Guideline

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Infants and Children Insertion and Confirmation of Placement of Nasogastric and Orogastric Tubes

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Functional Sub group Clinical/ Patient Services - Baby and child
Clinical/ Patient Services - Nursing and Midwifery

Summary This Guideline represents a best practice guide for the insertion and confirmation of placement of nasogastric and orogastric tubes in children and infants in the acute care setting. Further information may be required in practice.

Replaces Doc. No. Infants and Children Insertion and Confirmation of Placement of Nasogastric and Orogastric Tubes [GL2016_003]

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Applies to Local Health Districts, Specialty Network Governed Statutory Health Corporations, Affiliated Health Organisations, Community Health Centres, NSW Ambulance Service, Private Hospitals and Day Procedure Centres, Public Health Units, Public Hospitals, Cancer Institute (NSW)

Audience Paediatric wards, emergency departments, nursing, medical, allied health, clinical staff

Distributed to Public Health System, Divisions of General Practice, Government Medical Officers, NSW Ambulance Service, Ministry of Health, Private Hospitals and Day Procedure Centres, Tertiary Education Institutes

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GUIDELINE SUMMARY

INFANTS AND CHILDREN INSERTION AND CONFIRMATION OF PLACEMENT OF NASOGASTRIC AND OROGASTRIC TUBES

PURPOSE

The *Infants and Children Insertion and Confirmation of Placement of Nasogastric and Orogastric Tubes 1st edition* Guideline provides direction to clinicians and is aimed at achieving the best possible paediatric care in all parts of the state. The Procedural Guideline was prepared for the NSW Ministry of Health by an expert clinical reference group under the auspice of The Office of Kids and Families.

KEY PRINCIPLES

This Guideline applies to all facilities where paediatric patients are managed. It requires the Chief Executives of all Local Health Districts and specialty health networks to determine where local adaptations are required or whether it can be adopted in its current Clinical Practice Guideline format in all hospitals and facilities required to manage insertion and confirmation of nasogastric and orogastric tube placement in infants and children.

The Clinical Practice Guideline reflects what is currently regarded as a safe and appropriate approach to insertion and confirmation of nasogastric and orogastric tube placement in infants and children. However, as in any clinical situation there may be factors which cannot be covered by a single set of guidelines. This document should be used as a guide rather than as a complete authoritative statement of procedures to be followed in respect of each individual presentation. **It does not replace the need for the application of clinical judgement to each individual presentation.**

USE OF THE GUIDELINE

Chief Executives must ensure:

- This Guideline is adopted or local protocols are developed based on the *Infants and Children Insertion and Confirmation of Placement of Nasogastric and Orogastric Tubes 1st edition* Guideline
- Local protocols are in place in all hospitals and facilities likely to be required to insert a nasogastric or orogastric tube in a paediatric patient
- Ensure that all staff treating paediatric patients are educated in the use of the locally developed paediatric protocols.

Directors of Clinical Governance are required to inform relevant clinical staff treating paediatric patients of this revised guideline.

REVISION HISTORY

Version	Approved by	Amendment notes
February 2016 (GL2016_006)	Deputy Secretary, Strategy and Resources	Guideline revised following identified errors in the text and format following publication.
January 2016 (GL2016_003)	Deputy Secretary, Strategy and Resources	New guideline

ATTACHMENT

1. Infants and Children Insertion and Confirmation of Placement of Nasogastric and Orogastric Tubes 1st Edition: Guideline.

Infants and Children
Insertion and Confirmation of Placement of Nasogastric and Orogastric Tubes – 1st Edition

NSW GOVERNMENT Health

GUIDELINE

Issue date: February-2016

GL2016_006

CONTENTS

1 PURPOSE

This guideline is aimed at achieving the best possible care in NSW. This guideline presents the current best evidence for *Insertion and Management of Nasogastric and Orogastric Tubes in Infants and Children.* Its purpose is to inform practice for Australian health care providers.

The document should not be seen as a stringent set of rules to be applied without the clinical input and discretion of the managing professionals. Each patient should be individually evaluated and a decision made as to appropriate management in order to achieve the best clinical outcome.

This guideline is primarily targeted to clinicians caring for infants and children undertaking any task related to insertion and management of nasogastric and orogastric tubes in paediatric acute healthcare.

The systematic review underpinning this guideline was completed in 2014. The guideline was revised between October 2014 and October 2015. Targeted consultation occurred with specialist paediatricians and clinical nurse consultants in gastroenterology, nutrition and eating disorders. Public consultation occurred during August and September 2015. It is recommended that the literature is revisited and this document is reviewed in 2020.

This guideline was developed by a representative group of NSW Paediatric Clinical Nurse Consultants with expertise in acute paediatric care.

No conflict of interest was identified.

In the interests of patient care it is critical that contemporaneous, accurate and complete documentation is maintained during the course of patient management from arrival to discharge.

Respecting the difference – be aware of cultural differences of Aboriginal people. Refer to your local Aboriginal liaison officer or for further information see NSW Health Communicating positively – A guide to appropriate Aboriginal terminology.

2 SCOPE

This document is for use with ***term newborns*** through to children up to age 16 years. It does not cover issues around enteral nutrition for infants and children. All clinical staff involved in the medical or surgical management of infants and children are required to be knowledgeable in safe insertion and use of gastric tubes in children. Education and training to facilitate acquisition of knowledge and practical skill for gastric tube insertion and care before undertaking an insertion of gastric tubes is vital. Please refer to the e-learning program SKIP for baseline education.

This document is intended to guide health professionals within healthcare facilities in the insertion and confirmation of placement of gastric tubes. The principles of gastric tube management remain the same in any setting however, in primary healthcare settings local care pathways appropriate to circumstances may require development.

This guideline excludes Nasojejunal tubes inserted under radiological guidance.

3 DEFINITIONS

A gastric tube is a tube passed into the stomach via the nose or mouth as a means of meeting a patient's nutritional needs, administering medications, rehydration and decompression of the stomach.

Gastric tubes are short or long term devices that can come with or without a guide-wire. The manufacturer's recommendations must be followed to ascertain maximum dwell times and specific instructions regarding insertion.

4 CONTRAINDICATIONS AND CAUTIONS

Gastric tube insertion ***should not be performed without consultation with the medical consultant responsible*** for the patient's care in the following situations:

- The postoperative period – any reinsertion of a gastric tube required following recent surgery to the mouth, pharynx, oesophagus or stomach
- Known structural abnormality e.g. choanal atresia
- Recent caustic ingestion
- Suspected spinal injury
- Known or suspected oesophageal varices, chronic liver disease or liver failure
- Upper gastrointestinal stricture/oesophageal stricture /obstruction
- Suspected nasal, maxillary, oropharyngeal or oesophageal trauma
- Suspected base of skull fractures
- Bleeding disorder.

If a gastric tube is required to be inserted in any of the above circumstances, the medical consultant responsible for the patient's care should direct the method and personnel to perform the procedure (e.g. radiologist under radiological guidance, anaesthetist or delegate under direct vision, surgeon or delegate, experienced nurse).

Insertion of a gastric tube into an infant or child, particularly the above situations and in those with no or diminished reflexes, may cause accidental insertion into other anatomical structures. Special considerations include infants and children with:

- Altered level of consciousness
- Diminished or absent gag reflex and/or impaired swallow
- Significant developmental delay
- Use of anticoagulants or impaired blood clotting
- Tracheostomy in situ
- Gastro-oesophageal reflux
- Chronic eating disorders with vomiting.

If any of the above are present discuss with senior nursing or medical staff to ensure risks are addressed.

4.1 Insertion Risks

Tube misplacement can result in adverse patient outcomes including severe disability and death. These risks include:

- Pneumonitis from gastric feeds being deposited into the lungs
- Intracranial insertion in infant/child with base of skull disruption
- Aspiration associated with tube dislodgement
- Trauma to surrounding tissues
- Pneumothorax
- Spontaneous passage through pylorus, causing feeding intolerance, abdominal pain, poor absorption of medications given via tube and diarrhoea.

5 KEY RECOMMENDATIONS

- ✓ Removal of Litmus paper from all clinical areas and removal from the standard stores orders [1]. Replacement with narrow range pH paper (around 2.0-9.0) in minimum 0.5 increments [2].
- ✓ Threshold for "positive placement confirmation" pH reduced to 4.0 or less [2].
- ✓ Immediate change to tube measurement using Nose-ear-mid-umbilicus (NEMU) instead of Nose-ear-xiphoid (NEX) [3]. For details of measurement, please refer to Step 1 of Procedure for Insertion on Page 4.
- ✓ Incorrect and potentially dangerous techniques for confirming tube placement such as gas insufflation/auscultation, secretion colour and litmus paper **must not be used** [2].

6 PREPARATION AND PROCEDURE FOR GASTRIC TUBE INSERTION

It is important to prepare the child and carer for the procedure with a clear and age appropriate explanation of goals, timeframes, and expected outcomes. Informed verbal consent must be obtained prior to the procedure and documented in the healthcare record. Minimise anticipatory anxiety by preparing all equipment before commencing a brief and honest explanation to the child and immediately prior to the procedure. If there is a nasogastric tube insitu, the alternate naris (nostril) should be used for reinsertion.

The procedure should, if possible, take place in a treatment room. This is to preserve the child's bedspace as a safe environment, free from painful or unpleasant procedures.

Undertake patient observations pre and post insertion of the gastric tube. Observations must include heart rate, respiratory rate and be documented on the Between the Flags Observation Chart (SPOC/PEDOC/SNOC/eMR).

This procedure can be uncomfortable. Consider prescribing and administering procedural analgesia as per local protocol (e.g. oral sucrose for infants) pre and/or during procedure.

Whilst sedation may be useful in selected infants and children, extreme care must be used as all forms of sedation have the potential to impair gag and/or swallow reflexes and increase the risk of gastric tube misplacement.

For older children with a dry mouth but impaired gag reflex, moisten the mouth with a mouth swab prior to requesting them to swallow or ask them to sniff to lift the soft palate.

Where appropriate and with carer consent allow infants to suck on a dummy during the procedure to facilitate swallowing.

Where developmentally and medically appropriate, asking children to sip iced water through a straw facilitates swallowing and provides a helpful focus for distraction during the procedure.

Prior to commencing the procedure refer to Pre-procedure Checklist (Appendix 4.1).

6.1 Guide to gastric tube sizes

Tube size	Feeding	Decompression
Newborns	6FG	8FG
Infants and children up to 5 years	8FG	8-10FG
Children over 5 years	8-10FG	10-14FG
Special consideration to tube size selection should be given to children with developmental or physical delay, and others who are very small for age as a smaller tube may be indicated.		

6.2 Positioning

A member of staff may be required to hold the infant or child during insertion of the tube. Distraction therapy may be used to help a young child develop coping strategies – a carer can carry this out if required. Bubbles, action toys or guided imagery for older children work well. See Child Life Therapy: Procedure Support SCH Practice Guideline for more information. Consider giving sucrose to an infant as per local protocol. If available, a Child Life Therapist (Play Therapist) may be involved in this procedure.

Wrap an infant in a sheet or cuddly as per diagram 1. A toddler or child should be positioned in a sitting position as tolerated. Placing young children in the sitting position securely held by their carer (therapeutic holding)[4] as per diagram 2 helps facilitate correct tube placement and allows the child to maintain some sense of control over the procedure. The child should not lean forward, nor should the neck be extended.

Diagram 1 – wrapping an infant

Diagram 2 – holding a child in a seated position

6.3 Procedure for insertion

Ensure the procedure is clinically indicated and that assessment has been carried out to exclude contraindications or potential complications or as per local standing order.

The following insertion instructions are for the insertion of a nasogastric (NG) tube.
If an orogastric tube is required the principles remain the same, however, the tube is inserted via the oropharynx

5 MOMENTS OF HAND HYGIENE | **CONSENT** | **PERSONAL PROTECTIVE EQUIPMENT** | **ANALGESIA** | **CHECKLIST**

Step 1: Measure tube from the tip of the nose to the bottom of the ear lobe and to the observed midpoint between the xiphoid process and the umbilicus [3]. (as per diagrams 3 and 4). The length of insertion should be noted in the child's clinical record.

Step 2: Lubricate the end of the tube with a water based lubricant (PVC tubes) or activate the lubricant of a polyurethane/silicon tube by ***following the manufacturer's instructions*** carefully.

Step 3: Examine the nostrils for patency to determine best side for insertion. If age appropriate, ask the patient if they have had any problems with either side of their nose, e.g. sinusitis can increase irritation from the naso gastric tube. In younger children gently occlude each nostril separately and insert the tube in the nostril with the best airflow.

Step 4: Gently insert into one nostril and advance tube posteriorly aiming the tube parallel to nasal septum and superior surface of hard palate. Advance to nasopharynx, allowing tip of tube to seek its own passage into oesophagus and stomach until measured marking is reached (as per diagram 5).

Step 5: Where age appropriate, instruct or encourage (using dummy with consent/oral sucrose as per local protocol) the patient to swallow and advance the tube as the patient swallows. For infant or child with intact gag reflex swallowing small sips of water may enhance passage of tube into oesophagus.

Step 6: Observe infant or child for excessive gagging, coughing, wheezing, apnoea or colour change during placement. This may indicate passage of tube into trachea. If suspected, withdraw tube and re-advance once child is stable and comfortable.

Step 7: If resistance is met, withdraw the tube 1-2 cm and rotate it slowly with downward advancement directed toward the closest ear. Never force the nasogastric tube.

Whilst gagging and signs of respiratory distress are obvious indicators of incorrect placement, the absence of signs, particularly when using fine bore gastric tubes or when inserting in an infant or child with altered consciousness, swallow or gag does not indicate correct placement.

Should placement, maintenance, and ongoing verification of a gastric tube become hazardous, risking the patient's health, consideration of alternative methods for delivery of nutrition and medications is necessary.

Diagram 3 – Firstly measure using the tube from the tip of the nose to the bottom of the ear lobe

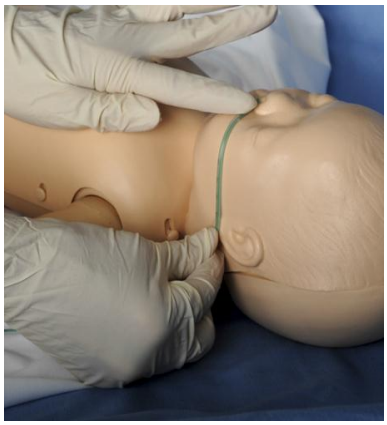


Diagram 4 – Secondly measure from the bottom of the ear lobe to the observed midpoint between the xiphoid process and the umbilicus

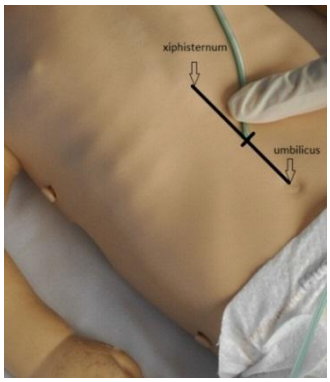


Diagram 5 – Gently insert into one nostril and advance tube posteriorly aiming the tube parallel to nasal septum and superior surface of hard palate

6.4 Process for confirming placement

Step 1: Note external length of tube at nostril. Gently aspirate a small quantity of gastric fluid from the NG tube with the smallest practicable syringe size (generally a 2.5mL syringe)[20] and check pH on pH indicator paper.

⇩

Step 2: Aspirated stomach contents usually have a pH of 1.0 – 4.0, and is considered "safe" as no other body fluid naturally has a pH in this acidic range. pH less than or equal to 4 indicates correct placement.

If the child is on acid suppressing medications or on continuous feeds, this range may be significantly altered [2]. See section 6.5 regarding the checking procedure in this group of infants and children.

⇩

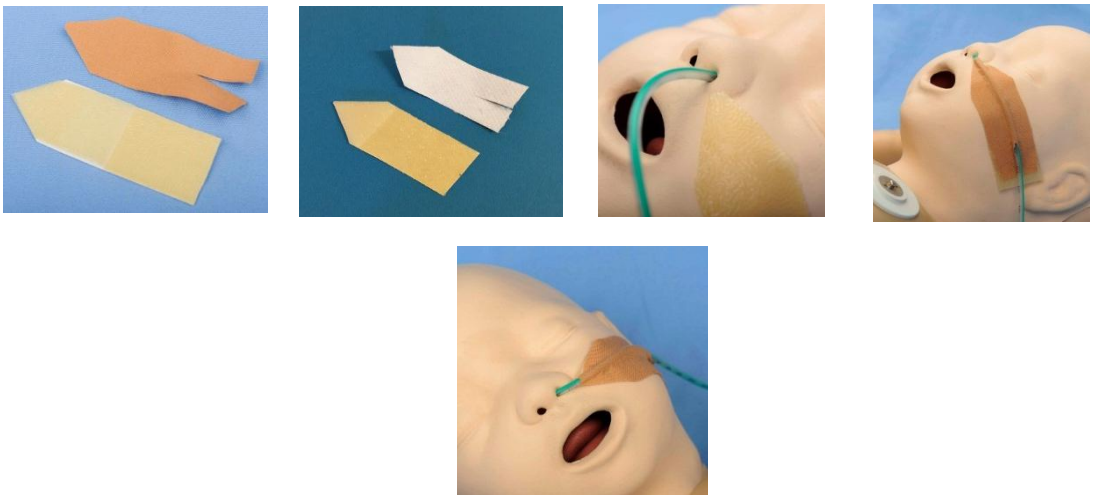
Step 3: Ensure external length of tube remains unchanged from step 1. Anchor the remainder of the tube with tape (brown tape/hyperfix as per diagram 7) and secure to the patient's clothes.

⇩

Step 4: Consider an x-ray prior to commencement of feeds on all new insertions in 'at risk' infant or child. pH testing may give false negatives for initial confirmation of placement in the presence of acid suppression therapy
'At risk' infants and children include those:

- on gastric acid pump inhibitors
- on gastric pump continuous feeds
- with diminished or absent gag reflex (e.g. children with developmental delay, neuromuscular disorders, bulimia)
- with an altered level of consciousness.

Diagram 7 – suggested taping for securing NG



DO:

- ✓ Follow the steps set out in the attached algorithm for checking gastric tube position
- ✓ Consider medical imaging to check placement of tube if pH is not less than or equal to 4.0 [5]
- ✓ Test pH of aspirate using pH indicator strips. Indicator strips with 0.5 gradations with a narrower range of 0 - 6, 3 - 9 or 1 - 11 are recommended
- ✓ Check exit–point mark at nose for signs of any tube migration

The following techniques **do not confirm** placement and **MUST NOT BE USED**:

- × auscultation of air insufflated through the feeding tube (the 'whoosh' test)[2,6,7,8]
- × absence of respiratory distress [9,10,11]
- × blue litmus paper to test the acidity or alkalinity of aspirate. It is not sufficiently sensitive to distinguish bronchial from gastric secretions[12]
- × bubbling at the proximal end of the tube[13]
- × appearance of the feeding tube aspirate[14,15]

6.5 Infant or child on gastric acid pump inhibitors and /or continuous gastric feeds

Infant/child who are on acid pump inhibitors and continuous feeds need to have a specialised care plan developed in consultation with the treating consultant to determine appropriate tube confirmation techniques

Acid pump inhibitors and continuous gastric feeds will alter the pH to a more alkaline state (4.0-7.0). If the gastric pH on initial insertion is found to be greater than 4.0 a senior medical official must be notified. Individual risk assessment will determine if a gastric pH up to 5.0 will be acceptable confirmation of placement or whether additional medical imaging is required to confirm placement. **Appropriate medical imaging must always be used to confirm initial placement if pH greater than 5.0.**

Ongoing confirmation of gastric placement by pH testing utilising patient specific benchmarking of gastric pH may be deemed acceptable by the patient's consultant medical officer. This acceptable pH must be clearly documented in the patient's healthcare record by the treating medical officer. Gastric pH levels particularly those above 5.0 to confirm gastric tube placement significantly increase the risk to the patient as some fluids found in the respiratory tract have a pH as low as 5.5 and salivary pH has a normal range of 6.3-7.4.

Where clinically appropriate, infants and children on continuous feeds should have consideration given to scheduled pauses in feeding compensated by higher flow rates at other times to allow gastric emptying and testing of gastric pH.

Any alteration of acceptable pH will decrease the margin of safety for correct gastric tube placement. Such risks weighed against the risks of ongoing exposure to radiation or repeated ultrasound examination must be explained to the patient or their legal guardian and their consent clearly documented in the healthcare record.

It is recognised that the best method of determining gastric tube location is provided by reliably obtained and interpreted X-ray that visualises the entire course of the tube [2,5]. However, many factors, including exposure to radiation, delay in obtaining and interpreting radiographs and risk of tube misplacement while moving the infant or child contribute to the need for other reliable methods for confirming tube placement.

Consider ultrasound confirmation in chronic, complex infants and children. The choice to use pH 4.5-5.0 must be by a senior clinician only in individual cases with risks and benefits explained to infant/child/carers and consent obtained.

6.6 Post-procedure / Documentation

Comfort the infant or child and dispose of all equipment according to local standards.

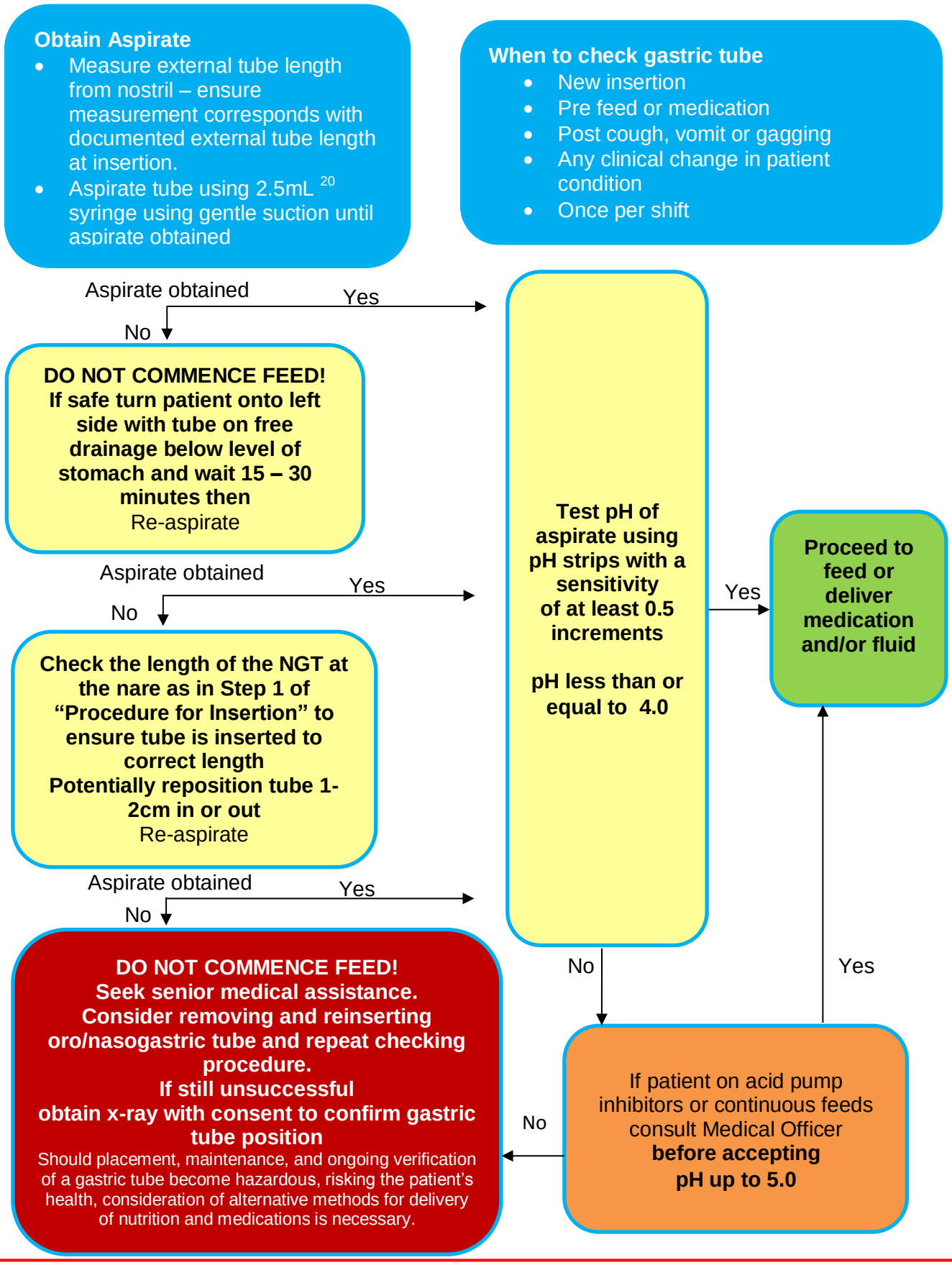
Undertake patient observations which must include heart rate, respiratory rate oxygen saturations. Document the observations on the Between the Flags Observation Chart (SPOC/PEDOC/SNOC/eMR).

Document the procedure in the patient's healthcare record, noting the tube type, size, date, aspirate amount, pH, and colour. Note the type, size and external length of the gastric tube on the nursing care plan. Notify the relevant medical officer of any problems or abnormalities, e.g. faecal fluid.

6.7 When to re-check the gastric tube position?

- ✓ Before administering each feed and/or giving medication
- ✓ At least once per shift during continuous feeds or as per medical officer orders
- ✓ Following episodes of respiratory distress vomiting, retching or coughing. Note: the absence of coughing does not rule out misplacement or migration
- ✓ If suspicion of tube displacement, e.g. poor tolerance to feed, reflux of feed into the throat, discomfort in the throat, change in tube length is suspected
- ✓ Any change in clinical condition.

6.8 Algorithm for checking gastric tube position



7 APPENDICES

7.1 Appendix 1: Pre and Post procedure checklist

Where two or more staff members are involved, they must introduce themselves to each other and the patient and carer, as appropriate, by their preferred names and roles before the procedure commences.

Stop and confirm the following before commencing the procedure:

☐ Consent as per Level 1 Clinical Procedure Safety Policy (PD2014_036)

☐ Patient identification

☐ Procedure verification

☐ Allergy / adverse reaction check

☐ Anticipated critical events
- Planned procedure
- Critical steps
- Anticipated events
- Equipment requirements

Please refer to Clinical Procedure Safety Policy (PD2014_036) for further details.

Post procedure checklist

☐ Document procedure findings in patient healthcare record making note of tube type and size

☐ Document external length of tube at nostril

☐ Positive confirmation of correct placement including method of confirmation

☐ Post insertion observations (including pain score)

☐ Note any problems and/or abnormalities encountered

7.2 Appendix 2: References

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7.3 Appendix 3: Further Resources

Parent Fact Sheet *Tube Feeding – Caring for your child's Nasogastric tube*

7.4 Appendix 4: Glossary

SPOC	Standard Observation Paediatric Chart
PEDOC	Paediatric Emergency Department Observation Chart
SNOC	Standard Newborn Observation Chart
eMR	electronic Medical Record

7.5 Appendix 5: Working Party

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