facilitate a partnership and collaboration between parents and the NICU staff, to promote parent-infant interactions, and to build parent confidence. This is achieved by promoting information sharing between staff and parents and by parent participation in their infants care. Under the FICare model, parents are taught to be involved in all possible aspects of their infant's care

Action	Rationale
If possible, explain procedure to parents/carers and offer information leaflet prior to procedure. Update parents as soon as reasonably possible	To ensure that parents are involved as partners in care for their babies through promoting information sharing between staff and parents and by parent participation in all aspects of their infants' care.
Document rationale for passing gastric tube in healthcare records. Date, time and sign including designation. If a patient requires an x-ray, ensure the enteral tube is passed prior to the x-ray being taken	To ensure the needs of the patient requiring an enteral tube are greater than the risks of incorrect placement. Provides at a glance evidence of placement and length of tube. To avoid unnecessary x-ray exposure.
Ensure the Infant, has not been fed for a minimum of 15-30 minutes prior to passing the gastric tube	To avoid the risk of vomiting and aspiration during procedure
Prepare the appropriate equipment and ensure oxygen and suction is checked and readily available	To avoid unnecessary interruptions to procedure and to ensure the environment is safe to proceed
Wash and dry hands, non-sterile gloves should be worn if required by local trust	To prevent cross infection as per local Infection Control Policies
Consider the baby's comfort during the procedure and select an appropriate care strategy to minimise discomfort. i.e. swaddling, sucrose, non-nutritive sucking.	To minimise stress and discomfort during the procedure.
Wherever possible, encourage parents to be present during the procedure.	To facilitate the involvement of families in the care of their babies as much as possible; [16] As per pain management evidence, parental presence (comfort holding/speaking to baby etc) can minimise pain for the baby. We realise that gastric tube insertion isn't necessarily "painful" but it is certainly uncomfortable and so we would suggest that parent comfort during the procedure is beneficial. [20] Parents find pain and discomfort the most distressing aspect of the NICU and also wish to actively participate in comforting their infant. These approaches are consistent with modern family-centred care

	in neonatal units in which the best interests of the infant and family are put ahead of staff convenience.
Position baby in the supine position with head in neutral position.	Hyper extension of the neck can occlude the airway.
Check the tube is intact. The tube should be stretched to remove any shape retained from being packaged	Establish patency of tube
Select nostril that is clear, if replacing tube use alternative nostril from which the tube was originally placed-if appropriate.	To prevent long term irritation and skin damage
Determine the length of the tube to be inserted. **For Naso-gastric tube placement**: (see above picture) Select a clear nostril, insert the tip of the tube into the nostril and slide backwards and downwards along the floor of the nose. Advance	To estimate accurate placement in the stomach following normal anatomical structures.
the tube steadily* to the predetermined length. **For Oro-gastric tube placement:** Insert the tip of the tube into the mouth and slide it backwards and inwards along the tongue to the oropharynx and advance steadily* to the predetermined length. *Insertion of tube should take around 15 seconds to minimise stimulation of vagal nerve. 14 With OGT there is an increased possibility of apnoea and bradycardia due to vagal stimulation.	
If at any time the baby shows signs of bradycardia, apnoea, vomiting or respiratory difficulties such as tachypnoea or harder or becomes cyanotic: stop the procedure immediately and remove the tube.	To prevent the deterioration of the infant.
If there is any resistance/ obstruction on insertion, pull back, turn the tube slightly and advance again. If obstruction occurs again try the other nostril. If resistance is still felt, stop the procedure and seek senior help. Do not force the tube.	To avoid causing perforation of the oropharynx, pneumothorax or damage to delicate mucosa[1] Consider Choanal Atresia, Tracheal Oesophageal Fistula / atresia if a tube has not been previously successfully passed.[10]

To assess tube position, aspirate 0.2 to 1ml stomach contents using a 2.5ml to 5ml syringe.[13] Check contents are gastric by using pH strips. The pH should be less than 5.5[3] If pH range falls between 5 and 6, the tube position should be assessed with a second competent person.	To ensure accurate placement of the tube prior to feeding The NPSA has highlighted the potential difficulty experienced by some staff in differentiating pH readings using currently available pH indicator strips between pH range of 5 and 6. Even though aspirates testing pH 5.5 and below should indicate correct placement in most babies. Best practice would be to confirm with a second person that the pH is 5.5.
If pH is ≥6, it is not deemed safe to feed, without undertaking a full risk assessment with another competent nurse following the guidance in Appendix 2	A pH 6 and above. There are many factors in neonates that affect the results from pH indicator strips or paper including: • gestation; • postnatal age; • small volumes of aspirate; • medications that affect the gastric pH; • Continuous and frequent feeding. Staff should consider the factors for each patient that may contribute to a high gastric pH (pH 6 or above) when risk assessing. Any decision made must ensure the safety of the patient using the best information available

patient's name, hospital number and date of insertion	practice, therefore labelling of the gastric tube will be determined by local policy.
Document gastric tube size and length on the appropriate documentation kept in either the health care records or the bedside nursing notes each time a new tube is passed.	To minimise risk, in accordance with the Professional Standards for nurses and midwives.[4] A reference measurement will provide a benchmark for the risk assessment of tube position and movement.

If the length of tube is advanced, retracted or repositioned, alterations should be clearly documented in the healthcare / nursing records.	To ensure patient safety with correctly documented changes.

When securing an oro-gastric tube, Care should be taken not to damage the lips or gums or obstruct the use of the tongue.	This can occur if the tube is pulled too tightly when securing the tube.
Every time a gastric tube is inserted, or on subsequent reinsertions, complete the local trust gastric placement checklist record.	To keep a documented record of all tube insertions and subsequent reinsertions. [1]
Manufacturing guidelines should be followed to determine routine tube changes.	To avoid irritation to the baby's mucosal lining within the stomach
If a child requires a gastric tube for abdominal distension due to paralytic ileus, gastrointestinal disease or following gut surgery, leave the tube on free drainage. Aspirate the tube as indicated and requested and check tube position. Large bore gastric tubes should be used for babies requiring gastric drainage.	To allow drainage of gastric contents and facilitate early gastric motility. To avoid aspiration of gastric contents.
If a child is on nasal Continuous Positive Airway Pressure (nCPAP) or has received bag valve mask ventilation, the gastric tube can be left on free drainage if NBM. The open end of the tube should be raised above the level of the stomach. If not on free drainage, Aspirate stomach contents 4-6hrly and check tube position. In units that practice continuous venting following administration of feeds: This can be facilitated by securing the end of the tube above the head of the infant, with an enteral syringe attached to create a reservoir should gastric contents reflux. [11] Documentation should be kept up to date including the aspirate	To prevent accumulation of air in the stomach. To avoid aspiration of gastric contents.
Factors that may affect the gastric pH [1] Gestation; postnatal age (presence of amniotic fluid); small volumes of aspirate; medications (anti reflux/antacids); continuous and frequent feeding; use of fine bore tubes. Staff should consider the risk factors for each	All can cause either an elevated pH (≥6) or an insufficient aspirate volume to test.
patient that may contribute to a high gastric pH (≥6).	
The following methods should NOT be used to confirm feeding tube placement [1]	

Absence of respiratory distress	Small bore tubes can enter the respiratory tract with few, if any, symptoms, and large bore tubes can enter a patient's respiratory tract without any symptoms being shown, particularly if the patient is unconscious.
Appearance of feeding tube aspirate	Research and anecdotal evidence indicate that relying on the appearance of feeding tube aspirate is unreliable as a primary testing method as gastric contents can look similar to respiratory secretions
Radiography - should NOT be used routinely but should be used if the baby is being xrayed for another reason. However, if all other attempts to confirm tube position fail, then X-ray should be undertaken. Tubes with markings should be used for all babies to enable accurate measurement of depth and length and the position of the tube documented. All tubes used should be radioopaque.	Routine radiography for feeding tube placement would result in excessive and unnecessary exposure to radiation, loss of feeding time, increased handling of the baby, and would not be cost effective.
Observe the infant until the feed is complete.	To be present to take prompt action to ensure no adverse event occurs during the feed or minimise the effects of a tube becoming dislodged by responding promptly.
Involve and educate the family in safely checking pH aspirates and tube feeding their babies on the unit.	To ensure that parents are involved as partners in care for their babies through promoting information sharing between staff and parents and by parent participation in all aspects of their infants' care.[16] The improved confidence and skills of parents involved in their baby's care increases parental readiness as they transition from hospital to home, improves management abilities at home, and lowers parental anxiety. Additionally, family/parental involvement enables staff to feel more confident in the parents' abilities which then facilitates earlier discharge. [16]

Securing and skin care

- Once the gastric tube is deemed as safe to use, secure the tube with the appropriate tape. Maintaining the skin integrity is essential as damage to the skin can occur. The more preterm the baby the more damage that can be inflicted on the superficial cell layer as it is torn away when the tape is later removed.
- Use Hydrocolloid dressing (extra thin) on the skin; then secure the feeding tube to the Hydrocolloid dressing with adhesive tape Adhesive tape should not be shared amongst patients to comply with local infection control guidance. Reassess the baby's condition and make the baby comfortable.

When to check the tube position

- Following initial insertion;
- Before administering each feed;
- Before giving oral medication;
- Following vomiting, retching or coughing;

- If there is evidence of displacement. For example, if the tape is loose or the tube appears longer or kinked;
- If the baby is on continuous feeds, tube checking should be synchronised with syringe changes. When continuous feeding has stopped, wait 15 – 30 minutes to allow the stomach to empty and the pH level to fall.

On-going management and documentation

- Check on the relevant paperwork, the date that the tube was inserted and the length that the tube is inserted to.
- Check position of the gastric tube at the nostril or the lips, every time the tube is used and record on the feeding chart or electronic record
- When aspirating the feeding tube and testing the pH, ensure that the value of the pH, and the colour, consistency and volume of aspirate, is recorded on the feeding chart or electronic record.
- If the baby requires a chest x-ray, where possible ensure that the tube is passed prior to the x-ray being carried out. The most accurate method for confirming correct tube placement is radiography. However x-ray for the sole purpose of confirming gastric tube position is not recommended.
- Change gastric tube according to manufacturer's recommendations [9]
- If using a non-adhesive remover to remove tape, ensure manufacturer's instructions are followed and product is suitable to be used on the face.
- When the tape is removed, clean area with water and dry thoroughly.
- When replacing gastric tubes, where possible alternate nostrils should be used.

Complications

- Vagal stimulation – bradycardias and apnoeas [8]
- Increased work of breathing
- Aspiration, perforation of the oesophagus, posterior pharynx, stomach, duodenum;
- Small bowel perforation;
- Necrotising enterocolitis

Monitoring and Audit

Audited annually, in line with the East of England Benchmarking standards

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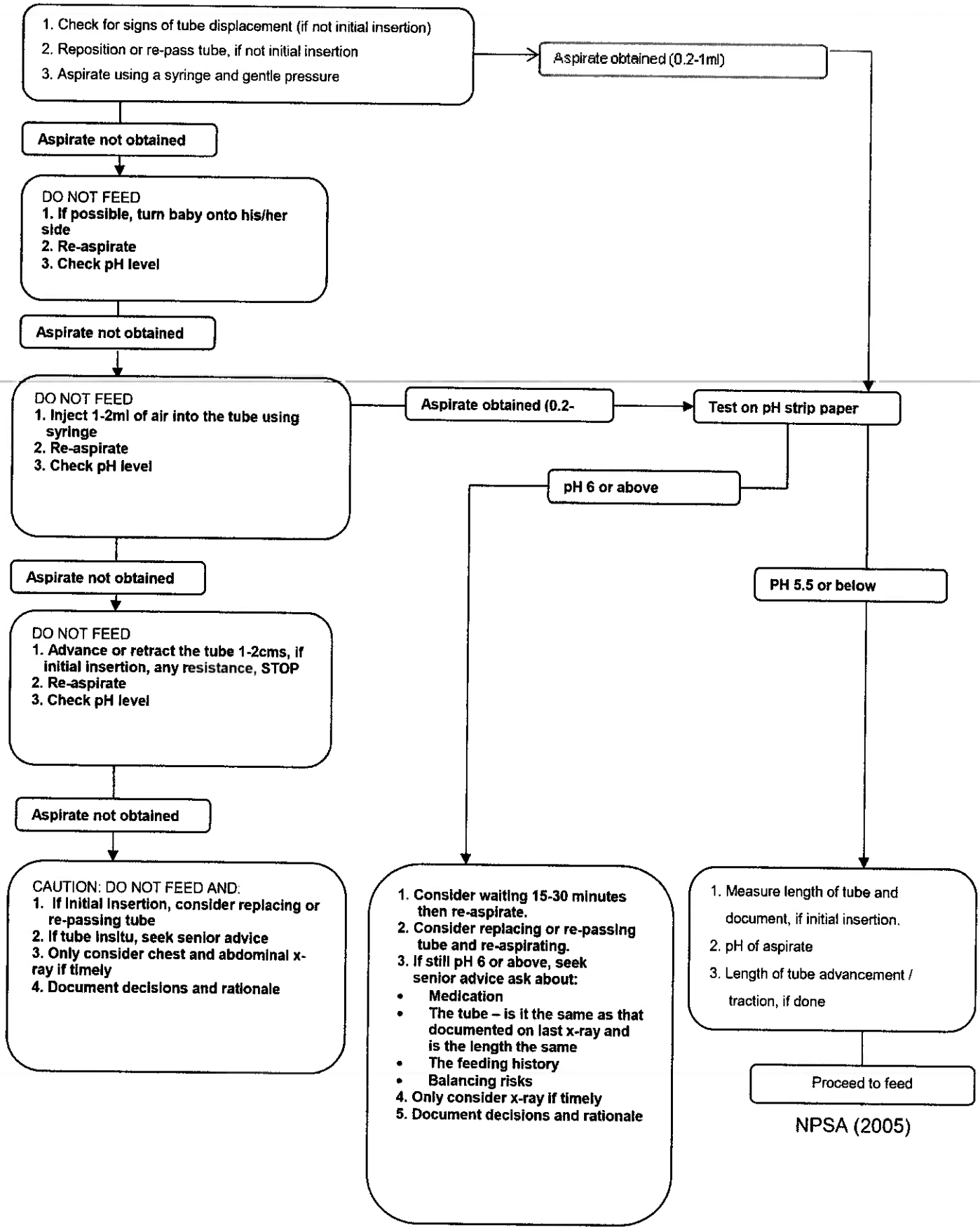
APPENDIX ONE (A)

The recommended procedure for checking the position of the naso and orogastric feeding tube in babies under the care of neonatal units Use this flow chart 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 fifteen seconds for any colour change	0.2 to 1ml of aspirate will cover an adequate on single, double or triple reagent panels of pH testing strips or paper.
Aspirate using an enteral 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. 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 or 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	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 t0 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 STAFF FOLLOW THE FLOWCHART, RECORD THE OUTCOMES AND MAKE DECISIONS BASED ON THIS INFORMATION	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	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 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 decision and their rationale.


1. Check for signs of tube displacement (if not initial insertion)
2. Reposition or re-pass tube, if not initial insertion
3. Aspirate using a syringe and gentle pressure
Aspirate obtained (0.2-1ml)
Aspirate not obtained
DO NOT FEED
1. If possible, turn baby onto his/her side
2. Re-aspirate
3. Check pH level
Aspirate not obtained
DO NOT FEED
1. Inject 1-2ml of air into the tube using syringe
2. Re-aspirate
3. Check pH level
Aspirate obtained (0.2-
Test on pH strip paper
pH 6 or above
PH 5.5 or below
Aspirate not obtained
DO NOT FEED
1. Advance or retract the tube 1-2cms, if initial insertion, any resistance, STOP
2. Re-aspirate
3. Check pH level
Aspirate not obtained
CAUTION: DO NOT FEED AND:
1. If initial insertion, consider replacing or re-passing tube
2. If tube insitu, seek senior advice
3. Only consider chest and abdominal x-ray if timely
4. Document decisions and rationale
1. Consider waiting 15-30 minutes then re-aspirate.
2. Consider replacing or re-passing tube and re-aspirating.
3. If still pH 6 or above, seek senior advice ask about:
• Medication
• The tube – is it the same as that documented on last x-ray and is the length the same
• The feeding history
• Balancing risks
4. Only consider x-ray if timely
5. Document decisions and rationale
1. Measure length of tube and document, if initial insertion.
2. pH of aspirate
3. Length of tube advancement / traction, if done
Proceed to feed

NPSA (2005)

Exceptional Circumstances Form

Form to be completed in the **exceptional** circumstances that the Trust is not able to follow ODN approved guidelines.

Details of person completing the form:	
Title:	Organisation:
First name:	Email contact address:
Surname:	Telephone contact number:
Title of document to be excepted from:	
Rationale why Trust is unable to adhere to the document:	
Signature of speciality Clinical Lead: Date:	Signature of Trust Nursing / Medical Director: Date:
Hard Copy Received by ODN (date and sign):	Date acknowledgement receipt sent out:

Please email form to: requesting receipt.

Send hard signed copy to:

EOE ODN Executive Administrator

APPENDIX 1 – VERSION CONTROL SUMMARY

Document Title: Gastric tube feeding Guideline for Staff on Neonatal units

Version Number	Purpose / Changes	Author	Date Changed
1	New document	East of England neonatal Benchmarking group	26TH March 2018
2	Updated document	East of England Benchmarking Group	August 2021

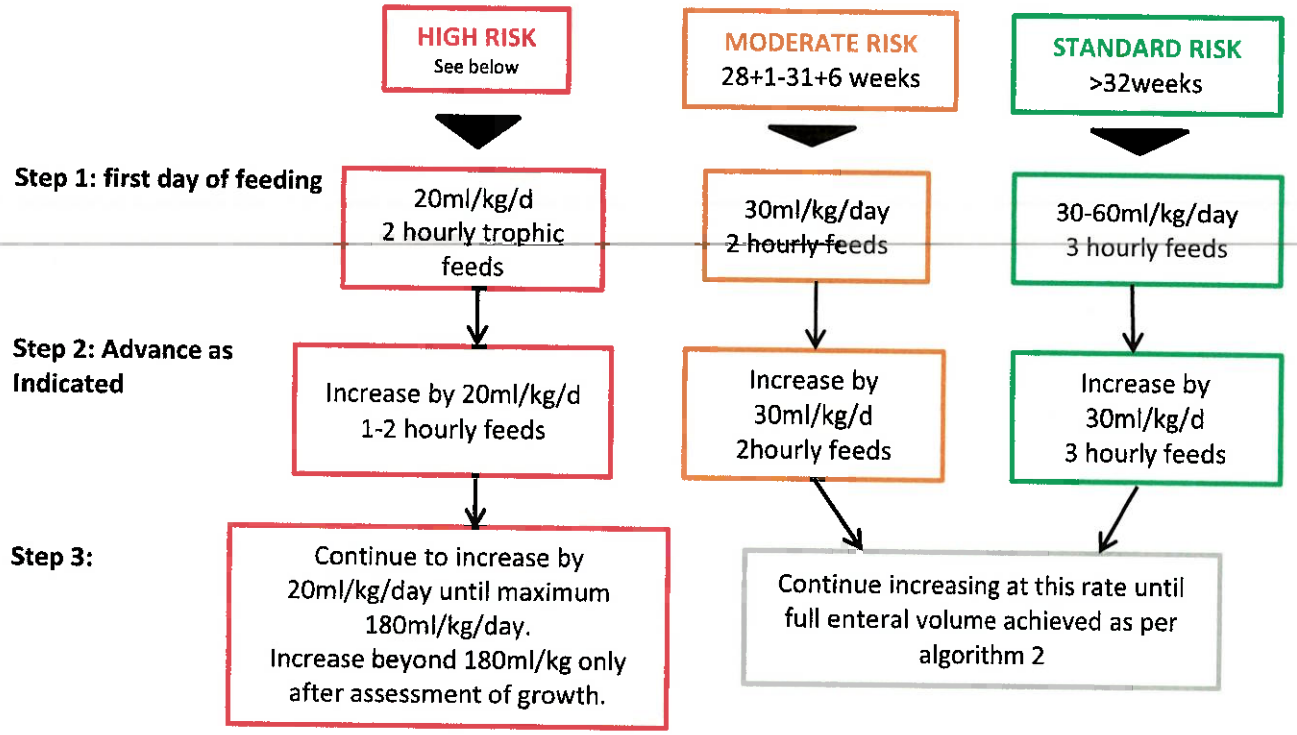
East of England Neonatal Network

Nutrition Care Pathway

Patient ID Label
Name:
Unit No:
Date of Birth:

Algorithm 1: Initiating and advancing feeds

- ✓ Commence feeding as close to birth as possible following clinical assessment
- ✓ Maintain trophic feeds in high risk infants only as long as clinically indicated
- ✓ Infants can move between risk categories following clinical assessment



HIGH RISK: Infants are considered high risk if they meet the following criteria below:	
	<28 weeks
	<1000g
	Unstable/hypotensive ventilated neonate
	Re-establishment of feeds following NEC or Gut surgery
	Perinatal hypoxic ischemia with significant organ dysfunction
	Absent/reversed end diastolic flow in infants < 34 weeks

CAUTION: should be taken in the following infants and managed as *either* **high** risk or **moderate** at clinician's discretion.	
	Severe SGA (<0.4th percentile AND > 34 weeks)
	Preterm SGA (<2nd percentile AND < 34 weeks)
	Indomethacin or ibuprofen for PDA
	Complex congenital cardiac disease
	Dexamethasone treatment
	Polycythaemic infants

Please manage my feeding as:

HIGH RISK ☐ MODERATE RISK ☐ STANDARD RISK ☐

Algorithm 2: Choice of milk feed

Fresh maternal breast milk is the first choice of milk for all babies unless clearly contraindicated.

Infants ≤ 33+6 weeks gestation:

Weight < 2kg at birth

Weight ≥ 2kg at birth

Increase feeds to 150ml/kg/day **EBM** as per algorithm 1

Weight **<1.5kg** at birth

Weight **>1.5kg** at birth

Once tolerating 150/kg/day for 24 hours – add BMF

Increase as tolerated to 180ml/kg/day

(max 200ml/kg if poor weight gain)

Nutriprem BMF
Increase to 165ml/kg/day (max 180ml/kg if poor weight gain)

SMA BMF
Do not advance beyond 150ml/kg

Consider BMF if:
*poor tolerance of volume
*Poor weight gain persists
*Serum urea <2µmol/l
*IUGR < 9th centile

If insufficient or no EBM use DBM where available, or preterm formula.

Infants ≥34+0 weeks gestation:

Increase **breast feeding** or **EBM** feeds to 165ml/kg/day as per algorithm 1

Increase up to maximum of 200ml/kg/day if required to achieve weight gain

Use term formula if insufficient EBM available

Nutrient Enriched Post Discharge Formula should be considered only for infants born <34 weeks and <2kg either just prior to discharge or when >2kg:

- Who have proven increased energy requirements (eg CLD on home oxygen)
- Who have continued poor growth, dropping > 2 centiles during neonatal stay
- On the advice of a Dietitian

All other babies should be discharged breastfeeding or on EBM/term formula

Supporting mothers to express breast milk:

To facilitate the production and maintenance of breast milk mothers of preterm and sick babies require support to:

- ✓ Understand, through discussion and provision of resources, the importance of breast milk for her baby
- ✓ Commence hand expression. Preferably within 1 hour and definitely within 6 hours of delivery
- ✓ Express 8-10 times in 24 hours and at least once between midnight and 6am, until milk supply is established
- ✓ Avoid gaps of longer than 4 hours between expressions
- ✓ Receive regular skin to skin/kangaroo care with her baby
- ✓ Produce at least 750ml/day of milk by day 10 (guide only). If < 350ml by day 10 consider referral to lactation consultant/infant feeding co-ordinator.

Expressing reviewed	Day of delivery Call to midwife within 4 hours post delivery	Day 1	Day 3	Day 5	Day 7	Day 9
Advice given and/or action taken	Benefits of breast milk discussed Y/N Supporting literature given Y/N Hand expression confirmed Y/N Time of birth ..... Time expression started.....					
Signed						

LUTON & DUNSTABLE UNIVERSITY HOSPITAL

Example 1 5 S E P 2 0 1 2

Paediatric Nasogastric Tube Care Plan

_____ has a Nasogastric tube to use for medications [ ] feeding [ ]

Make of Tube.....Size.....FG.....CM Tube passed to.....CM

Make of Tube.....Size.....FG.....CM Tube passed to.....CM
(Complete If any changes Made)

The position of the nasogastric tube should be checked:

- **Following initial insertion**
- **Before administering each feed**
- **Before giving medications**
- **Any new or unexplained respiratory symptoms or if oxygen saturations decrease**
- **At least once a day during continuous feeds**
- **Following episodes of vomiting, retching or coughing spasms**
- **When there is suggestion of tube displacement**

Date learning goals commenced for x2 parents/carers to learn to use the nasogastric tube? / / *If there is a plan for discharge on tube feeding*	Weights: - Daily [ ] - Twice weekly [ ] on _____ and _____ Weekly [ ] on _____
Encourage: (where appropriate) - Use of dummy [ ] *(liaise with parent/carer)* - Oral feeding [ ] *(liaise with dietitian/ SALT/ Consultant)* - Messy Play [ ] *(liaise with play therapist)* - Oral hygiene and/or teeth cleaning [ ]	In discussion with the parents/carers, parents/carers are competent and happy to undertake the following care:
Child referred to dietitian: Yes [ ] Date / /	Parents/ carers briefing leaflet given [ ]

Plan of Care
1. Ensure patient understands reason for tube feeding
2. Wash Hands prior to handing the tube or feed. Change the giving set every 4hrs if decanted or unsterile feed, and every time the bag is changed for sterile pack feed.
3. Check positioning of nasogastric tube by checking length of tube visible for tube migration, and by testing aspirate. Document pH test results on confirmation of nasogastric tube position chart, and use listed techniques to help gain aspirate if having difficulty. Follow radiology decision tree if x-ray is required.
4. Medicine administration: a. Try to avoid giving medicines through the tube. If it is essential- discuss with pharmacist. b. Give where possible, medicines as liquids/suspensions **(Do not give clarithromycin or ciprofloxacin suspension via NGT)** c. Do not mix medicines together d. Flush tube, using sterile water, before, between and after medicines using push-pause technique. e. Ensure in low dose syringe drug is not sitting in the barrel- tap to remove.
5. Ensure tube is comfortably and securely positioned. Change tapes when necessary.
6. Flush tube every 4 hours with water, during feeds
7. Give feed as prescribed on dietetic regimen sheet.
8. Asses for nausea, abdominal distension, thirst and hunger- report to the dietitian
9. Monitor bloods as per medical/dietetic plan
10. Record input/output
11. Monitor Stools
12. Teach parents using teaching pack and home enteral feeding learning goals if required
13. Support Parent/Carers with using the tube if they are competent to do so.

Care planned by:_____

Designation:_____

Date:_____

NHS
Bedfordshire Hospitals
NHS Foundation Trust

CLINICAL PROCEDURAL DOCUMENTS

Document Title: Paediatric Enteral Feeding

This document is relevant for staff at: *(please indicate)*	**Luton Hospital site**	**Bedford Hospital site**	**Both Hospital sites** ✓

Document Type: *(please indicate)*	**Clinical Guideline** ✓	**Standard Operating Procedure**	**PGD**	**Integrated Care Pathway**

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Paediatric Dietitians
Sister, Paediatrics

Is this document new/revised/has minor amendments?
Revised

Reason for minor amendments? Please highlight all amendments in your document.

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Chief Executive / Chair of Clinical Guidelines Signature:		**Date:**
Signature of Chief Nurse / Director of Nursing and Midwifery:		**Date:**
Signature of Chief Pharmacist:		**Date:**
Signature(s) of Lead Clinician(s):		**Date:**

CONTENTS

1. INTRODUCTION

This document aims to provide guidance to all staff working with Infants and Children within Bedfordshire Hospitals NHS foundation trust. It will optimise the use, safety and efficacy of enteral tube feeding (ETF) as a means of nutritional support. The document aims to standardise practice, where possible, to ensure consistent advice is given to children and their families and healthcare professionals.

1.1 Scope

This guidance has been developed by a multi-disciplinary group from both Luton and Bedford sites from Bedfordshire Hospital NHS foundation trust. The document is relating to Infants and the children in acute paediatrics. Although it is aimed to have similar practices to neonates and the community, they are not included in the scope of this document.

1.2 Training

When staff commence employment with Bedfordshire Hospitals NHS Foundation Trust, training on enteral tube feeding will be given on induction to the wards. Further training will also be provided at the request of individuals should it be required.

In addition to theoretical training, staff will require supervised practice at ward level until competence is achieved. This supervised practice will be provided by registered nurses who have been signed off as competent. Current local and national guidance must be followed.

Online pump training is available online via the Nutricia Flocare Infinity simulator, on the Nutricia website. The feeding company can provide pump training. There are also instruction handbooks with troubleshooting guides available.

Staff requesting and interpreting x-rays to determine the position of a nasogastric tube must be competent to do so. Training must be completed online via ESR (electronic staff record) account while on induction. A copy of the certificate should be submitted to the appropriate line manager at either Bedford Hospital or Luton & Dunstable Hospital.

1.3 Nutritional risk assessment in Paediatrics

Children admitted at either site of the Bedfordshire Hospitals NHS foundation trust should be screened for malnutrition using the Paediatric Malnutrition Score (PYMS) within 24 hours of admission to the ward- see clinical guideline.

1.4 Infection control in enteral tube feeding

Enteral tube feeding is associated with infection risks. It is important that the patient is protected from potential infection. Enteral feed is an ideal medium for growth of microorganisms. The following key points should be considered:

- Where possible sterile commercially prepared feed should be used- unless breast milk is being used.
- Addition of non-sterile ingredients should be avoided where possible.
- Feed and administration sets should be inspected for damage prior to use.
- Ready to hang feed should be used where possible to avoid decanting and handling of the feed.
- Preparation of feed should take place on a clean surface within a clean environment.
- Hands should be washed as per Infection control procedures before handling of any equipment or feed.
- Aseptic non-touch technique should be used whilst handling feed and feeding equipment.

1.5 Feed hang times and feed preparation

Feed bottles must be labelled with the child's name, hospital number, the date, the time the feed was prepared.

Feeds should be given at room temperature and **must not be heated.**

Feed sets should be used for no longer than 24 hours (see feed hang times below)

Feed Type	Maximum time feed can be hung for
Sterile ready to hang feed packs	24 hours
Decanted/ mixed feed	4 hours
Breast Milk	4 hours

In hospital, sterile water should be used to flush the feeding tubes. Opened sterile water should be labelled with the child's name, the date and time of opening. They may be open for a maximum of 24 hours.

In the home, most patients can use cooled, boiled- water to flush their feeding tubes, stored in a clean container with lid. This should be stored in the fridge for up to 24 hours and then discarded. (NICE 2017)

Items marked "single use", must not be re-used. This includes syringes and feeding equipment.

1.6 Enteral feeding regimen

Patients receiving enteral feeds should have an individualised feeding regimen. This will be based on the patients estimated energy requirements following assessment by a paediatric dietitian.

Infants under the age of 1 year should usually meet their nutritional requirements when fluid requirements are met with infant formula (150mls/kg/day). This may be managed by the medical team. Infants and children over the age of 1 year require calculation of fluid requirement and enteral feed selection by a Paediatric Dietitian.

For children receiving enteral feeds, weights need to be monitored regularly to assess if a child is receiving an adequate intake. (See screening and weights policy).

1.7 Feed administration

Feed is administered either via bolus or continuously. Bolus feeding mimics the normal pattern of eating (BAPEN 2016) and is common in acute paediatrics. It is also standard practice in infants for the infant to take bottle or cup feeds (dependent on a safe swallow) and then top up any remaining feed afterwards.

Bolus feeds can be given via gravity using a 50ml syringe or by setting a rate and volume on a feeding pump. When giving expressed breast milk (EBM) where possible, it should be given via a bolus as often the fats stick to the side of feeding containers reducing the intake of calories and fat-soluble vitamins.

Continuous enteral feeds can reduce the risk of vomiting and diarrhoea in children who may struggle to tolerate large boluses. It is also better tolerated in critically ill children or in those that have an increased fluid requirement. Continuous feeding is required when feeding via a jejunal tube as the jejunum has no capacity for a bolus due to its structure.

On discharge, overnight feeds where possible should be avoided. The risk of strangulation and aspiration is increased. If they cannot be avoided then a clear documented risk assessment should be completed prior to discharge.

The decision around the type, volume and method of delivery of feed should be an MDT decision, including but not exclusive to the Consultant, ward team and dietitian, taking into account the child's clinical condition- the rate will then be increased depending on tolerance.

1.8 Monitoring

Clinical monitoring varies depending on the child's clinical condition. However, the following should be monitored, (frequency should be decided on initiation of tube feeding and documented in the patients care plan):

- Weight, height/ length and head circumference (in children under 2 years)
- Blood tests as clinically indicated
- Fluid balance

- Observations-(Temperature, pulse, respirations, oxygen level) Frequency dependent on clinical condition
- Stool chart
- Measurement of losses e.g vomits/ gastric losses
- Intake
- Tube position (as per tube specific care plan)

1.9 Refeeding syndrome

Refeeding syndrome is a severe fluid and electrolyte shift, causing metabolic abnormalities in patients who are malnourished and under-going re-feeding. It is caused by a switch from starvation to anabolism. Metabolic abnormalities include:

- Hypophosphatemia
- Hypokalaemia
- Hypomagnesaemia
- Altered glucose metabolism
- Oedema
- Vitamin deficiency

These abnormalities can lead to cardiac, neuromuscular, hematologic, hepatic and gastrointestinal complications. If left untreated- they can be fatal.

Children at risk of re-feeding syndrome include:

- Anorexia nervosa
- Severely malnourished patients
- Prolonged fasting
- Patients unfed for 7-10 days
- Diabetes with hyperglycaemia
- Oncology patients on chemotherapy

The guidelines for the management of re-feeding syndrome can be found on the trust guideline database.

1.10 Administration of medications via enteral feeding tubes

Where possible, medications should be given via the oral route. Most medications are not licenced for administration via enteral feeding tubes. It is accepted however, that in some patients medications which are licenced for the oral route, will need to be administered via a feeding tube. The following should be considered when giving medications via a feeding tube:

- Consider if there is an alternative route that the medication can be administered eg: oral, rectal, topical, IV
- Ensure that the paediatric pharmacist is aware that the medications are being administered via a feeding tube.

- When possible use solutions or soluble tablets- however note exceptions- as not all liquid formulations are suitable for use via a feeding tube.
- Dilute any thick medications with sterile water.
- Tablets should be crushed as a last resort- **NEVER** crush cytotoxic medicines, immunosuppressant, steroids, hormones, antibiotics, enteric coated or sustained release capsules.
- Consider if the feed needs to be stopped before and after a medication.
- Medicines should not be mixed with feed.
- Medicines should not be mixed with each other.
- 3 way taps should not be used on feeding tubes.
- Medicines should be measured in an appropriately sized purple oral/enteral syringe- the largest, which can safely measure the dose.
- Flush the tube before, between and after medications.

The "Handbook of Drug Administration via Enteral Feeding Tubes" is available to refer to for guidance on drug administration via feeding tubes

1.11 Out of hours feeding

For an existing tube fed child their existing community plan should be followed and adapted to reflect their medical need by the medical team.

For infants/children requiring a new tube feed to start:

Under 1 years of age – medical team to use the fluid requirement to determine a suitable volume of infant formula or breast milk.

Over 1 year of age – ensure hydration needs are met and make an urgent feed referral request to dietitian for the next working day.

As there are a wide range of feeds/regimens it is not possible to provide a standard feeding plan.

1.12 Blended Feed

Blended diet policy to follow. Children to be assessed on an individual basis and risk assessed on admission.

1.13 Weaning from enteral feeding and tube removal

It is important that when a patient is moving from an enteral feeding diet to a full oral diet that they are monitored closely to ensure that they continue to meet their nutritional requirements.

If an infant is having continuous nasogastric feeds, it is best to move to bolus feeds as tolerated to allow them to have gaps in their feeding and to promote hunger. If it is deemed that an infant has a safe swallow, then oral feeds should be offered and any leftover feed should be topped up via the nasogastric feeding tube

Families will be provided with an individualised weaning plan in collaboration with the multidisciplinary team for increasing oral intake and reduction in enteral feeding. Throughout this weaning process the infant/child will be monitored.

1.14 Discharging an Infant/child with an enteral feeding tube

Discharging a child home with an enteral feeding tube is a complex discharge. It requires a multi-disciplinary risk assessment, which should be completed and documented prior to the child's discharge home from hospital into the community.

Patients may be considered for home enteral tube feeding if the child is medically fit to be discharged home, but is not meeting their nutritional requirement orally.

However, a number of requirements must be met prior to discharge:

- The competent parent/ carer understand that home enteral feeding poses major lifestyle changes for the family and the child.
- The parent/ carer give consent for the treatment.
- A risk assessment is completed and discussed with the parent/carer
- The parent/carer is capable of performing the required competencies at a "competent" level.
- Two parent/ carers are signed off the enteral feeding competencies
- There is a clean sink and work area, an electric socket and a dry storage area away from sunlight and extreme heat are available in the home setting as a minimum.

Discharge Process for a new tube fed patient

- If the child has pump feeds- pump training should be provided by the feeding company.
- 14 days of equipment should be provided to the family
- The child should be referred to their local community nursing team.
- At least two parent/carers complete learning goals and are signed off at "competent" level. Each provided with their own set of learning goals.
- Training to families should be provided by a competent member of staff. "Competent" may only be signed by the dietitians/ dietetic assistant and/ or a registered member of the nursing team under the relevant sections of the learning goals.
- Families will be issued with information around tube feeding and contact phone numbers with advice on where they can access help.
- If felt necessary, a discharge planning meeting can be organised, to be attended by the family and the health professionals involved with the patients care.
- The child will have a named consultant and will have a follow up post discharge.
- Open access to the Paediatric assessment unit will be issued for tube related issues at both the Luton and Bedford sites.

2. NASOGASTRIC TUBE FEEDING

2.1 Relative and Absolute Contraindications to Blind Nasogastric Tube Insertion

Contraindication	Relative/Absolute	Reason
Nasal problems such as: - deviated septum - frequent nosebleeds - recurrent sinusitis - nasal tumour	 - relative - relative - relative - **absolute**	 - difficult insertion - risk of epistaxis - risk of intracranial placement due to thinned cribriform plate - risk of perforation
Coagulation disorders	- relative	- risk of severe haemorrhage
Oesophageal disease such as: - stricture - tracheo-oesophageal fistula - achalasia	 - relative - **absolute** - relative	 - risk of perforation and aspiration - risk of aspiration - risk of aspiration
Recent head or facial trauma such as fractured base of skull	- **absolute**	- risk of tube entering cranium
Previous traumatic insertion	- relative	- risk of failure/trauma

2.2 Fine bore tubes

The choice of tube used is patient dependent and based on the individual assessment of the patient. Rational should be documented in the patient's notes.

There are short term and long term tubes available- refer to the individual manufacturers guidelines to determine length of time the tube should be in situ. There are a range of lengths and width available, when choosing size, it should be considered if the tube is long enough for the size of the child and the tube is narrow enough not to block the child's nostril.

2.3 Who can pass a nasogastric feeding tube?

Bedfordshire Hospitals Trust requires that suitably trained and competent registered nurses, associate nurses and doctors are able to pass nasogastric tubes. In some circumstances parents / carers will be trained to pass nasogastric tubes, using competencies, either within hospital or by the children's community nursing team, in this instance they will also be able to pass nasogastric tubes on their child whilst in hospital, however, the nurse allocated to the patient remains accountable for the child and therefore should work in partnership with the parent/carer.

The rationale for starting nasogastric tube feeding should be documented in the patient's notes, as well as any further decisions made.

2.4 Preparing the child and their family

Age appropriate preparation of the child and family should be given. Play therapy may be useful but should occur immediately before tube insertion in order to minimise distress. Correct positioning is essential. If clinical holding or swaddling are needed this should be discussed with the child and family.

2.5 Relevant documents

All care plans and nasogastric tube feeding documentation can be found on the hospital local document system.

2.6 Procedure for the insertion of a nasogastric tube

Tools and Equipment:

- Appropriate sized feeding tube
- Non sterile gloves
- Apron
- Eye protection- Risk assess if required
- 2x 20ml Enfit syringe
- Low range PH testing strips 0-6.0
- Fixation tapes (Duoderm and Tegaderm- appropriately sized)
- Sterile water (for flushing the tube)

Please refer to trust policy for correct PPE, due to changing guidance.

	Action	Rationale
1.	Ensure rationale for the Nasogastric Tube is documented by Senior Doctor. Ensure verbal consent is given and documented.	
2.	Risk assess patient for bed side procedure, discuss with senior colleagues if unsure	Previous bedside procedure may have been unsuccessful, and may be inappropriate to perform – Patient may have underlying condition or altered GI anatomy
3.	Select appropriate sized tube for the patient, to suite clinical need, weight of patient and length of time tube may be needed	To provide patient with the correct sixe tube, ensuring it isn't too short or too long. If patient needs tube as long term – insert longer term tube to prevent more regular insertions
4.	Prepare both patient and family for procedure- explaining the procedure, and possible complications,(possible trauma to the nostril, vomiting, incorrect placement, distress to patient)	To gain cooperation and confidence
5.	Wash hands – following hand hygiene protocol and put on gloves and apron and eye protection if required	Clean procedure – PPE should be worn to protect staff from contamination

6.	Measure Nasogastric Tube length. Take NEX measurement – Measuring from the tip of the nose of patient, to the ear lobe and then to the bottom of the xiphisternum – This is to be documented on insertion record.	If tube to short – may not reach stomach. Risk of being in the lungs.
7.	Pass the tube to the NEX measurement, and confirm tube position using low range PH testing strips, should test between 0-5.5. **Only once position confirmed secure the tube with appropriate fixation tapes and flush with water.** **If long term tube is used, flush prior to removing the guidewire.**	**Tube position MUST be confirmed prior to flushing tube – risk of flushing into the lungs if correct placement of tube is not confirmed – this could be fatal.** **Flushing tube prior to removing the guidewire allows the removal to not cause damage to the tube.**
8.	If unable to obtain a sufficient aspirate to test the tube placements pH – please follow The Nasogastric Tube Insertion Flowchart (give fluids orally if able to take anything orally. **If no aspirate can be obtained and patient is unable to take anything orally ask Drs to request an upper chest and abdominal x-ray – Once patient has had x-ray, competent Dr is to assess tube position and document position on the NG insertion paperwork.**	Feeding **CANNOT** commence until correct tube position is documented by appropriate competent Doctor.
9.	Document insertion on relevant paperwork.	To ensure it is clearly documented where the tube is passed to.

2.7 Confirmation of tube position

pH testing is first line method for confirming position. pH of 1-5.5 is the desired range. Each time the tube is tested the result must be documented on the bedside chart.

Nasogastric tubes should be aspirated to check the tube is correctly positioned after insertion and before starting the feed. It should also be aspirated:

- Before each feed
- Before giving medication via the tube
- Once per shift as a minimum during continuous feeding
- After a bout of retching, vomiting or coughing
- After oropharyngeal suction
- If the tube appears to have moved
- If there are new respiratory symptoms or oxygen desaturations

At both the Luton and Dunstable Hospital and Bedford Hospital and as per national guidance, feed may be commenced if aspirate is pH 5.5 or less.

At the Luton and Dunstable Hospital **If the pH is 5.5** a second competent person must verify the result independently.

At Bedford Hospital **all pH test must be checked by a second competent person.**

pH strips should be CE marked for testing human gastric aspirate and should be kept clean and dry, storing the, in their sealed container.

Nasogastric tubes should always be aspirated slowly and gently to prevent the walls of the tube from collapsing under suction. The syringe size will depend upon manufacturer's recommendations.

It should be possible to aspirate a fine-bore nasogastric tube with or without the guidewire present. However, it is common to experience difficulty in aspirating such tubes

If aspirate cannot be obtained, the NPSA flow diagram (found in appendix 1) can be used to try to obtain an aspirate, at Luton and Dunstable hospital the care plan also has clear recommendations to try to obtain an aspirate.

If acid aspirate cannot be obtained, the child may be able to have a drink or dummy dip of lemon or orange squash. It would not be appropriate to give as a drink to children under the age of 6 months; however, a dummy dip could be considered. This must be in agreement with the parents and the consultant and the child **MUST** have a safe swallow. The decision and rationale of the decision should be documented clearly in the notes.

If acid aspirate still cannot be obtained, a chest and upper abdominal x-ray will be required.

- The x-ray request form should clearly state that the purpose of the x-ray is to establish the position of the nasogastric tube for the purposes of feeding.
- The radiographer takes responsibility to ensure that the tube can be seen clearly on the x-ray.
- There should be clear documentation of the tube placement checking process including confirmation that the x-ray viewed was the most current x-ray for the correct patient, how placement was interpreted, and clear instructions as to required actions on the confirmation of tube placement care plan.
- Any tube that is identified as being in the lung should have a medical decision of ongoing management immediately.

The following techniques should NOT be used to confirm the position of a tube:

- Blowing air down the tube via a syringe and listening over the epigastrium (the whoosh test) is not conclusive as sounds can be transmitted from the respiratory tract to the epigastrium.
- Holding the tube end under water is not research based, could be hazardous and should **not** be used.

- Litmus paper should **not** be used to check the tube position because bronchial secretions may be acidic and thus turn blue litmus paper red.
- Injecting water, withdrawing it and testing the pH of this fluid.
- Using the appearance of the aspirate in the syringe.

3. NASOJEJUNAL (NJ) FEEDING

3.1 Indications for nasojejunal feeding

Feeding beyond the pylorus is indicated in infants/children at increased risk of pulmonary aspiration or in whom gastric feeding is contraindicated. The decision to start NJ feeding should be documented in the patient's notes, along with the rationale for starting NJ feeding.

3.2 Nasojejunal tube insertion

NJ insertion should be completed by a competent nurse or doctor. Blind tube insertion can be attempted in appropriate children on the ward. However it is recognised that insertion of NJ tubes can be difficult in the acute children's ward setting. If blind insertion is contraindicated – contact Paediatric Consultant Radiologist at the earliest opportunity in addition to ICE referral. Nasojejunal insertion pathway- appendix 2, showed be followed.

3.3 Procedure for passing a NJ tube

	Action	Rationale
1	Ensure rationale for the nasojejunal tube is documented by senior doctor. Ensure verbal consent has been given and documented.	
2	Risk assess child for blind, bedside procedure- discuss with senior colleagues if unsure.	Blind procedure may have previously been unsuccessful and therefore may be inappropriate to perform. Patient may have altered GI or spinal anatomy.
3	Select appropriate sized tube to suit the clinical need and the weight and size of the patient.	To provide the patient with the appropriate sized tube to meet their clinical need. If the length of the tube used is too short- it will stay in the stomach.
4	Prepare child and family for procedure- explaining the procedure and the possible complications (trauma to the nostril, perforation of the GI tract, incorrect position, distress to patient)	To gain confidence and cooperation.
5	Decontaminate hands as per hand hygiene protocol and put on appropriate PPE (as per hospital protocol)	Clean procedure. Please follow relevant infection control and PPE guidance from the trust

6	Measure nasojejunal tube length: - Take NEX measurement (Measuring from the patient's tip of the nose- to the ear lobe- to the bottom of the xiphisternum and document on insertion record. - Continue to get measurement for Nasojejunal tube and document on insertion record. - **For a child under the age of 1:** NEX measurement, to mid umbilicus and then to right iliac crest. - **For a child over the age of 1:** NEX measurement, to right iliac crest.	If tube is not passed far enough it will not reach the jejunum. If too much is passed it may kink.
8	Pass the tube to the NEX measurement and confirm position with low range pH testing strips. Tube should test at pH 0-5.5. **Once position confirmed flush with water and Remove guide wire**	**Tube position MUST be confirmed prior to flushing tube if flush goes into the lungs this may be fatal.** Flushing the tube prior to guide wire removal aids the removal without causing damage to the tube.
9	Undo securing of tube if necessary. Place patient onto their right side	This position makes tube insertion easier
10	Gently hold the tube, and allow peristalsis to take the tube to the length measured at the start of the procedure.	
11	Secure with appropriate tapes	
12	Send patient for chest and upper abdominal x-ray to assess the tube position.	Feeding cannot commence until correct tube position is document by appropriate competent Doctor.
13	Once returned- competent doctor to assess the tube position and document position in the NJ tube position paperwork. If tube not in correct position- **ONE** further insertion may be attempted. If unsuccessful see nasojejunal tube insertion pathway and discuss with family and senior colleagues.	
14	Mark tube with red sharpie at the nostril if in correct position.	So that it is clear if the tube has moved as tube markings may not be visible.

3.4 Confirmation of Nasojejunal tube position

Ideally the tube should be situated beyond the ligament of Treitz (well into the small bowel). However, blind insertion is likely to achieve a tip in the second part of the duodenum. If this is far enough to prevent aspiration of feed, no attempt is needed to achieve a more distal position.

The initial position must be confirmed via X-ray by a competent doctor and marked at the nostril once confirmed to be in the correct position. Initial insertion and xray confirmation should be documented on the appropriate care plan.
Once the tube is initially confirmed to be in the correct position the tube position check flowchart in appendix 3 should be followed for ongoing use of the tube each time the tube is used. Each confirmation of position should be documented on the appropriate care plan.

3.5 Key issues for Nasojejunal feeding

- Feeding into the small bowel bypasses the protection of gastric acid so risk of infection is increased- standard ANTT must be used when handling the tube.
- The small bowel does not have capacity for large volumes of feed and therefore continuous feeding is required over at least 16 hours- diet plan should be followed.
- The tube is long and thin and therefore at risk of blockage. The tube should be flushed 4 hourly with sterile water and the push pause technique used, to avoid blockage.
- Care should be taken when prescribing medications for patients with nasojejunal tubes. Medications can block the tube and some medications are not suitable for giving via the jejunal route. It should be explored if medications can be given via an alternative route. Suitability of medications and alternative routes should be discussed with the paediatric pharmacist.

3.6 Troubleshooting for nasojejunal tube feeding

Problem	Considerations
Abdominal pain, distension, bilious vomiting	Possible small bowel intussusception- Review Ultrasound scan needed Consider removing the tube
Low blood sugar	Possible dumping syndrome
Vomiting feed	? Tube has moved into the stomach Inform medical team Imaging required to confirm tube position.
Tube blocked	Consider what has caused blockage? Tube will need removal and replacing.

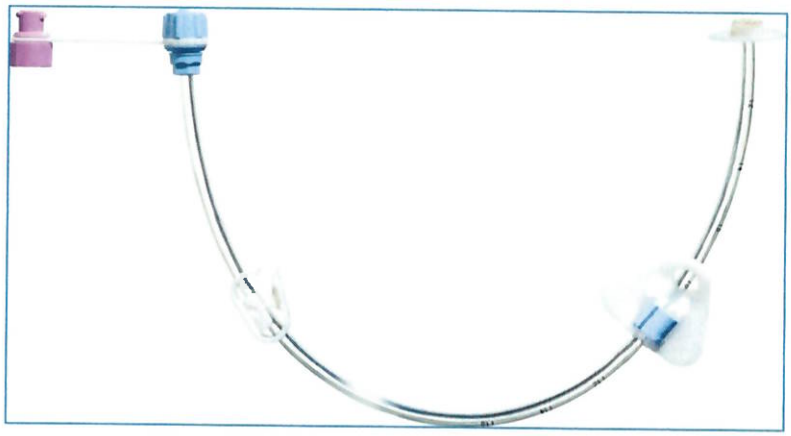
4. GASTROSTOMY TUBE FEEDING

Gastrostomy tube feeding is the route of choice for children/young people who require long-term ie longer than 3 months (Braegger et al, 2010) feeding into the stomach. Children who require decompression of the stomach or are non-compliant in taking their medications orally may also benefit from having a gastrostomy tube. At the Luton & Dunstable Hospital and Bedford Hospital the initial insertion of gastrostomy is not performed, patients will have their tube inserted at a tertiary centre and will be handed over to the local community nursing team. All patients with a gastrostomy tube will have open access to the paediatric assessment unit, for issues relating to their feeding.
The National Patient Safety Agency (NPSA, 2010) issued a rapid response report outlining the post-operative care required for patients post gastrostomy insertion.

If a patient experiences pain on feeding, prolonged or severe pain post- procedure, fresh bleeding or external leakage of gastric contents feed should be stopped immediately, urgent senior advice should be obtained on the appropriate investigations and a surgical review. Consideration should be given to performing a limited CT.

4.1 Percutaneous Endoscopic Gastrostomy (PEG)

A Frekka (Fresenius Kabi) PEG is the most commonly seen PEG tube at both Luton & Dunstable Hospital and Bedford hospital. The care for other PEG tubes may differ.



Tube Care:

- The PEG has an external fixation plate, this should not be loosened for the first 10-14 days post insertion (this will be advised by inserting tertiary centre). After this, the fixation plate should be kept approximately 3mm away from the skin.
- After the initial 10-14 days post insertion, the PEG tube should be advanced and rotated weekly. To advance and rotate the PEG:
    - Gather equipment to clean the site. (Sterile Gauze, Sterile water and dressing pack.)
    - Wash hands and apply gloves
    - Remove tube from the external fixation device (triangle against the skin)

- Move the external fixation away from the skin. Then, whilst holding the tube, clean the stoma area, making sure to clean the underneath of the triangle.
- Once clean, insert the tube into the child's stomach 2-3cms and rotate the tube 360°
- Pull the tube back until you can feel the internal bumper will not allow you to pull back any further.
- Return the external fixation (triangle) back to against the skin, making sure it is not too far away, but not too close to the skin
- Put the tube back into the fixation device.
- Document that you have performed an advance and rotate and clean on the care plan.

- If required, the PEG tube can be secured with a Clinifix dressing, if used, it should be secured close to the triangle fixation to minimise movement.
- The PEG site should be cleaned daily
- The PEG should be flushed at least daily.
- The tube clamp should be maintained at the distal end of the tube.
- PEG tubes are normally changed every eighteen months to two years. It will be changed at the tertiary centre it was inserted at.

Patients will present to the Paediatric assessment unit when issues occur with their tubes that cannot be dealt with in the community. Appendix 4 is a troubleshooting guide to give guidance on dealing with these issues. Appendix 5 is an imaging guide to give guidance when imaging is required The Paediatric Gastroenterology and Nutrition Clinical Nurse specialist team at Luton and Dunstable Hospital may also be available to offer advice and assistance.

4.2 Low profile balloon device

A Mic-Key button is the most commonly seen low profile balloon gastrostomy device at both Luton & Dunstable Hospital and Bedford hospital. The care for other low profile balloon devices may differ.

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Tube Care:

Primary Button

Primary buttons are placed directly into the child, they do not use an existing stoma. Primary buttons are not used very regularly; however there are significant differences in their care.

- Primary buttons may be stitched in place and secured with the internal water filled balloon.
- Water in the balloon should not be changed for the first six weeks, when the stiches are removed.
- The first change of button will be performed by the tertiary centre- arranged with the patient when this will be.

Specific guidance from the tertiary centre must be followed around the management

Secondary Button

These are placed using an existing stoma, formed from a gastrostomy.

Regular cares:

- Water in the balloon should be changed weekly using the following procedure:

1. Gather all equipment needed
   - 2x 5ml Luer Slip Syringes
   - Sterile Water
   - Correct PPE – as per hospital policy
2. Fill one of the Luer Slip syringes with the required amount of water to fill the balloon (will be dependent on each patient, please refer to care plan, or ask parents).
3. Take the other syringe and gently push the syringe into the 'BAL' port of your Mic-key button.
4. You should see the syringe start to fill with water from the balloon inside, once the syringe has filled pull back gently on the plunger to ensure all water is removed from the balloon (between 3-5mls).
5. Remove the syringe from the BAL port.
6. Keep hold of the tube with your other hand ensuring the tube remains secure in the stomach (especially if the child is moving).
7. Take the other Luer Slip syringe that you previously filled with fresh sterile water at the beginning and attach this to the BAL port.
8. Gently push the sterile water into the BAL port.
9. Once all the water has filled the balloon remove the syringe from the BAL port and ensure the Mic-key button is secure in the stomach.
10. Dispose of equipment correctly and document in the patients notes, inform the parents/guardian that the water has been changed if they are not present, so they know when it is next due to be changed.

- The stoma site should be cleaned daily.
- The button should be flushed at least daily.
- The device has an extension set which is to be attached when feed, fluid or medication is required. The extension set should be removed when not in use as it can damage the valve of the low profile device if left in place.
- Extension sets should be cleaned in running water with a mild detergent. They should be changed fortnightly.
- The button should be changed three to six monthly- see section below.

Changing a low profile device

The button device will require changing every 3-6 months. This will normally be performed by competent parents or the children's community nurses. In some cases this may be performed in hospital. The following procedure should be followed:

Equipment needed –

- New low profile device
- Sterile water
- 2x Luer Slip syringes
- Lubricating jelly
- Universal testing strips

Prior to inserting the new tube – fill the balloon to ensure there are no tears, and that the balloon is working correctly.

1. Wash your hands
2. Before removing the current tube- check the pH of the tube in situ (NNNG, 2016)
3. Apply a small amount of lubricating gel to the tip of the new tube, and lay the new tube on a clean surface –
4. Fill a syringe with required amount of water and set aside
5. Attach second syringe to port marked 'BAL' and withdraw water from balloon – once water has filled syringe, remove the syringe and discard
6. Gently remove the button from the child's stomach
7. Take the new button and gently push the device into the tract until the top part sits flat against the child's skin
8. Hold the button still
9. Insert the first syringe (filled with water) into the port marked 'BAL'
10. Gently push the syringe allowing the balloon to fill with water
11. Once all of the water has filled the balloon, remove the syringe, keeping a thumb on the end of the syringe to prevent water being expelled back into to syringe.
12. Wipe away any excess fluid or gel from the skin
13. Check the pH, by attaching an extension set to the gastric port, and aspirate a small amount of gastric contents – test on a pH testing strip (0-6.0)
14. If pH is (1-5.0) – child is now able to be fed and gastrostomy tube change is complete.

Tube must be tested after tube placement to confirm position; if tube position cannot be confirmed with pH then imaging will be required.

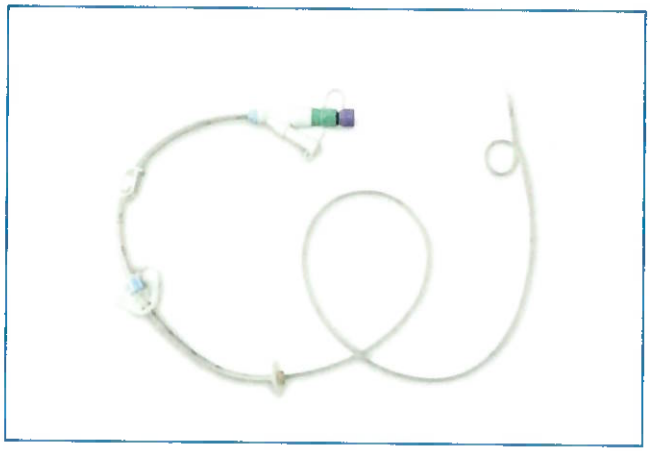
Patients will present to the Paediatric assessment unit, when issues occur with their tubes that cannot be dealt with in the community. Appendix 4 is a troubleshooting guide to give guidance on dealing with these issues. The Paediatric Gastroenterology and Nutrition Clinical Nurse specialist team at Luton and Dunstable Hospital may also be available to offer advice and assistance.

5. TRANS-GASTRIC TUBE FEEDING

These tubes allow for feed, medication or fluid to be administered into the jejunum. They will also have a second port to allow for gastric emptying. Transgastric tubes are difficult to insert, they may be used in children with moderate to severe gastroesophageal reflux. These tubes will be inserted by a tertiary centre and can only be replaced in endoscopy or radiology.

5.1 Percutaneous Endoscopic Gastrostomy with Jejunal extension (PEG-J)

A Frekka (Fresenius Kabi) PEG-J is the most commonly seen PEG-J tube at both Luton & Dunstable Hospital and Bedford hospital.



Tube Care:

- The PEG has an external fixation plate, this should not be loosened for the first 14 days post insertion. After this, the fixation plate should be kept approximately 3mm away from the skin.
- After the initial 14 days post insertion, the PEG tube should be **advanced only** weekly. To advance the PEG- J:

    - Gather equipment to clean the site. (Sterile Gauze, Sterile water and dressing pack.)

- Wash hands and apply gloves
- Remove tube from the external fixation device (triangle against the skin)
- Move the external fixation away from the skin. Then, whilst holding the tube, clean the stoma area, making sure to clean the underneath of the triangle.
- Once clean, insert the tube into the child's stomach 2-3cms .
- Pull the tube back until you can feel the internal bumper will not allow you to pull back any further.
- Return the external fixation (triangle) back to against the skin, making sure it is not too far away, but not too close to the skin
- Put the tube back into the fixation device.
- Document that you have performed an advance and clean on the care plan.

- If required, the PEG-J tube can be secured with a Clinifix dressing, if used, it should be secured close to the triangle fixation to minimise movement.
- The PEG-J stoma site should be cleaned daily
- Both the ports of the PEG-J should be flushed at least daily.
- The tube clamp should be maintained at the distal end of the tube.

Patients will present to the Paediatric assessment unit, when issues occur with their tubes that cannot be dealt with in the community. Appendix 4 is a troubleshooting guide to give guidance on dealing with these issues. The Paediatric Gastroenterology and Nutrition Clinical Nurse specialist team at Luton and Dunstable Hospital may also be available to offer advice and assistance.

5.2 Transgastric Low profile balloon device

A Mic-J is the most commonly seen low profile transgastric balloon gastrostomy device at both Luton & Dunstable Hospital and Bedford hospital..

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Tube Care:

- Water in the balloon should be changed weekly using the following same procedure as low profile button gastrostomy above.
- The button should not be rotated to avid dislodging the tube.
- The stoma site should be cleaned daily
- The button should be flushed at least daily.
- The device has an extension set which is to be attached when feed, fluid or medication is required. The extension set should be removed when not in use as it can damage the valve of the low profile device if left in place.
- Extension sets should be cleaned in running water with a mild detergent. They should be changed weekly.
- The button should be changed three to six monthly at the tertiary centre that it was inserted at.

Patients will present to the Paediatric assessment unit, when issues occur with their tubes that cannot be dealt with in the community. Appendix 4 is a troubleshooting guide to give guidance on dealing with these issues. Appendix 5 is an imaging guide to give guidance when imaging is required. The Paediatric Gastroenterology and Nutrition Clinical Nurse specialist team at Luton and Dunstable Hospital may also be available to offer advice and assistance.

6. LESS COMMON TUBES

6.1 Jejunostomy

Surgical jejunostomy are used infrequently in children. The tube is inserted directly into the jejunum.

- There are several different surgical techniques (Roux-en-Y; percutaneous endoscopic jejunostomy; transgastric jejunostomy though an existing gastrostomy; needle jejunostomy; catheter jejunostomy). Each technique has inherent complications and requires different care. It is essential that the tertiary centre provides sufficient information to promote safe management of the feeding tube.
- The tubes are often difficult to anchor securely, leading to skin soreness and tube dislodgement. Refer the child to the paediatric CNS.
- In the case of accidental removal insert a nasogastric tube 2-3 cm into the stoma tract to keep it patent, tape in place and seek specialist medical advice. Use the largest size that can be inserted **without force**.
- The tube can be very long and thin so can block easily. It must be flushed at least 6 times a day using a 20 ml syringe, **sterile** water and a push-pause technique.
- **If possible avoid giving medicines through this tube** as medicine administration increases the risk of tube blockage. Discuss alternative routes and medicine formulation with the paediatric pharmacist. If ciprofloxacin or clarithromycin are required, give as crushed tablets as these suspensions are known to block feeding tubes.

- The tube bypasses the protection of the gastric acid so the risk of infection is increased. The tube and feed must be handled using ANTT.
- The small bowel does not cope well with large volumes of feed therefore the child will be fed 16 - 24 hours a day. Whole protein feed may be tolerated.
- The make and size of the tube should be documented and the parents should always have at least one spare.

6.2 Malecot tubes

Malecot tubes are used by some tertiary centres to create a stoma tract, then after 6 weeks are replaced with a low profile button device. These tubes have an increased risk of dislodgement or migration and should therefore be pH test prior to each use using pH 0-6 testing papers.

If a Malecot tube is removed during the 6 week period post insertion a device such as a 10fr NGT or urinary catheter should be inserted to maintain the stoma site and then the tertiary centre contacted.

6.3 Orogastric tubes

This is a feeding tube passed through the mouth into the stomach. They may be used in infants requiring CPAP, and in children with a suspected or confirmed fractured base of skull, where passing a tube through the nose is contraindicated. These tubes are not suitable for sending patients home with as they have a high risk of moving position.

6.4 Oesophagostomy tubes

These are feeding tubes passed through the neck into the stomach at the time of surgery (e.g. following facial trauma or oesophageal atresia). These short-term tubes may be sutured in place and the position should be confirmed before the feed is started.

7. MANAGEMENT OF MINOR COMPLICATIONS

Possible complications should be regularly observed for, these may include:

- **Discharge/ inflammation.**

The stoma site should be observed for bleeding, exudate and redness.
It is common in healthy stoma sites to have some mucous from the site- providing there is no evidence of inflammation or irritation.
If the site appears infected then a sample should be taken of exudate. The patient should be treated accordingly. It may be necessary to give antibiotics depending on the patient's clinical condition.

- **Granuloma**

To assess, the site should be cleaned. If there is evidence of granulation tissue, It is important to establish what is causing the granulation tissue, causes may include excess moisture, infection, friction/ movement, presence of foreign material (NNNG, 2020). Initially a polyurethane foam dressing can be applied- assessing the effectiveness after one week. A topical steroid may also be considered and should be reviewed in one week. (NNNG, 2020) If treatment is started the patient should be referred to the Gastroenterology and nutrition clinical nurse specialist at Luton & Dunstable Hospital or the community nurses in Bedford.

- **Leakage**

If there is leakage of stomach contents from the site onto the skin this may cause burning to the skin. A barrier such as soft paraffin or Medi-Honey can be applied to the skin to protect it. It is also important to establish why there is leakage- for example it may be due to a poorly fitted device, constipation. These patients can be referred to the community children's nurses or at Luton & Dunstable Hospital the Gastroenterology and nutrition CNS team.

8. REFERENCES

BAPEN (2016) Choice of feed modality, https://www.bapen.org.uk/nutrition-support/enteral-nutrition/choice-of-feed-modality.

BAPEN (2016) Home enteral nutrition, https://www.bapen.org.uk/nutrition-support/enteral-nutrition/home-enteral-nutrition

British National Formulary for Children, London: NICE.

NICE (2017) Infection: prevention and control of healthcare associated infection in primary and community care. Clinical guidelines.

NPSA (2011) Reducing the harm caused by misplaced nasogastric feeding tubes in adults, children and infants

NPSA (2010) Rapid Response Report, Early detection of complications after Gastrostomy

NNNG (2020) Good practice guideline- care of Gastrostomy tubes and exit site management in adults and children.

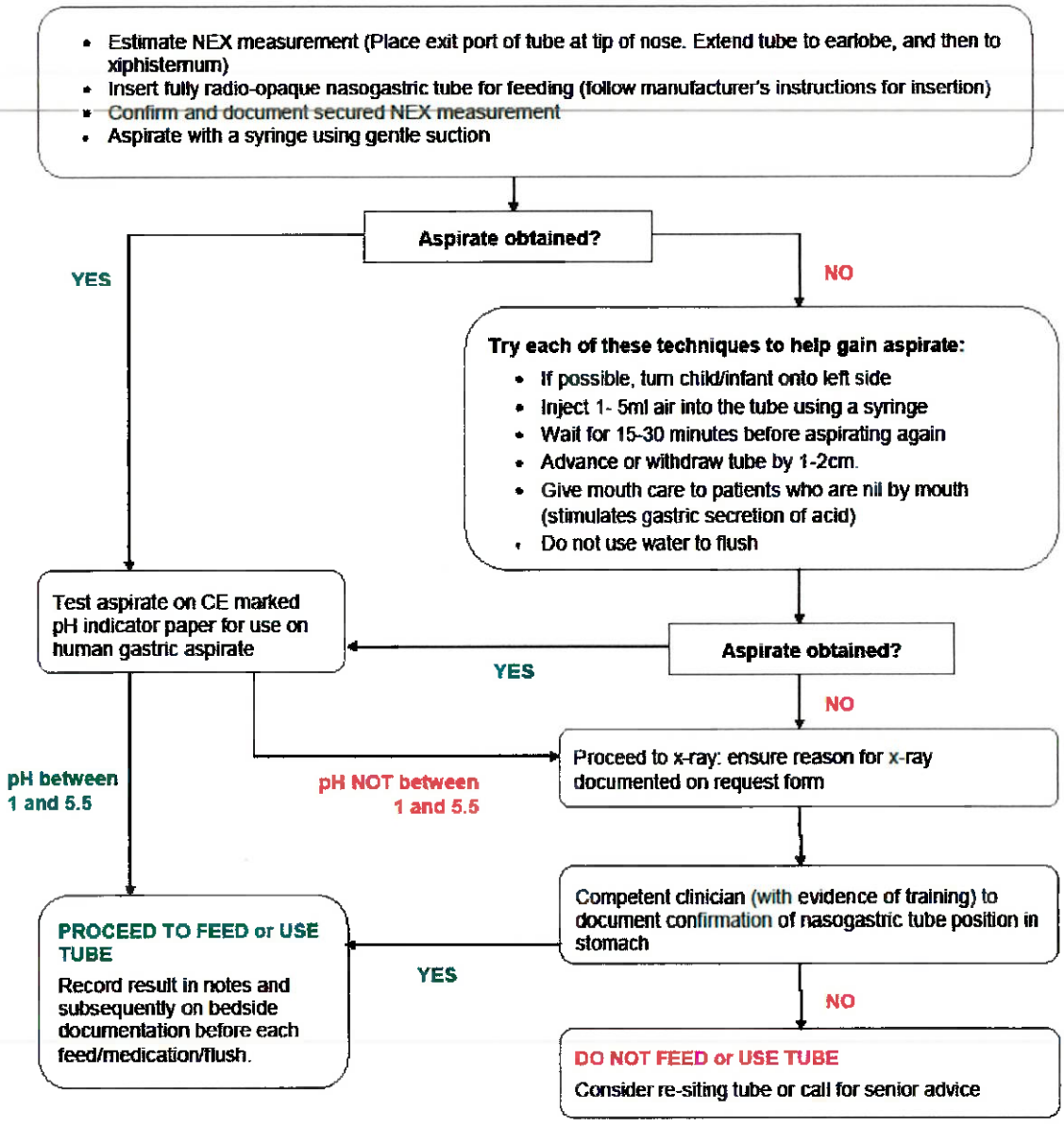
NNNG (2016) Good Practice Guideline- Changing of a balloon gastrostomy tube (BGT) in the stomach for adults and children.

White R and Bradnam, V (2015) *Handbook of Drug Administration Via Enteral Feeding Tubes* 3rd Edition, London: Pharmaceutical Press

APPENDIX 1: DECISION TREE

NHS
National Patient Safety Agency

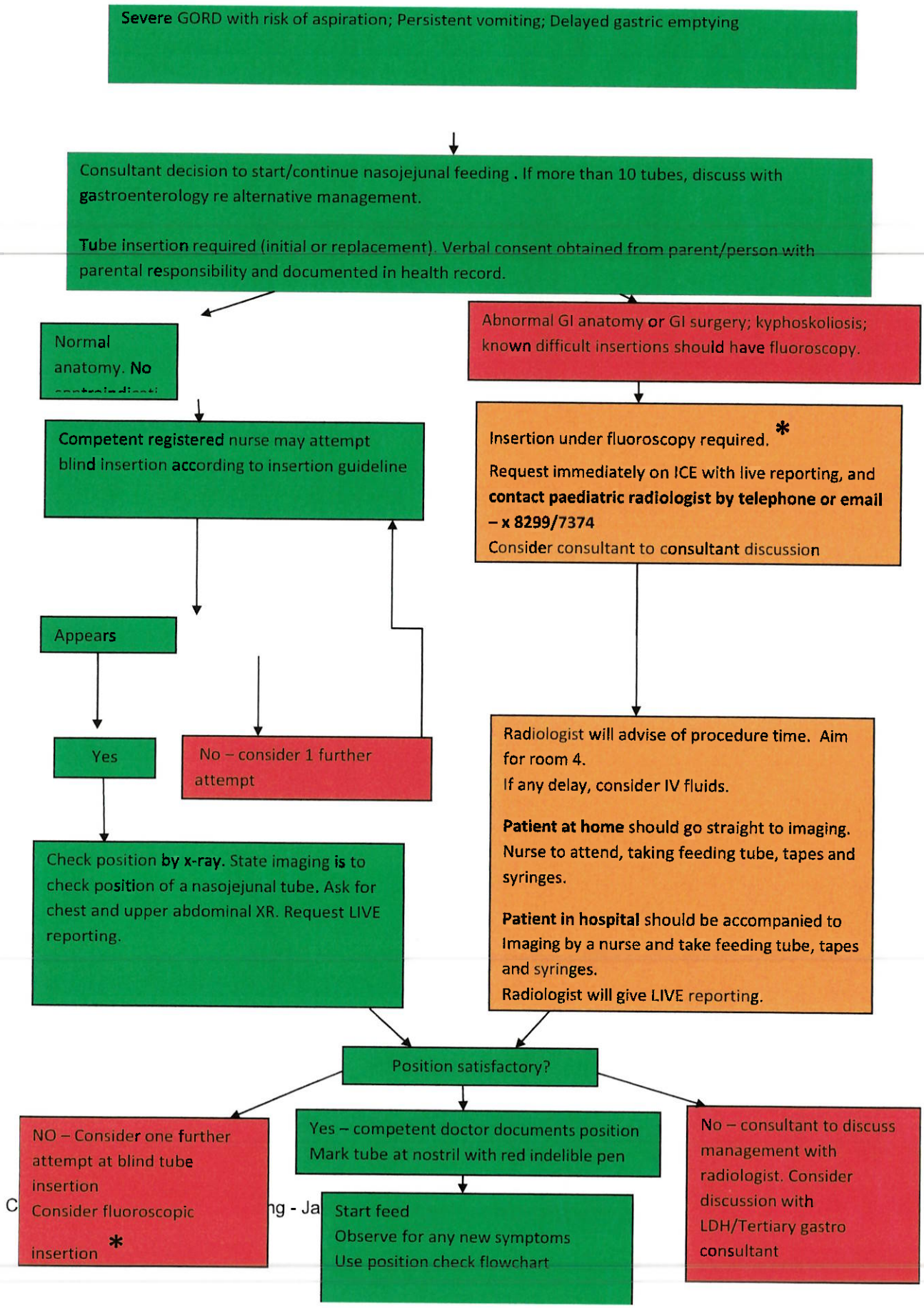
Decision tree for nasogastric tube placement checks in CHILDREN and INFANTS (NOT NEONATES)



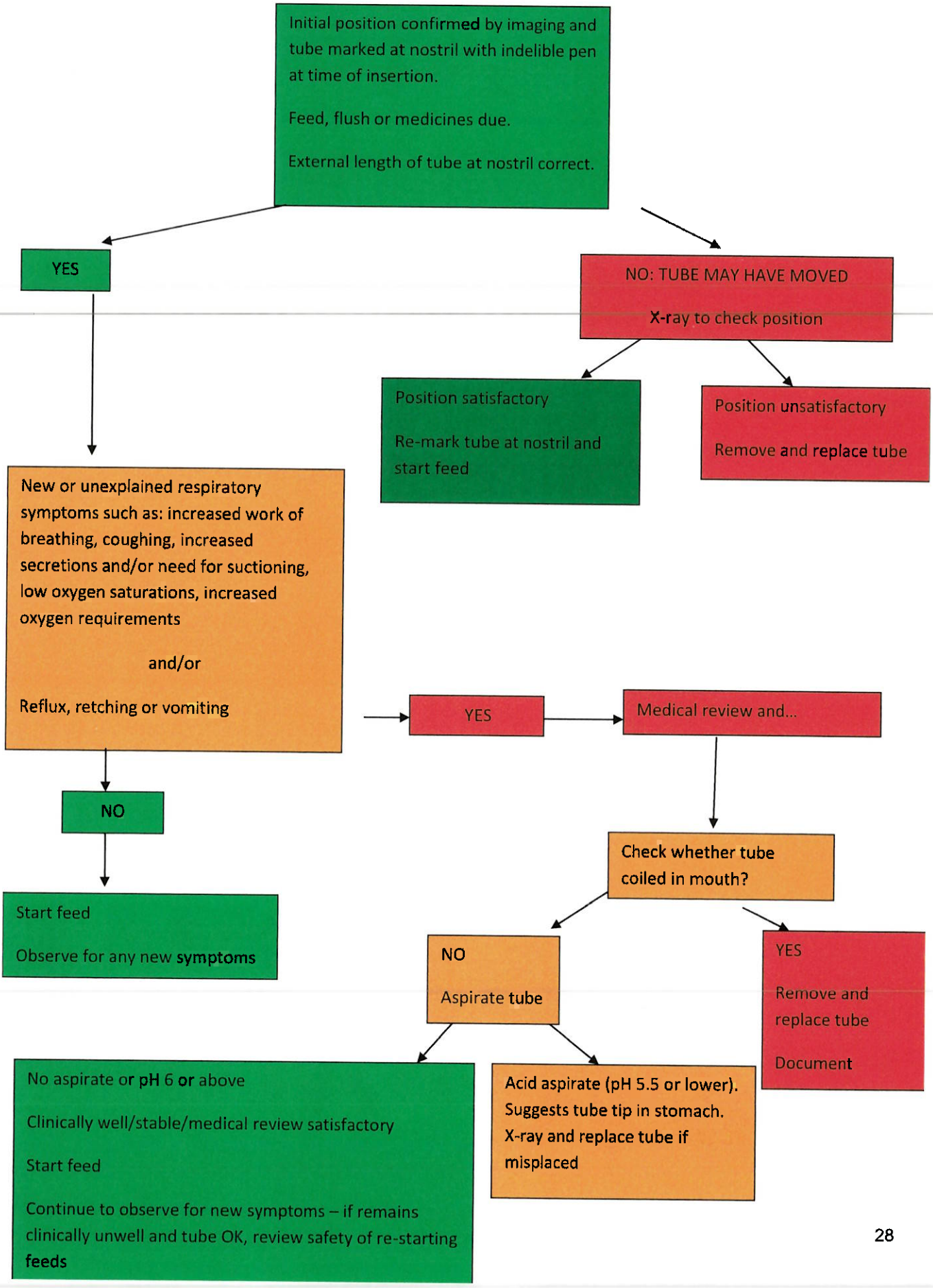
A pH of between 1 and 5.5 is reliable confirmation that the tube is not in the lung, however it does not confirm gastric placement as there is a small chance the tube tip may sit in the oesophagus where it carries a higher risk of aspiration. If this is any concern, the patient should proceed to x-ray in order to confirm tube position.

Where pH readings fall between 5 and 6 it is recommended that a second competent person checks the reading or retests.

APPENDIX 2: PAEDIATRIC NASOJUJUNAL TUBE INSERTION PATHWAY



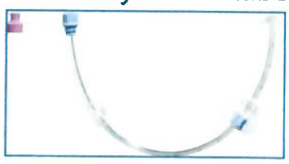
APPENDIX 3: PAEDITRIC NASOJUJUNAL TUBE POSITION CHECK PATHWAY



APPENDIX 4: TROUBLESHOOTING GUIDE FOR PAEDIATRIC FEEDING TUBES

Paediatric feeding tube troubleshoot guide

Identify which tube the patient has



PEG

Button

PEG- J

Mic- J

Tube Type	Problem	Action
All Tubes	New gastrostomy insertion or tube replacement. Pain on feeding. Prolonged or severe pain post procedure. Fresh bleeding. External leakage of gastric contents.	**Stop using the tube. Obtain senior review urgently.** **Refer to paediatric Tertiary centre** See imaging guide Appendix 5
PEG	Split in Tube	Where is split in tube? Above triangle/ near the top of tube: Cut tube just below split, replace tube ends. If very short; inform CNS/ CCN team. Below triangle/ very close to patient: Liaise with CNS or tertiary centre who inserted tube for advice.
PEG	PEG end/ triangle/ clamp broken	Spare stock is kept on the ward to replace these
PEG	Blocked tube	See "blocked PEG step-by step guide Appendix 6"
PEG	Unable to advance/ rotate the PEG tube	Possible buried bumper. Stop feeds. Consult "imaging guide" Appendix 5 Discuss with tertiary centre Consider IV fluids/ oral intake or NG tube- depending on child's situation
PEG	Leaking from stoma site	Consider: fit of tube, is the patient constipated? Has the patient got any "red flag" symptoms?, **If the tube is less than 72 hours old- stop feed, consider imaging (imaging guide Appendix 5)** Are there any signs of infection? If yes, swab site Is there a granuloma? If yes- start treatment. Refer to CNS/ CCN for further management

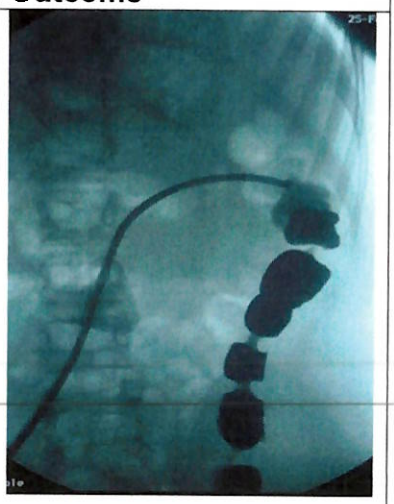
PEG- J	Split in tube	Inform tertiary centre Is the tube leaking milk or just gastric contents?- gather this information to inform tertiary. Consider IV fluids or NJ tube dependant on child's situation.
PEG-J	Jejunal extension has been removed or it is blocked	Contact tertiary centre. Consider IVI or NJ tube dependent on child's situation
Malecot Tube	Tube removed	If less than 6 weeks old- needs urgent surgical referral to tertiary surgeons. NBM Start IVI and ?IVABS Do not try to put anything in the stoma.
Button	Button removed	Follow replacement of button step by step guidance with same size button or g-tube if no button available. MUST check pH after insertion. If no aspirate obtained or pH above 5.0- contrast x-ray must be requested.
Button	Balloon burst	If spare available- replace with spare If none available- use g-tube to replace. If family unhappy, or no g-tube available tape in place until new tube available.
Button	Blocked	If spare available- replace with spare If none available- use g-tube to replace.
Gastro jejunal tube	Patient vomiting feed or pain on feeding	? Has the jejunal tube migrated into the stomach? See imaging guide- Appendix 5
Gastro jejunal Button	Removal or it is blocked	Insert standard mickey button or g-tube to keep stoma open. Contact tertiary centre Consider IVI or NJ tube depending on child's condition

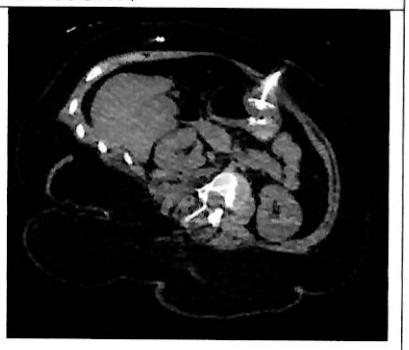
APPENDIX 5 – IMAGING GUIDE FOR GASTROSTOMY & TRANSGASTRIC TUBES

Discuss with paediatric radiologist as soon as possible

Problem	Question	Imaging	Outcome
New gastrostomy insertion or tube replacement. Pain on feeding. Prolonged or severe pain post procedure. Fresh bleeding. External leakage of gastric contents. **Stop using the tube.** **Obtain senior review urgently.** **Refer to paediatric Tertiary centre.**	Is the tube displaced? Is there a perforation? Is there an intraperitoneal leak? Is there a collection or major bleed?	Limited CT of abdomen Or Contrast tubogram Discuss with radiologist best test for the clinical scenario.	Tube tip in peritoneum or subcutaneous tissues. Evidence of perforation. **Stop using the tube.** **Obtain senior review urgently.** **Inform attending consultant.** **Refer to paediatric surgeon.** **Obtain venous access and start fluids and antibiotics.** **Monitor for sepsis.**

Problem	Question	Imaging	Outcome
Abdominal pain on feeding in established PEG tube. Tube may appear shorter than usual. Unable to feel internal fixation device under the insertion site.	Has the tube migrated?	Plain abdominal x-ray (+/- contrast instilled in feeding tube)	 Note internal fixation device is sideways on, has crossed the midline and come back into distal duodenum. **Call paediatric surgeon at Tertiary centre.** **Do NOT use the tube as this will cause pain. Consider IV access and alternative routes for essential medicines.**

Problem	Question	Imaging	Outcome
Gastrostomy tube in situ. When feeds are given it is expelled quickly into nappy/pad or toilet, looking and smelling like enteral feed. **High risk of dehydration**	Is there a gastrocolic fistula?	Plain abdominal x-ray with contrast through tube.	 Internal fixation device is in transverse or descending colon. Contrast fills colon. **Refer to paediatric surgeon at tertiary centre.** **Stop using the tube.** **Consider alternative route for fluids/feeds/medicines.**

Problem	Question	Imaging	Outcome
Unable to advance and rotate an established PEG tube. May be associated with erythema, skin excoriation and induration. Feed may leak from stoma site during feeding.	Is there a buried bumper?	Limited CT of abdomen with contrast through tube.	 Note internal fixation device on PEG tube is fixed within the gastric mucosa. **Refer urgently to a paediatric gastroenterologist at their tertiary centre. If tract is completely closed internally, use a nasogastric tube for feeding and medicines while awaiting definitive outcome.**

Problem	Question	Imaging	Outcome
Child has a Freka PEG-J or balloon retained gastrojejunal tube in situ. Child vomiting feed or appears to have pain on feeding	Has the jejunal tube migrated back into the stomach?	Abdominal x-ray +/- contrast through jejunal lumen. Discuss with paediatric radiologist	 The tube tip can be seen to be in the stomach or otherwise displaced. **Stop using it for feeding. Urgent referral to tertiary centre. Link images via PACS.**

APPENDIX 6 - WHAT TO DO IF A PEG TUBE BECOMES BLOCKED

Enteral feeding tubes can become blocked due to the following:

- Medications being given via the tube that cause a blockage e.g. Clarithromycin
- Feeds – that have not been flushed sufficiently
- Buried bumper

Below is a flow diagram that can be used in the event of an enteral feeding tube becoming blocked:-