Paediatric Home Enteral Nutrition (HEN)

Tube Feeding

A Multidisciplinary Resource for Health Professionals

February 2013

Kids on HEN Working Party
Forward

The ‘Paediatric Home Enteral Nutrition (HEN), Tube Feeding, A Multidisciplinary Resource for Health Professionals’ was developed as part of the Kids on HEN (KOH) Project 2012 - 2013, funded by the Western Child Health Network (WCHN).

This resource was produced to assist Dietitians, Nurses, Speech Pathologists and Medical Officers with the management and coordination of Paediatric HEN.

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Also attached to this resource are tools developed by the KOH working party to improve communication around and the coordination of care:
- Parent / Carer HEN Education Checklist
- Paediatric Discharge on HEN Checklists
- HEN Summary

and a series of Parent/Carer Factsheets on Paediatric HEN.

Special recognition and gratitude to the Working Party members who contributed to the KOH project:

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### Scope

This document ‘Paediatric Home Enteral Nutrition (HEN) - Tube Feeding - A Multidisciplinary Resource for Health Professionals’ is designed to provide guidance on the management of paediatric HEN.

It includes:
- introducing,
- assessing,
- planning,
- implementing,
- monitoring,
- managing,
- transitioning and
- terminating HEN.

This document does not cover:
- oral nutrition support or
- parenteral nutrition

The term HEN refers to home enteral nutrition and home tube feeding.
HOME ENTERAL NUTRITION - Introduction

What is Enteral Nutrition?

Enteral Nutrition is the delivery of a liquid nutrition formula directly into the gastrointestinal tract, via a feeding tube, inserted through the nose, stomach or jejunum.

What is Home Enteral Nutrition (HEN)?

The provision of enteral nutrition in the home setting is called Home Enteral Nutrition (HEN). HEN allows enterally fed hospital patients, who are otherwise medically stable, to be discharged into the community.

Multidisciplinary HEN teams

The best care of the patient receiving HEN will occur when the primary care physician is working with a nutrition support team, comprising of a: ¹

- medical practitioner,
- nurse,
- dietitian,
- stomal therapist and
- speech pathologists.

Decisions regarding patient selection and the ongoing management of HEN should be made jointly/ in consultation with the nutrition support team.

While the way in which each discipline is involved will vary at each stage according to specific expertise, local policies and procedures, at a minimum all patients should have access to a team with the knowledge and skills to: ¹ ² ³

- assess nutritional status
- estimate nutritional requirements
- monitor nutritional intake
- place, replace and remove feeding tubes
- advise on drug interactions and stability
- advise on appropriate formula
- advise on HEN consumables and equipment
- manage feeding tubes
- manage stoma sites
- troubleshooting.

A successful team can be characterised by its: ⁴

- Patient and family / carer centred approach
- Commitment to evidence based practice
- Consistency of practice based on well researched procedures and protocols
- Attention to recording and monitoring progress and outcomes
- Timely communication between Health Professionals and Health Professionals and Parents / Carers that is consistent, clear and unambiguous.
- Ability to maximise the individual attributes of each team member thereby enabling team goals to be achieved
• Collaborative approach at all levels ranging from between individual ward staff to liaising with other clinical teams
• Creativity in providing service which is flexible and responsive to both clinical and organisational change. This is achieved by continually monitoring and reviewing the way in which the service is provided in the context of the demands placed on it.

HEN teams operating within hospitals have demonstrated that their involvement can: 4.
• improve standard of care
• increase cost effectiveness
• ensure appropriate training and counselling of the patient/ or carer
• reduce complication rates

Selecting HEN patients

The preferred route of nutrition support is by mouth, unless otherwise indicated. Health professionals should consider enteral / tube feeding in infants / children who are malnourished or at risk of malnutrition and who have:
• inadequate or unsafe oral intake
• a functional accessible gastrointestinal tract

Figure 1. An algorithm for nutrition support planning. 5.

Additional considerations may include: 3.
• the improvement in quality of life for the child and family
• the ability of the family to cope with the lifestyle changes required
• the ability of the parent / carer to adequately learn and perform the procedures required
• the suitability of the family home in terms of sanitation and access to utilities
• the family’s socioeconomic status and their understanding of the ongoing costs of HEN
Indications for Paediatric HEN / Enteral Nutrition?

Enteral nutrition should be considered when an infant/child is not safe for oral intake or when oral intake is not adequate to meet their nutritional requirements. Indications may include but are not limited to: 1, 3, 6, 7, 8, 9.

**Impaired ability to ingest nutrients eg**
- oropharyngeal, oesophageal dysfunction, cleft palate/ lip
- neurological disorders eg brain injury, trauma, cerebral palsy

**Impaired absorption of nutrients eg**
- surgical resection / bypass eg gastrectomy, small bowel resection
- inflammatory disordered eg crohn’s disease
- short bowel syndrome
- gastrointestinal fistulae
- radiation enteritis

**Swallowing disorders eg**
- oropharyngeal dysphagia eg neuromuscular conditions, neurodegenerative conditions, congenital abnormalities

**Increased / specialized nutrition requirements eg**
- chronic pulmonary disease eg cystic fibrosis
- chronic renal failure
- anorexia nervosa
- HIV / AIDS
- metabolic and haematological disorders
- trauma
- liver failure

**Failure to thrive**
- Non-organic, the most common type, for which there is no identifiable medical disorder eg
  - poor feeding techniques
  - social factors (eg maternal depression, child abuse/ neglect, parental drug/ alcohol abuse, emotional or psychosocial deprivation)
  - poor child-carer interactions
  - lack of carer nutrition knowledge
  - infantile anorexia
  - food refusal or aversion
  - improper formula preparation
  - delayed introduction of solids
- Organic, less common type, occurs when there is the presence of an underlying illness or organ system dysfunction eg
  - congenital/ anatomical (eg, congenital syndromes, chromosomal abnormalities, congenital heart disease, pyloric stenosis).
  - infectious (eg, hepatitis, tuberculosis, human immunodeficiency virus, parasitic infection, urinary tract infection).
  - toxic/drugs (eg, lead/mercury poisoning, foetal exposure to alcohol).
  - genetic/metabolic (eg, malabsorption (including lactase deficiency or coeliac disease), cystic fibrosis, diabetes mellitus, thyroid, parathyroid, adrenal or pituitary disease, hypercalcemia, chronic renal insufficiency)
- allergic/inflammatory (eg, food allergies, inflammatory bowel disease, chronic lung disease)
- functional (eg, gastro-oesophageal reflux, chronic constipation, dental infection/caries)
- neurologic (eg, cerebral palsy, developmental delay, down’s syndrome, oro-motor dysfunction, degenerative diseases)
- haematologic (eg sickle cell disease, thalassemia)

**Certain genetic disorders**
- HEN maybe required for some infants / children diagnosed with certain genetic disorders eg
  - Down’s syndrome, Angelman syndrome, Di George syndrome, Pierre Robin syndrome, Agenesis of corpus callosum etc

**Gastro oesophageal reflex disease (GORD)**

**Inborn errors of metabolism** eg.
- Phenylketonuria (PKU)

**Contra indicators**

**General contra indicators may include:**
- Severe gastro-oesophageal reflux or vomiting. Caution is required if enteral feeding is established. May need to investigate need for alternative feeding route or fundoplication.
- Inadequate gastro-intestinal tract functioning including stricture, fistula or bowel obstruction.
- Inaccessible gastro-intestinal tract.
- Unconscious, comatose patient

**Oro/ nasogastric tubes specific contraindications may include:**
- Post fundoplication or oesophageal atresia repair
- Post oesophageal/ head and neck surgery
- Severe maxillary trauma/ nasal injuries/ possible base of skull fractures
- Plastics reconstruction to mouth, nose or oropharynx
- Suspected spinal injury
- Oesophageal varices or signs of long standing liver failure including hepatomegaly, Wernicke-Korsakoff's syndrome, telangiectasia
- Upper gastrointestinal stricture/ obstruction

In extenuating circumstances, there may be a need to insert an oro/ nasogastric tube in infants/ children with the above conditions. It is suggested that only a Senior Medical Officer experienced in the insertion of oro/ nasogastric tubes within these specific circumstances perform the procedure.
Figure 2. The Patient Pathway for HEN Service.

1. The above should be used as a guide.
   Infants and young children may need more frequent reviews as their:
   • growth
   • requirements and
   • tolerance/stability on HEN can change quickly. 3, 8, 9.
The HEN Assessment

Any potential HEN patient should have a comprehensive, well-documented assessment by a multidisciplinary paediatric HEN team. The assessment should include but not be limited to:

**Clinical / medical history**

The assessment should include: 1. 6. 7. 8. 11.
1. underlying disease
2. concurrent medical and surgical problems that may affect nutrition requirements
3. age
4. metabolic demands including growth requirements
5. fluid requirements

**Medications and supplements**

The assessment should include: 1. 3. 6. 7. 8. 11.
1. Consideration of the method of delivery of medications and supplements
2. HEN patients should have regular medical reviews to determine if the current drug formulation, route and timing of administration is appropriate and without contraindications for the feeding regimen or swallowing process.

**Nutrition assessment**

A nutritional assessment should be undertaken by an experienced paediatric dietitian. The assessment should include: 1. 3. 6. 7. 8. 11.
1. recent changes in dietary intake (quantitative and qualitative)
2. gastrointestinal symptoms and problems (including nausea, vomiting, diarrhoea, constipation and anorexia)
3. Individual nutrient requirements

**Anthropometry**

The following anthropometric measures should be assessed: 1. 5. 6. 8. 11. 12.
1. Weight (bare weights in infants), height (length in infants), BMI; serial measures are required for a full assessment
2. weight history: usual body weight; changes in weight
3. parental stature
4. percentile growth data
5. head circumference
6. if body weight cannot be measured, an estimation of body weight should be obtained from family or carer.
7. if height cannot be measured, an estimation of height can be obtained using eg knee height, demispan.
Biochemical data

At baseline the following biochemical data should be assessed: 2. 6. 8. 11.
1. albumin, prealbumin, total protein and C-reactive protein
2. urea and creatinine
3. electrolytes
4. glucose
5. mineral status
6. liver function
7. iron studies

Social considerations

The home environment and the parent/ carer’s ability to cope with the necessary procedures including: 1. 3. 7. 8. 11. 12.
1. psychosocial factors (eg social support; eating disorders, language barriers; family dynamics; personal, ethnic, cultural, or religious dietary prescriptions; substance abuse; psychiatric disorders)
2. socioeconomic factors (eg the family’s financial situation)
3. patient preferences and directives with regard to intensity and invasiveness of care; emotional response to current illness
4. the patient's home environment
5. educational level or learning ability

Activity pattern and lifestyle

Consideration should be given to the practically of HEN for the family. Health professionals should work with the parent/ carer to negotiate the most practical way to implement HEN, not only into the home environment but perhaps more importantly, into the family’s lifestyle ie the feasibility of 24 hour continuous feeding in the home setting. 6. 7. 8. 11. Consideration should also be given to childcare, school, and respite care.

Assessment of dysphagia

The assessment: 1. 2. 6. 7. 8
1. Any infant / child who presents with any indicators of dysphagia or feeding impairment should be referred to:
   • a Medical Officer as feeding problems are typically multi factorial and
   • a Speech Pathologist for diagnosis, assessment and management of swallowing disorders.
2. The Speech Pathologist should regularly monitor, review and reassess patients with dysphagia who are having modified food and liquid.
3. Patients with dysphagia should have a drug review to ascertain if the current drug formulation, route and timing of administration remains appropriate and is without contraindications for the feeding regimen or swallowing process.

The results of the assessment and recommendations should be documented and shared with all health professionals involved in the child’s care as well as the infant / child’s parents / carers including childcare, school and respite care. 1. 3. 5. 6.
HEN Planning

Enteral feeding tubes may enter the body at a number of different sites. The choice of feeding route depends on several factors such as the intended duration of use, safety, efficacy, the infant / child’s clinical condition and any limitations to access eg obstructions or trauma.

Figure 3. Routes of Administration / Enteral Feeding

- Nasogastric
- Orogastic
- Nasojejunal
- Trans-gastric jejunal
- Jejunostomy
- Percutaneous endoscopic gastrostomy
- Low profile / skin level gastrostomy

Diagram:
- Tube feeding
  - Gastric
    - Orogastric
    - Gastrostomy
  - Duodenal
    - Nasoduodenal
  - Jejunal
    - Nasojejunalostomy
      - Trans-gastric jejunal
      - Jejunostomy
<table>
<thead>
<tr>
<th>Device</th>
<th>Route</th>
<th>Indication</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyvinyl Chloride</td>
<td>Nasogastric</td>
<td>• Children unable to maintain adequate oral nutrition</td>
<td>• Cost efficient</td>
</tr>
<tr>
<td>(PVC)</td>
<td></td>
<td>• Children requiring short term supplements or fluid replacement</td>
<td>• Green x-ray line if required</td>
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<td></td>
<td></td>
<td>• Short term feeding</td>
<td>• Dwell time as per manufacturer’s recommendations.</td>
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<td>• Patient should have intact gag reflex</td>
<td>• Requires flushing post feeds</td>
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<td>• Easy to aspirate</td>
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<td></td>
<td>• Different lengths</td>
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<td></td>
<td>Orogastric</td>
<td>• Premature infants less than 34 weeks who are obligatory mouth breathers</td>
<td>• Placement must be confirmed before each use</td>
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<td></td>
<td></td>
<td>• Children unable to maintain adequate oral nutrition</td>
<td></td>
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<td></td>
<td></td>
<td>• Children requiring short term supplements or fluid replacement</td>
<td>• Facial taping required</td>
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<tr>
<td></td>
<td></td>
<td>• Short term feeding</td>
<td>• Increased risk of aspiration</td>
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<td></td>
<td></td>
<td>• Not well tolerated in patients with delayed gastric emptying or gastroparesis</td>
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<td></td>
<td>• Exacerbation of gastro oesophageal reflux.</td>
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<tr>
<td>Polyurethane</td>
<td>Nasogastric</td>
<td>• Children unable to maintain adequate oral nutrition</td>
<td>• Less cost efficient than PVC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Medium to long-term nasogastric feeding pending possibility of more</td>
<td>• May have weighted metallic tip</td>
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<td></td>
<td></td>
<td>permanent device</td>
<td>• Guide wire for ease of insertion</td>
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<td></td>
<td></td>
<td>• Dwell time as per manufacturer’s recommendations.</td>
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<td></td>
<td>• Can be difficult to aspirate</td>
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<td>• Don’t use a syringe smaller than 20mL to aspirate the feeding tube</td>
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<td>• Contains separate feeding/ medication port</td>
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<td>• Different lengths</td>
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<td>• Placement must be confirmed before each use</td>
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<td>• Facial taping required</td>
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<tr>
<td>Polyurethane</td>
<td>Nasojejunal</td>
<td>• Children unable to maintain adequate oral nutrition&lt;br&gt;• Medium to long-term nasogastric feeding pending possibility of more permanent device</td>
<td>• Less cost efficient than PVC&lt;br&gt;• May have weighted metallic tip&lt;br&gt;• Guide wire for ease of insertion&lt;br&gt;• Dwell time as per manufacturer’s recommendations&lt;br&gt;• Don’t use a syringe smaller than 20mL to aspirate the feeding tube&lt;br&gt;• Contains separate feeding and medication port&lt;br&gt;• Different lengths&lt;br&gt;• Placement must be confirmed before each use&lt;br&gt;• Facial taping required&lt;br&gt;• Likely to require pump feeding secondary to the lack of reservoir&lt;br&gt;• Risk of dislodgement/migration back into the stomach&lt;br&gt;• Not necessary to aspirate&lt;br&gt;• Will required fluoroscopic/endoscopic insertion&lt;br&gt;• Increased risk of bacterial overgrowth, dumping syndrome&lt;br&gt;• Possibly less tolerance of hyperosmolar feeds and or large volumes</td>
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<td>Nasoduodenal</td>
<td>• Children unable to maintain adequate oral nutrition&lt;br&gt;• Medium to long-term nasogastric feeding pending possibility of more permanent device</td>
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<td>Device</td>
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<tr>
<td>Percutaneous Endoscopic Gastrostomy (PEG)</td>
<td>Gastric</td>
<td>• Long-term enteral feeding for children with normal emptying of gastric and duodenal contents</td>
<td>• Silicon tube/ polyurethane</td>
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<td></td>
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<td></td>
<td>• Endoscopic placement under General Anaesthetic</td>
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<td></td>
<td>• May require surgical replacement under General Anaesthetic</td>
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<td></td>
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<td>• Replace as required or as per manufacturer’s recommendations</td>
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<tr>
<td>Device</td>
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<td>Considerations</td>
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</table>
| Low Profile / Skin Level Gastrostomy | • Gastric | • Long-term enteral feeding for children with normal emptying of gastric and duodenal contents | • Silicon low profile (device)/ button  
• Requires surgical placement on 1st or new insertion  
• Replace as required or as per manufacturer’s recommendations.  
• May be replaced by trained medical/ nursing staff  
• Parents may be trained to replace  
• Suitable for all methods of enteral feeding. ie continuous, intermittent or bolus |
| Balloon Device  
ie. Mic-key/Nutriport |       |                                                                             |                                                                                |
| Flange Device  
ie. Entristar |       |                                                                             |                                                                                |
<table>
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<th>Device</th>
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<th>Indication</th>
<th>Considerations</th>
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<tr>
<td>Trans-Gastric Jejunal</td>
<td>• Gastric • Jejunal</td>
<td>• Children who have impaired gastric emptying 5.11</td>
<td>• Potential gastrointestinal intolerance, bloating, cramping, diarrhoea</td>
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<tr>
<td></td>
<td></td>
<td>• Children with problematic gastroesophageal reflux 5.11</td>
<td>• Requires continuous pump feeds 5.11</td>
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<td></td>
<td>• Children at increased risk of gastric contents aspiration 5.11</td>
<td>• Requires surgical radiographic or endoscopic placement</td>
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<td></td>
<td></td>
<td>• Children with conditions effecting upper gastrointestinal functioning eg. gastroparesis 5.11</td>
<td>• Replacement as required / as per manufacturer’s recommendations.</td>
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<td></td>
<td>• Risk of displacement and migration back into the stomach 5.11.</td>
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<td>• Increased chance of blocking if not flushed well regularly and post administration of feeds and medication 5.11.</td>
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<td></td>
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<td>• Also comes in low profile device</td>
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<tr>
<td>Trans-Gastric Jejunal tube with jejunal access only</td>
<td>• Jejunal</td>
<td>• Children who have impaired gastric emptying 5.11</td>
<td>• Potential gastrointestinal intolerance, bloating, cramping, diarrhoea</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Children with problematic gastroesophageal reflux 5.11</td>
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<td></td>
<td></td>
<td>• Children at increased risk of aspiration 5.11</td>
<td>• Requires surgical radiographic placement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Children with conditions effecting upper gastrointestinal functioning 5.11</td>
<td>• May requires radiographic replacement as per manufacturer’s recommendations</td>
</tr>
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<td></td>
<td></td>
<td>• No gastric access and failed trial of gastro jejunal device due to mechanical issues. 5.11</td>
<td>• Risk of displacement and migration back into the stomach 5.11.</td>
</tr>
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Tube Feeding Formula

There are several considerations in choosing a feeding formula.

Age of the patient

An infant/child should receive a formula that is made to meet the specific nutrient needs of his/her age group.
- premature
- 0 to 12 months
- 1 to approximately 10 years (8-20kg)
- Approximately 10 years and older (greater than 20kg)

Underlying disease

There are many specialty formulas available for different medical conditions eg: 5, 8, 9, 11, 13.
- Intolerances eg. lactose
- gastrointestinal disorders
- allergies
- metabolic conditions

Nutritional requirements

A formula is described as nutritionally complete if it can be used as the sole source of nutrition, providing all essential nutrients in a defined volume. The volume required will vary according to the infant/child’s age, size and medical condition.

Depending on the situation additional supplements may be required such as:
- vitamins and or minerals
- fibre
- protein
- energy
  - fat and or
  - carbohydrate
- thickeners

Suggested resource:

James Fairfax Institute of Paediatric Nutrition and The Children’s Hospital Westmead 6th Edition 2010
Figure 4  **Formula Decision flowchart**

Is the gastrointestinal tract functioning?
- Yes
  - Can nutritional requirements be met with oral intake?
    - Yes
      - Enteral / Parenteral nutrition is not indicated
    - No
      - Parenteral Nutrition
- No
  - Enteral nutrition indicated

**Premature infant <2000g**
- Expressed Human Milk is the milk of choice
- Human milk fortifier + EHM
- Prem formula 24kcal/30mL (80kCal/100ml)

**0 - 12 months**
- Standard 20kcal/30mL (67kCal/100ml)
  - Expressed human milk
  - Human milk substitute

**1 - ~ 10 years**
- Standard 1kcal/mL
  - Complete, whole protein feed, fibre free or fibre enriched
- Specialised
  - Soy
  - Fibre enriched
  - Semi elemental
  - Elemental
  - Fat modified
  - Fluid restricted / High energy (>1kcal/mL)
  - Renal
  - Metabolic

**~ 10 years +**
- Standard 1kcal/mL
  - Complete, whole protein feed, fibre free or fibre enriched
- Specialised
  - Soy
  - Fibre enriched
  - Semi elemental
  - Elemental
  - Fat modified
  - Fluid restricted / High energy (>1kcal/mL)
  - Renal
  - Metabolic
Preparation of powders and liquids

A volume of formula can be made in advance and stored in the back of a refrigerator for up to 24 hours. The temperature of the refrigerator should be less than 4°C. \(^{15, 16}\).

After opening a can of ready-to-use formula, it should be covered, stored in the fridge and used within 24 hours. \(^{15, 16, 17}\).

Hang times

Formula produced in bottles, known as ‘ready-to-hang’ or closed system (accessed by a spike set) can be hung for a maximum of 24 hours \(^{5, 9, 15, 16}\).

If decanting formula into a feeding container or bag either:
- prepared from powder or
- ready to use liquid
it is recommended the volume decanted should not exceed a four hour supply \(^{15, 16, 17, 18}\). This is to reduce the risk of microbiological contamination.

Maintaining the environmental temperature at less than 24°C will further reduce the risk of micro-organism growth. \(^{8, 9, 15}\).
Table 2 **Tube Feeding Schedules / Regimens for Enteral Feeding**

There are different types of feeding schedules used. The choice of enteral feeding regimen is based on assessment of the child/infants needs. Enteral feeds can be administered by continuous, intermittent, gravity drip or bolus methods, or a combination of these.

<table>
<thead>
<tr>
<th>Continuous feeding</th>
<th>Defined as feeding for 24 hours continuously either by gravity drip or a feeding pump. Allows for a slow and steady infusion. Continuous feeding at low volume can be achieved by either gravity drip feeding or by use of an enteral pump.</th>
</tr>
</thead>
</table>
| **Advantages:**    | • Fewer complications (e.g. diarrhoea, reflux, nausea, abdominal distension, bloating) ⁵, ⁹, ¹⁹, ²⁰.  
                      • Enhanced tolerance to hyperosmolar enteral formula especially if fed into the small intestine. ⁹, ¹⁹, ²¹.  
                      • Able to use a lower hourly rate compared with feeding for <24 hours.  
                      • Decrease risk of aspiration ⁹, ¹⁹.  
                      • Preferred method when post pyloric feeding is required  
                      • Preferred in head injury patients with transpyloric tube to prevent aspiration and achieve maximum calorific intake  
                      • Better tolerated in children with compromised gastrointestinal function or delayed gastric emptying. ⁹, ²² |
| **Disadvantages:** | • The psychosocial impact of 24 hour continuous feeding in the home setting on not only the parent/carer but also the family dynamic.  
                      • Reduced mobility due to physical attachment to the feeding apparatus. ⁸.  
                      • Can be difficult managing and supervising overnight feeds  
                      • Can be difficult with children who are mobile during the day  
                      • Expense of equipment (pump, feeding containers/bags, giving sets etc)  
                      • Can be more equipment to maintain and clean than bolus feeding  
                      • Potential risk of formula contamination if feeds are left at room temperature longer than 4 hours ¹⁰, ¹¹, ¹⁵, ¹⁶. |
### Intermittent feeding

Defined as a continuous infusion delivered over a shorter period or periods of time during the day and or night, usually ranging from 12-20 hours. Can be given by slow gravity drip or feeding pump.

Volume provided will vary, depending upon the infant / child’s requirements and the duration of infusion.

<table>
<thead>
<tr>
<th>Advantages:</th>
<th>Disadvantages:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Allows greater patient mobility</td>
<td>- Expense of equipment (pump, feeding containers/ bags, giving sets etc)</td>
</tr>
<tr>
<td>- Allows breaks:</td>
<td>- More equipment to maintain and clean than bolus feeding</td>
</tr>
<tr>
<td>- for physical activity;</td>
<td>- Potential risk of formula contamination if feeds are left at room temperature longer than 4 hours.</td>
</tr>
<tr>
<td>- for the administration of medications that are incompatible with feeds</td>
<td>- Larger hourly volumes/ higher infusion rate, when compared to continuous feeding may be poorly tolerated in some infants/ children</td>
</tr>
<tr>
<td>- to encourage oral intake if applicable.</td>
<td>- May increase risk of reflux, aspiration, abdominal distension, diarrhoea and nausea due to higher infusion rate.</td>
</tr>
<tr>
<td>- Can be flexible to suit the infant/ child/ parent/ carer’s lifestyle and improve quality of life.</td>
<td>- Unsuitable for transpyloric feeding</td>
</tr>
<tr>
<td>- May be more psychologically acceptable</td>
<td></td>
</tr>
<tr>
<td>- Useful in the transition from continuous to bolus feeding, or from tube feeding to oral intake.</td>
<td></td>
</tr>
<tr>
<td>- Beneficial compared to continuous feeding in infants/ children with smaller gastric capacity and increased risk of gastro oesophageal reflux</td>
<td></td>
</tr>
</tbody>
</table>

---

9.19

15.16

9.23
Gravity Drip Feeding

Can be given by intermittent or continuous drip.

This method of feeding involves calculating the drip rate and adjusting it to administer the desired volume of feed in a set time.

Estimated drip rates.²³

<table>
<thead>
<tr>
<th>mL/hr</th>
<th>Number of drips / minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>50</td>
<td>13</td>
</tr>
<tr>
<td>75</td>
<td>20</td>
</tr>
<tr>
<td>100</td>
<td>27</td>
</tr>
<tr>
<td>125</td>
<td>33</td>
</tr>
<tr>
<td>150</td>
<td>40</td>
</tr>
<tr>
<td>175</td>
<td>47</td>
</tr>
<tr>
<td>200</td>
<td>53</td>
</tr>
</tbody>
</table>

To calculate the drip rate to deliver 1200 mL over 14 hrs. Infusion sets are calibrated for a drop factor of 15.

\[
\frac{1200 \text{ mL}}{840 \text{ min}} \times 15 = 22 \text{ drips / minute}
\]

Advantages:
- Useful if the infant/child is not able to tolerate bolus feeding and pump feeding is not an option
- Power source is not required
- Feeding pump is not required

Disadvantages:
- Less accurate measurement and control of feeding rate
- Potential reduced mobility due to physical attachment to the formula bottle/container/bag
- Potential risk of formula contamination if feeds are left at room temperature for longer than 4 hours.¹⁵,¹⁶
Bolus feeding

Defined as rapid administration of a measured amount of feed/water by syringe (usually by gravity).

Bolus feeding is only ever into the stomach, which has the reservoir capacity to tolerate a large volume.

The infant/child must have a competent oesophageal sphincter and be able to protect his/her airway adequately to minimise the aspiration risk associated with larger feed volumes and faster administration rates.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• More physiologically similar to a typical eating pattern</td>
<td></td>
</tr>
<tr>
<td>• Allows greater patient mobility ⁹, ¹³</td>
<td></td>
</tr>
<tr>
<td>• Convenient for gastrostomy feeding</td>
<td></td>
</tr>
<tr>
<td>• Can be used to supplement oral intake</td>
<td></td>
</tr>
<tr>
<td>• Can be used in conjunction with other administration methods</td>
<td></td>
</tr>
<tr>
<td>• Can be flexible to suit the infant/child’s lifestyle ⁹, ²³</td>
<td></td>
</tr>
<tr>
<td>• May facilitate transition to oral intake</td>
<td></td>
</tr>
<tr>
<td>• Less expensive as a pump and giving sets are not required ⁹, ¹⁹</td>
<td></td>
</tr>
<tr>
<td>• Lower risk of microbiological contamination</td>
<td></td>
</tr>
<tr>
<td>• Power source is not required</td>
<td></td>
</tr>
</tbody>
</table>

• Not suitable for post-pyloric feeding |
• More time intensive for parents/carers compared to pump feeding |
• Highest risk of aspiration, reflux, abdominal distension, diarrhoea and nausea ⁹, ¹⁹ |
• Contraindicated with any form of jejunal feeding ⁵, ¹⁹
Equipment

Enteral feeding pumps

Enteral feeding pumps deliver precise amounts of formula at an even rate (mLs/hr). Useful features of pumps include battery back-up, portability, simplicity of use and ease of cleaning, alarm sound, quiet operation, a hold facility for administration of medications and a method of attaching the pump to the bed/IV pole/other location. Many different types of enteral pumps are available, including lightweight, compact pumps for ambulatory patients and pumps with the capacity for programming automated water flushes.

Some companies provide pumps for loans or hire in addition to selling them. The pump supplier will provide a maintenance service.

Feeding containers / bags

Administration reservoirs are available as feeding containers and bags, in a range of sizes. In some systems the giving set and reservoir come as an “all-in-one” combined system.

Giving sets

A giving set is plastic tubing, attached from the bottle / bag or container to the feeding tube. It has a roller clamp to regulate or stop the flow rate. As each company that supplies pumps and consumables will have a range of giving sets it is essential to ensure the giving sets prescribed matches the feeding pump or ready-to-hang system being used. Giving sets need to be changed every 24 hours.²⁴

Feeding adaptors / Extension tube

Low profile feeding devices have adaptors / extension tubes. The extension tube connects the giving set or syringe directly to the low profile/ skin level device. These must be used for feeding and flushing as inserting a syringe directly into the feeding port of the device will damage the one-way valve.

Syringes

Syringes are useful for flushing enteral tubes with water and for the delivery of bolus feeding. A 60 ml catheter tip syringe is recommended for gastrostomy and jejunostomy tubes via the extension tube. Oro/nasogastric tubes will require smaller syringes (30mL); the size of the leu slip is compatible with the hub of the tube.

Note: the use of small syringes less than 30mls for flushing produces greater pressure and may split the tube.⁹
Table 3  **Equipment requirements for a closed or open feeding system**

<table>
<thead>
<tr>
<th>Continuous pump feeds</th>
<th>A closed system</th>
<th>An open system</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Using a ready-to-hang bottle / bag of formula.</td>
<td>Decanting liquid formula (either ready-made or reconstituted from powder) into a feed container or bag</td>
</tr>
<tr>
<td></td>
<td>• Ready to hang bottles of formula</td>
<td>• Feed/ formula</td>
</tr>
<tr>
<td></td>
<td>• Pump</td>
<td>• Feeding container / bag</td>
</tr>
<tr>
<td></td>
<td>• Pump giving set</td>
<td>• Pump</td>
</tr>
<tr>
<td></td>
<td>• Syringe</td>
<td>• Pump giving set</td>
</tr>
<tr>
<td></td>
<td>• Feeding adaptor / extension tube (required if the infant / child has a low profile device insitu)</td>
<td>• Syringe</td>
</tr>
<tr>
<td></td>
<td>• Feed/ formula</td>
<td>• Feeding adaptor / extension tube (required if the infant / child has a low profile device insitu)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* all-in-one bag / container and giving are also available</td>
</tr>
</tbody>
</table>

| Gravity feed | • Ready to hang bottles of formula                                              | • Feed/ formula                                                                 |
|              | • Gravity giving set                                                            | • Feed container / bag                                                         |
|              | • Syringe                                                                        | • Gravity giving set                                                           |
|              | • Feeding adaptor / extension tube (required if the infant / child has a low profile device insitu) | • Syringe                                                                        |
|              |                                                                                   | • Feeding adaptor / extension tube (required if the infant / child has a low profile device insitu) |
|              |                                                                                   | * all-in-one bag / container and giving are also available                     |

| Bolus feeds | • Syringe                                                                       | • Feed/ formula                                                                 |
|            | • Feeding adaptor / extension tube (required if the infant / child has a low profile device insitu) | • Feed container / bag                                                         |
|            |                                                                                   | • Gravity giving set                                                           |
|            |                                                                                   | • Syringe                                                                        |
|            |                                                                                   | • Feeding adaptor / extension tube (required if the infant / child has a low profile device insitu) |
|            |                                                                                   | * all-in-one bag / container and giving are also available                     |
Feeding Tubes

Health Professionals should be familiar with their Local Health District (LHD) and facility policy concerning Enteral Feeding and Feeding Tubes.

Tube Dwell Times

Dwell times for enteral feeding devices can be dependent on manufacturer recommendations or advice and individual clinical scenarios. The feeding tube manufacturer’s recommendations must be followed to ascertain maximum dwell times.

Health Professionals who are unsure about dwell times for oro/ nasogastric, gastric or jejunal devices should seek advice/ consult with a health professional who is experienced in managing paediatric enteral feeding.

Oro/ nasogastric tube

Risks around insertion of fine bore tubes \(^9, 10\).

Poor technique or using the incorrect procedure to insert or check tube placement can result in adverse patient outcomes including:

- Misplacement of the tube into the lungs or rarely, in patients with cribriform plate disruption, intracranial insertion.
- Aspiration associated with tube dislodgement
- Pneumonitis from oro/nasogastric feeds being deposited into the lungs
- Trauma to surrounding tissues
- Pneumothorax

Note: \(^9, 10\).

Children with an altered level of consciousness, due to a neurological deficit, significant developmental delay or critically illness are at increased risk of complications.

Children with significant developmental delay more frequently have alterations in their gag/ swallow reflexes and are at particular risk. These children are at increased risk of having a feeding tube accidental insertion into other anatomical structures.

Caution is required when inserting oro/nasogastric tubes in patients on anticoagulants or who have impaired blood clotting.

Caution is required when inserting an oro/nasogastric tube into a child with a tracheostomy because of the risk in inadvertent tracheal intubation (particularly in children with un-cuffed tracheostomy tubes).

An oro/ nasogastric tube may cause gastric contents to leak from the stomach causing oesophageal erosions in patients with gastro-oesophageal reflux.
Strategies to reduce risk: 9, 10, 13.

- Ensure that insertion of a tube is ordered by a medical officer, with the order and the rationale for insertion of the tube documented in the patient’s health care record.
- Assess that the patient does not have a contraindication or potential complications for insertion of an oro/nasogastric tube.
- Check the patient’s allergies, including allergies to Lignocaine and to tape.
- Use feeding tubes that are radiopaque with markings to enable accurate measurement, identification and documentation of tube position.
- Confirm the position of the oro/nasogastric tube by following method outlines in LHD and facility policies. If pH is inadequate to ascertain gastric placement, i.e. pH is not found to be less than/equal to 5.0 or the patient has significant comorbidities and/or risk factors, then placement should be confirmed radiologically after the risks and benefits are explained.
- Consider referring the patient to radiology for insertion of the oro/nasogastric tube under imaging if the patient is known to have had multiple difficult or failed insertions or has other risk factors.

A guide to oro/nasogastric tube sizes 10.

<table>
<thead>
<tr>
<th>Size of tube</th>
<th>Weight/age of the infant/child</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 FG</td>
<td>infants weighing less than 1500 grams</td>
</tr>
<tr>
<td>6 FG</td>
<td>infants weighing over 1500 grams</td>
</tr>
<tr>
<td>8 FG</td>
<td>infants and children up to 5 years</td>
</tr>
<tr>
<td>8 – 10 FG</td>
<td>child over 5 years</td>
</tr>
</tbody>
</table>

Larger bore tubes - generally 2 to 4 FG higher than for feeding may be required for gastric decompression.

* Remember this is only a guide and clinical judgement must be used at all times.
To assist with the insertion of oro/ nasogastric feeding tubes the following points maybe useful: 10.

- An adequate explanation must be given to the child and carers and informed verbal consent obtained prior to the procedure and documented in medical notes.
- This procedure can be uncomfortable. Consider prescribing and administering a small amount of Lignocaine gel in the nostril, and/or a spray of Lignocaine to the back of the throat.
- A brief, age appropriate and honest explanation of the procedure is best given to the child immediately before the procedure once all the equipment is prepared to minimise anticipatory anxiety.
- For older children with a dry mouth but impaired gag reflex, moisten the mouth with a moist cotton bud prior to requesting them to swallow or ask them to sniff to lift the soft palate.
- Where appropriate and with carers consent allow infants to suck on a dummy during procedure to facilitate swallowing.
- Where developmentally appropriate, asking children to suck on iced water through a straw facilitates swallowing and provides a helpful focus for distraction during the procedure.
- A member of staff may be required to hold the child during insertion. Distraction therapy may be used to help a young child develop coping strategies – parents can carry this out if required. Consider giving sucrose to an infant as per local protocol.
- If available, a Play Therapist may be involved in this procedure.
- 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.
- Wrap an infant in a sheet or cuddly.
- A toddler or child should be positioned in a sitting or Fowler’s position as tolerated. Restraint of young children in a sitting position helps facilitate correct tube placement and allows the child to maintain some sense of control over the procedure. Being restrained lying down is frightening in ANY age group.
- Consider short acting and age appropriate sedation/analgesia as per local procedural sedation guidelines that is least likely to interfere with gag reflex eg intranasal Fentanyl or Nitrous Oxide.

Insertion, re-insertion and removal of an oro/ nasogastric tube

Health Professionals should refer to their LHD and facility policy for procedures around the insertion, re-insertion and removal of oro/ nasogastric tubes.
Checking the position of an oro/ nasogastric tube

Health Professionals should refer to their LHD and facility policy for procedures around checking the position of oro/ nasogastric tubes.

It is recognised that the best method of determining oro/nasogastric tube location is provided by reliably obtained and interpreted X-ray that visualises the entire course of the tube.\(^{27,28}\)

However, many factors, including exposure to radiation, delay in obtaining and interpreting radiographs, risk of tube misplacement while moving the patient, and the cost to the patient, contribute to the need for other reliable methods for confirming tube placement.

**Do not** use auscultation of air insufflated through the feeding tube (‘whoosh’ test). There are many reports on the ineffectiveness of this method.\(^{28,29,30,31}\)

**Do not** use absence of respiratory distress as an indicator of correct positioning. Observing for signs of respiratory distress is often ineffective in detecting a misplaced tube.\(^{32,33}\). Tubes can enter the respiratory tract without resulting in observable symptoms\(^{33}\), particularly if the patient is unconscious.\(^{33,34}\)

**Do not** commence feed if aspirate pH \(>\) or equal to 6.0 (may occur with respiratory or oesophageal placement\(^ {35}\)) or if in doubt about the position of the oro/ nasogastric tube.

**Do not** use blue litmus paper to test the acidity or alkalinity of aspirate. It is not sufficiently sensitive to distinguish bronchial from gastric secretions.\(^ {36}\)

**Do not** rely on observations of bubbling at the proximal end of the tube. This method is unreliable because the stomach contains air and could falsely indicate respiratory placement.\(^ {10}\)

**Do not** rely on the appearance of the feeding tube aspirate to rule out misplacement. This method is unreliable because gastric contents can look similar to respiratory secretions.\(^ {37}\)

Checking and re-checking the oro/ nasogastric tube position\(^ {9,10,25}\)

It is the responsibility of the nurse (in Hospital) and the Parent/ Carer (at home) to ensure the correct placement of the oro/ nasogastric tube at all times. The oro/ nasogastric tube should be checked:

- Following initial insertion.
- Before administering each feed and/ or giving medication.
- At least once per shift during continuous feeds.
- 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.
- If the patient has been transferred from one clinical area to another.
Care and ongoing management of oro/ nasogastric tubes

The following points will ensure the integrity of tubes and the safety of patients.

- Follow manufactures recommendation regarding safe dwell times.
- Regular flushing has been reported to increase the life and patency of feeding tubes.\(^{10}\)
- Check the nares regularly to ensure skin integrity, try to alternate nares with any reinsertion of the tube.\(^{10}\)

**Gastrostomy tube**

**Low profile / skin level gastrostomy tubes**

**New gastrostomy**

It is normal to have a small amount of clear (serous) discharge around the gastrostomy which may make the skin red particularly in the first week following tube insertion. Any of the following however are not normal:

- persistent redness particularly if it is spreading around the surrounding skin
- pain and discomfort
- swelling
- unusual draining / discharge around the tube (blood, odorous, pus)
- fever associated with any of the above.

**General care** \(^{3, 13, 38}\)

- The button is held in place by a balloon inflated at the time of insertion. The balloon normally holds 3.5 - 4mL (maximum of 5mL) of water.
- It is important to check the water volume of the balloon weekly. To do this, aspirate all the water from the balloon and replace it with the original amount prescribed. Method:
  - Prepare two 5mL luer syringes. One syringe should be empty, the other should contain the original amount of sterile water prescribed or used by your doctor to inflate the balloon.
  - Deflate the balloon with the empty syringe and note amount of water removed. Ensure that the button is held firmly in place while deflating.
  - Inflate the balloon using the other syringe with water.
  - Remove syringe

**If the tube is dislodged** \(^{3, 38}\).

- If the button has been dislodged, (usually due to balloon deflation or bursting) rinse it well with water and check the balloon (by inflating it with 5mL of water).
  - If the balloon is still intact, deflate it completely, reinsert the gastrostomy into the stoma and inflate the balloon with the recommended volume of water.
  - If the balloon is leaking or it cannot be inflated, the button will need to be replaced with a new device.
• If there is no spare device available reinsert the gastrostomy into the stoma to keep the tract open while a new device is sourced. To do this:
  - remove the remaining water from the balloon
  - apply a lubricant (KY Jelly) at the tip of the button to ease insertion
  - reinsert the gastrostomy into the stoma
  - once the button is in place, tape it securely in position
  - do not use the button with the balloon deflated.
• Alternatively an equivalent size foley catheter will be inserted 3-4cm into the stoma to maintain the tract. A foley catheter can be used for feeding until a new gastrostomy button is reinserted.

Malecot / Foley Catheter and Percutaneous Endoscopic Gastrostomy (PEG) Tubes

General information

• Initial insertion of a Malecot / Foley catheter is done under general anaesthesia. Subsequent tube changes however may be done in an outpatient setting.
• PEG tube are also inserted under general anaesthesia. Due to the presence of an internal retention dome or bolster subsequent tube changes / replacement must be done in theatres.

If the tube is dislodged

• An equivalent size foley catheter should be inserted about 3 - 4 cm into the tract (stoma) if accidental displacement of the tube occurs.
• For PEG tube reinsertions following removal / displacement refer to the gastro team / surgeon involved.
Trans-gastric jejunal tube

Mickey trans-gastric jejunal feeding tubes

General information

- The trans-gastric feeding tube is held in place by a balloon inflated at the time of insertion. The balloon normally holds between 5-10mL of water.
- It is important to check the water volume of the balloon weekly. To do this, aspirate all the water from the balloon and replace it with the original amount prescribed. Method:
  - Prepare two 5-10mL luer syringes. One syringe should be empty, the other should contain the original amount of sterile water prescribed or used by your doctor to inflate the balloon.
  - Deflate the balloon with the empty syringe and note amount of water removed. Ensure that the button is held firmly in place while deflating.
  - Inflate the balloon using the other syringe with water.
  - Remove syringe

If the tube is dislodged

- If the device has not completely come out, tape it in place in order to keep the stoma open. Do not use the feeding tube with the balloon deflated.
- If the device has completely come out and you have a gastrostomy button or foley catheter insert this into the tract to keep the stoma open until another trans-gastric device can be reinserted in Radiology.
Initiating tube feeds

All patients require an individual assessment for determining the rate of delivery of nutritional support. Determination of the starting rate involves consideration of the:

- infant / child’s medical condition,
- formula type,
- site of delivery and
- infant / child’s nutritional status at the time of starting feeds.

The decision to advance the feeding rate is based on assessment of feeding tolerance. Determination of the advancing feed rates involves consideration of:

- infant / child’s medical condition,
- formula type,
- site of delivery,
- infant / child’s nutritional status at the time of starting feeds,
- symptoms / tolerance and
- biochemistry

The following tables can be used as a guide:

**Continuous feeds -**

**Suggested starting rates and incremental increases for nasogastric/ gastrostomy tubes**

<table>
<thead>
<tr>
<th>Age</th>
<th>Initial hourly Infusion</th>
<th>Increments</th>
<th>Maximum Rate *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preterm</td>
<td>1 - 2 mL/ kg/ hour</td>
<td>1 mL/ hour every 1 - 4 hours</td>
<td>120 mL/ kg/ day</td>
</tr>
<tr>
<td>0 - 2 years</td>
<td>5 - 10 mL/ hour x 4/24</td>
<td>5 - 10 mL/ hour every 1 - 4 hours</td>
<td>6 mL/ kg/ hour</td>
</tr>
<tr>
<td>2 - 6 years</td>
<td>10 - 15 mL/ hour</td>
<td>10 mL/ hour every 1 - 4 hours</td>
<td>4 - 5 mL/ kg/ hour</td>
</tr>
<tr>
<td></td>
<td>Nasogastric For the first 4 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gastrostomy For the first 4 - 8 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 - 14 years</td>
<td>10 - 20 mL/ hour</td>
<td>10 mL/ hour every 1 - 4 hours</td>
<td>3 - 4 mL/ kg/ hour</td>
</tr>
<tr>
<td></td>
<td>Nasogastric for the first 4 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gastrostomy for the first 4 - 8 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 14 years</td>
<td>20 - 30 mL/ hour</td>
<td>10 mL/ hour every 1 - 4 hours</td>
<td>125 mL/ hour</td>
</tr>
<tr>
<td></td>
<td>Nasogastric For the first 4 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gastrostomy For the first 4 - 8 hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
* Note that the infant / child’s goal rate should be determined on an individual basis taking into consideration energy, fluid and nutrient requirements.

**Suggested starting rates and incremental increases for nasojejunal/ jejunostomy tubes**

In addition to the advice for nasogastric and gastrostomy tubes, when feeding into the jejunum:

- In children > 7 years can start at 15mL/ hour.
- May take 3 - 4 days to reach goal / final rate
- Continuous / intermittent pump feeding is preferred due to the lack of reservoir capacity in the small bowel.
- Bolus feeding is contraindicated as it is likely to cause abdominal distension, discomfort and Dumping Syndrome.
- Hyperosmolar feeds may result in osmotic diarrhoea

**Bolus Feeds**

**Suggested starting rates and incremental increases for bolus feeds**

<table>
<thead>
<tr>
<th>Age</th>
<th>Initial hourly Infusion</th>
<th>Daily Increases</th>
<th>Maximum Goal Volume *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preterm &gt;1200g</td>
<td>Decisions should be made in consultation with treating neonatal medical team. Often 2 - 4 mL/ kg/ bolus feed</td>
<td>Double volume for 2nd hourly bolus</td>
<td>150 - 200 mL bolus feed every 4 hours</td>
</tr>
<tr>
<td>0 - 2 years</td>
<td>10 -30 mL hourly bolus</td>
<td>Double volume for 2nd hourly bolus</td>
<td>150 - 200 mL bolus feed every 4 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Treble volume for 3rd hourly bolus</td>
<td></td>
</tr>
<tr>
<td>2 - 6 years</td>
<td>10 - 30 mL hourly bolus</td>
<td>As for 0 - 2 years</td>
<td>150 - 250 mL bolus feed every 4 hours</td>
</tr>
<tr>
<td>7 - 14 years</td>
<td>10 - 30 mL hourly bolus</td>
<td>As for 0 - 2 years</td>
<td>150 - 250 mL bolus feed every 4 hours</td>
</tr>
<tr>
<td>&gt; 14 years</td>
<td>20 - 40 mL hourly bolus</td>
<td>As for 0 - 2 years</td>
<td>150 - 300 mL bolus feed every 4 hours</td>
</tr>
</tbody>
</table>

* Note that the infant / child’s goal rate should be determined on an individual basis taking into consideration energy, fluid and nutrient requirements.
Administering the feeds

Continuous feeds

Equipment required:
- Pump
- Pump giving set
- Feed container or ready-to-hang feed
- Pole/hook to hang feed container from
- Catheter syringe
- Measuring cup and jug
- Formula
- Water for flushing

If the infant/child has a low profile or button tube, an adapter and/or extension tube is needed.

Method:
1. Wash hand with soap and warm water then dry well
2. Assemble equipment.
3. Prepare formula as instructed.
4. Fill container with the required amount of formula and connect to it to the pump giving set.
5. Hang the container above the pump
6. Prime the pump giving set with formula, ie. run the formula through the line until almost at the end of the tubing, then clamp off.
7. Connect the pump giving set to the pump.
8. Gently undo the cap of the tube. If the infant/child has a low profile or button tube attach the adapter and/or extension tube.
9. Vent the tube (sometimes called degassing)
   a. Attach a syringe, outside only (without the plunger), to the feeding port.
   b. Hold the syringe barrel below the stomach to allow gas to escape.
   c. Allow stomach juices and air to fill the syringe.
   d. Drain contents back into the stomach by raising the syringe above the stomach.
10. Connect the tip of the giving set to the feeding port.
11. Set the desired rate on the pump and release the clamp on the giving set.
12. Select run to commence feeding.
13. Continue to give the remainder of the feed.
14. Flush the tube with the required amount of water.
15. Remove the syringe and replace the cap on the tube.
Gravity Feeds

Equipment required:
- Gravity feeding sets
- Feed container or ready-to-hang feed
- Catheter syringe
- Pole / hook to hang feed container from
- Measuring cup and/or jug
- Formula
- Water for flushing

If the infant/child has a low profile or button tube, an adapter and/or extension tube is needed.

Method:
1. Wash hand with soap and warm water then dry well
2. Assemble equipment.
3. Prepare formula as instructed
4. Fill container with the required amount of formula and connect it to gravity giving set
5. Hang the container and prime the gravity giving set with formula using the clamp ie run the formula through the line until almost at the end then clamp off.
6. Gently undo the cap of the tube. If the infant/child has a low profile or button tube attach the adapter and/or extension tube.

7. Vent the tube (sometimes called degassing)
   a. Attach a syringe, outside only (without the plunger), to the feeding port.
   b. Hold the syringe barrel below the stomach to allow gas to escape.
   c. Allow stomach juices and air to fill the syringe.
   d. Drain contents back into the stomach by raising the syringe above the stomach.

8. Connect the tip of the giving set to the tube. If using a low profile tube, use an extension set.
9. Release the clamp on the gravity set until the desired drip rate is achieved
10. Continue to give the remainder of the feed
11. Flush the tube with the required amount of water.
12. Remove the syringe and replace the cap on the tube
Bolus feeds

Equipment required:
- Catheter syringe
- 2 x measuring cups/ jugs (one for formula and the other for water)
- Formula
- Water for flushing

If the infant / child has a low profile or button tube, an adapter and / or extension tube is needed.

Method:
1. Wash hand with soap and warm water then dry well
2. Assemble equipment.
3. Prepare formula as instructed
4. Measure out the required amount of formula and water to flush the tube
5. Gently undo the cap of the tube. If the infant / child has a low profile or button tube attach the adapter and / or extension tube.

6. **Vent the tube** (sometimes called degassing)
   a. Attach a syringe, outside only (without the plunger), to the feeding port.
   b. Hold the syringe barrel below the stomach to allow gas to escape.
   c. Allow stomach juices and air to fill the syringe.
   d. Drain contents back into the stomach by raising the syringe above the stomach.

7. Remove the plunger form the syringe
8. Put the tip of the syringe into the feeding port
9. Pour the required amount of feed into the syringe
10. Allow the feed to flow down the tube slowly. Each syringe should take 3-4 minutes to empty. The rate at which the feed is allowed to flow down the tube can be adjusted by gravity ie holding the end of the syringe higher or lower.
11. Continue to give the remainder of the feed
12. Flush the tube with the required amount of water.
13. Remove the syringe and replace the cap on the tube

Note: In some situation bolus feeds are given with a pump. It is not recommended to use the plunger in the syringe to push the formula through. Remember: Giving a bolus feed too quickly can make the child feel unwell, nauseous or vomit
Administering Medication

Giving Medications through a Feeding Tube

The feeding tube may be used to give medications, however if the child is safety able to take medications by mouth, use this route.

Not all medications can be safely given through a feeding tube. Check with a pharmacist and where possible use liquid medications to avoid blocking the feeding tube.

It is important to ensure that medication is administered via the correct port. Do not syringe medication into the feeding port as this may damage directional valves. If devices do not have medication ports then medication may be given via the feeding port with the use of an extension tube.

Do not mix medications with: formula, antacids or vitamin supplements containing iron, calcium or magnesium.

Give each medication separately with water flushes between each medication.

Tablets
- Immediate release - these are ordinary tablets, sometimes they can be sugar or film coated. Most will disperse if left in water.
- Soluble - these tablets dissolve completely to leave a clear or coloured solution
- Dispersible - these tablets break down into a fine powder when put in water
- Special release - also called slow release or enteric coated, should not be crushed and do not dissolve in water. Seek advice from a Pharmacist on how best to administer these. Omeprazole/ Losec can be administered via a feeding tube if given with sodium bicarbonate to soften the pellets.

Capsules
Most capsules have a gelatine shell with loose powder inside that can be mixed with water. Some contain granules and others liquids. Advice should be sought a Pharmacists before giving these through a feeding tube.

Liquids
Some liquid medicines eg Phenytoin, Docusate, Lactulose or certain antibiotics are very thick and will need to be diluted with 5 to 10 mLs of water.
Preparing for discharge from hospital

When an infant/child is discharged on home enteral nutrition, it requires careful planning with all members on the multi-disciplinary team involved. The patient is taking on a different life style that requires new skills and a new system of feed delivery. Even the fact that food is now called feed takes time for the child’s parents / carers to get used to. Typically the nurse and dietitian will coordinate/lead this process.

The discharge planning can be broken down into 2 parts:
• preparing the child and his / her Parents / Carers
• preparing the child’s community environment

The dietitian is responsible for preparing the community environment by arranging an ongoing supply of feed and equipment before the patient is discharged.

The nurse is responsible for preparing the child for discharge by educating the Parents/Carer to use, care for, feed through and manage the feeding tube.

There are many processes and steps to coordinate so the sooner planning starts, the more time everyone has to prepare.

Preparation of the infant/child and Parent/Carer

The parent / carer should receive education by health professionals experienced in managing paediatric HEN.

The parent/ carer should receive written and verbal instruction and demonstrate competence in the safe and effective use of HEN including but not limited to the following: 1.

1. Name/type of the formula
2. Volume to be administered
3. Frequency and timing of administration
4. Preparation and storage of formula, consumables and equipment (if applicable)
5. Method for administration and use of consumables and equipment (if applicable)
6. Care of enteral device and entry/stoma site (if applicable)
7. Contact details of HEN team
8. Techniques for monitoring HEN and identifying potential complications
9. Ordering process for additional feeding formula and supplies
Preparing the child’s community environment

The HEN Team should make arrangement that include but are not limited to:

1. Notification
2. Communication
3. Consideration
4. Education
5. HEN Equipment and formula
6. Registration
7. Information
8. Follow up and
9. Handover to the receiving facility / HEN Team / Health Professionals

Thorough preparation of both the infant/child and his/her Parents/Carers and the infant/child’s community environment will ensure:

- parent / carer involvement
- infant/child and parent / carer centred approach
- commitment to evidence based practice
- consistency of practice based on well researched procedures and protocols
- attention to recording and monitoring progress and outcomes
- cooperation between disciplines/teams
- timely communication between Health Professionals and Health Professionals and Parents/Carers that is consistent, clear and unambiguous.
- collaborative approach at all levels ranging from between individual ward staff to liaising with other clinical teams
- coordination of care
- focus on longitudinal rather than episodic care

This will lead to:

- improve standard/ quality of care
- increase cost effectiveness and
- reduce complication rates by ensuring appropriate training and support for the infant/child and patient/ carer
<table>
<thead>
<tr>
<th>Monitoring Parameters *</th>
<th>Description and comments</th>
<th>Frequency of monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs and symptoms of intolerance to nutrition therapy</td>
<td>Constipation, diarrhoea, nausea, reflux, stomach fullness / bloating, vomiting</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Infant / child’s compliance to HEN therapy</td>
<td>Recipe and feeding schedule (volume, rate/ timing)</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Dietary intake (if appropriate) 1. 6. 8.</td>
<td>Food/ beverage, texture, amount/ volume and frequency ; Children with dysphagia should be assessed and reviewed by a Speech Pathologist</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Growth 1. 2. 6. 8.</td>
<td>Weight (bare weight in infants)</td>
<td>&lt;12 months: x 2 / week – 1 / month</td>
</tr>
<tr>
<td>With FTT more regular measurements may be required.</td>
<td>Height / length</td>
<td>1-3 years: 1-3 monthly</td>
</tr>
<tr>
<td>NOTE: In certain circumstances weighing too often may cause undue stress for parents</td>
<td>Head circumference NOTE: May be effected by medical condition rather than nutritional status.</td>
<td>&gt;3 years: 3-6 monthly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;12 months: monthly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-3 years: 3 monthly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;3 years: 6 monthly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;12 months: as per standard infant checks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;12 months: as appropriate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydration status</td>
<td>Fluid intake - oral, feed and flushes</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td></td>
<td>Output - urine, stools and sweat</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Monitoring continued...</td>
<td>Description and comments</td>
<td>Frequency of monitoring</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td><strong>Nutrition requirements</strong></td>
<td>Use appropriate estimated macronutrient requirements for the child’s age and condition. (refer to The Feeding Guide); Refer to National Health and Medical Research Council’s Nutrient Reference Values (NRV) website re: micronutrient requirements</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td><strong>Biochemical/ laboratory data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Albumin Prealbumin Total protein C reactive protein</td>
<td>Abnormal results and certain conditions indicate more regular monitoring is required</td>
</tr>
<tr>
<td></td>
<td>Urea Creatinine</td>
<td>Regular monitoring of urea and creatinine in renal failure is required.</td>
</tr>
<tr>
<td></td>
<td>Electrolytes</td>
<td>Test at least daily if patient at risk of Refeeding Syndrome. Electrolyte imbalances in tube-fed patients are usually associated with underlying medical conditions.</td>
</tr>
<tr>
<td></td>
<td>Glucose</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vitamin D</td>
<td>An infant/ child with a disability is at higher risk of deficiency</td>
</tr>
<tr>
<td></td>
<td>Mineral status (calcium, magnesium, phosphorus)</td>
<td>Patients at risk of Refeeding Syndrome will need mineral status tested at least daily.</td>
</tr>
<tr>
<td></td>
<td>Iron studies Liver function</td>
<td>Monitoring frequency depends on patient’s clinical condition and drug therapy.</td>
</tr>
<tr>
<td><strong>Clinical signs of nutrient deficiencies or excesses</strong></td>
<td>See NRV website for signs and symptoms of deficiency and excess</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Monitoring continued ...</td>
<td>Description and comments</td>
<td>Frequency of monitoring</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Other disease states or conditions that may affect nutrition therapy</td>
<td>Gastro oesophageal reflux, delayed gastric emptying</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Possible interactions between nutrition therapy and medications or other disease states</td>
<td>Ensure that the child condition does not contraindicate the use of particular nutrition therapies and that medications are compatible.</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Functional status, performance and quality of life</td>
<td>Feed time environment, exercise / physical activity time</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Formula, route and method of delivery of HEN</td>
<td>Is the current formula, route and method of delivery most appropriate?</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Access tube / device and stoma site (if present)</td>
<td>Tube - time insitu, quality, fit; Stoma site - skin integrity, granulation, signs of inflammation/ infection</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Parent / carer competence with HEN</td>
<td>Hygiene, care of tube and equipment, feed administration technique, formula and equipment supply</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Stool, urine and other gastrointestinal losses</td>
<td>Stool - frequency and consistency (Bristol stool chart) Urine - frequency and concentration</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Psychosocial status</td>
<td>Social support, family dynamics, language barriers etc</td>
<td>Monitor when reviewed</td>
</tr>
<tr>
<td>Home environment</td>
<td>Ensure that the home environment is appropriate for the provision of enteral feeding; consider the ongoing financial commitment.</td>
<td>Monitor when reviewed</td>
</tr>
</tbody>
</table>

### Preventing and Solving Problems

#### Aspiration 3.5.11.13.

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
<th>Other intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastro-oesophageal reflux</td>
<td>Reduce bolus volume and increase frequency of feeding. Review feeding position.</td>
<td>Try continuous feeding or move tube into the duodenum/ jejunum</td>
</tr>
<tr>
<td>Poor swallow</td>
<td></td>
<td>Consider gastrostomy if long-term problem.</td>
</tr>
<tr>
<td>Tube dislodgment or incorrect positioning</td>
<td>Check tube position and reinsert is required</td>
<td></td>
</tr>
<tr>
<td>Poor positioning while feeding</td>
<td>Ensure child’s upper body inclined $&gt;30^\circ$ while feeding and for at least 30mins post feed</td>
<td></td>
</tr>
<tr>
<td>Delayed gastric emptying</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Constipation 3.5.11.13.

**Note**: For children with disabilities, constipation is more commonly due to reduced physical activity, low tone or gut motility issues.

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
<th>Other intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dehydration / inadequate fluid intake</td>
<td>Increase amount of water given. Monitor fluid intake and output based on maintenance fluid requirements.</td>
<td></td>
</tr>
<tr>
<td>Concentrated formula</td>
<td>Decrease the concentration of the formula and increase the volume or try a different formula.</td>
<td></td>
</tr>
<tr>
<td>Insufficient fibre/ residue</td>
<td>Medical review for infants; consider adding fibre if child is $&gt;12$ months old.</td>
<td>Consider a gastro consult</td>
</tr>
</tbody>
</table>

#### Dehydration 3.5.11.13.

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
<th>Other intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate fluid intake (feed volume/water flush)</td>
<td>Review total fluid intake including water flushes.</td>
<td></td>
</tr>
<tr>
<td>Concentrated feed/ formula</td>
<td>Ensure adequate fluid provision if using high concentration formula ($&gt;29kCal/30ml$, $&gt;99kCal/100ml$) in infants, especially in the absence of fluid restriction.</td>
<td></td>
</tr>
<tr>
<td>Diarrhoea and / vomiting</td>
<td>As above</td>
<td></td>
</tr>
</tbody>
</table>
**Diarrhoea 3. 5. 11. 13.**

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
<th>Other intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>infection</td>
<td>Medical / surgical review</td>
<td></td>
</tr>
<tr>
<td>Medications</td>
<td>Check commencement of medication in relation to diarrhoea onset ie. antibiotics, sorbitol, antacids or other Mg containing medication.</td>
<td>Consider a probiotic</td>
</tr>
<tr>
<td>Bolus/ rapid feed administration</td>
<td>Check time taken to administer bolus, may need to give over longer period ie. continuous feeding.</td>
<td>Consider using feed containing fibre.</td>
</tr>
<tr>
<td>Hyperosmolar feed / Modular feed</td>
<td>Change to iso-osmolar feed or for infants dilute formula initially to half strength. Review enteral feeds: - reduce concentration back to level previously tolerated - gradual increase in total energy intake (glucose polymer, MCT) by 1% increments - change source of additive ie. to LCT supplement</td>
<td>Osmolality &lt;400m Osm/kg to prevent diarrhoea in infants. Osmolality &gt;500m Osm/kg may cause diarrhoea in children Check ratios of all macro and micro nutrients</td>
</tr>
<tr>
<td>Malabsorption</td>
<td>Additional risk with modular feeds (&gt;1 additive). Review preparation technique</td>
<td>May need to change carbohydrate or fat source ie. lactose free, MCT based. Consider semi-elemental/ elemental feeds.</td>
</tr>
<tr>
<td>Feed contamination</td>
<td>Check: formula storage and preparation technique; care of feeding equipment; frequency of bag and line changes; feed hanging time etc.</td>
<td>Additional risk with modular feeds (&gt;1 additive). Review preparation technique</td>
</tr>
<tr>
<td>Excessive fluids</td>
<td>Review fluid intake (including IV fluids) and requirements.</td>
<td></td>
</tr>
</tbody>
</table>

**Dislodgement / migration of tubing 3. 5. 9. 11. 13.**

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
<th>Other intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial removal</td>
<td>Cease feed and re-site tube if necessary</td>
<td>Check for signs of aspiration</td>
</tr>
<tr>
<td>Vomiting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To and fro peristalsis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Hyper granulation

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
<th>Other intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive tube movement</td>
<td>Stabilise the tube to minimise/ restrict movement</td>
<td>Doesn’t require treatment unless it is causing problems.</td>
</tr>
<tr>
<td>Trapped moisture</td>
<td>Keep site free from moisture</td>
<td>If necessary cauterize with silver nitrate.</td>
</tr>
</tbody>
</table>

### Leaking around the tube

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
<th>Other intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocked tube</td>
<td>Check to see if the tube is blocked. If it is blocked attempt to unblock using warm water and a gentle pump action, may take 30 minutes.</td>
<td>If the tube is a low profile device ensure you use the feeding adapter/ extension tube.</td>
</tr>
<tr>
<td>A deflated or burst balloon</td>
<td>Check that the balloon is properly inflated. If faulty replace the tube.</td>
<td></td>
</tr>
<tr>
<td>Infection around the tube</td>
<td>Clean and dry the stoma. Seek medical review</td>
<td></td>
</tr>
<tr>
<td>Increased intra-abdominal pressure ie. from air/ gas, constipation, during vomiting/ retching</td>
<td>Try venting the tube before each feed. Monitor bowel motions and manage constipation.</td>
<td></td>
</tr>
<tr>
<td>A poorly fitting tube</td>
<td>Perhaps the child has grown/ gained weight. Perhaps the child has lost weight. Consider replacing the tube</td>
<td></td>
</tr>
<tr>
<td>Delayed gastric emptying</td>
<td>Seek a medical / surgical review</td>
<td></td>
</tr>
</tbody>
</table>

### Leaking through the tube

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
<th>Other intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>A problem with the feeding tube</td>
<td>Check if the tube is blocked by gently flushing it. Check the tube lid seals properly.</td>
<td>The tube may need to be replaced.</td>
</tr>
<tr>
<td>The anti-reflux valve in the low profile device may be stuck open or be broken.</td>
<td>Using the adaptor, flush the tube several times using warm water to try to un stick the anti-reflux valve. If this does not stop the leaking, the valve may be broken and the button will need to be replaced</td>
<td>Always use the feeding adaptor. Flush frequently with water through the adaptor. Never put a syringe directly into the feeding tube. The pressure from the syringe can break the anti-reflux valve.</td>
</tr>
</tbody>
</table>
Red and irritated skin around the stoma site 3. 5. 11. 13.

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
<th>Other intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection due to excessive moisture or pressure.</td>
<td>Clean and dry the site 2-3 times / day. Keep uncovered if possible.</td>
<td>Swab site and send for bacteriological culture. A bacterial infection may require oral or topical antibiotics</td>
</tr>
<tr>
<td>Skin breakdown</td>
<td>Clean and dry the site, apply a barrier cream and seek medical advice.</td>
<td></td>
</tr>
</tbody>
</table>

Stomach fullness / bloating 3. 5. 11. 13.

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
<th>Other intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delayed gastric emptying</td>
<td>Seek medical / surgical review</td>
<td></td>
</tr>
<tr>
<td>Bowel obstruction</td>
<td>Reduce/ cease feeds and seek medical review. Return to previous strength and volume tolerated and advance very slowly.</td>
<td></td>
</tr>
</tbody>
</table>

Tube blockage 3. 5. 11. 13.

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
<th>Other intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not flushing correctly. Formula left in the tube to curdle</td>
<td>Flush with warm water, using gentle pump action, may take 30 minutes Review flush volume and frequency. Check preparation of feed for lumps ie. poor mixing etc</td>
<td>Blockage risk is reduced by using a feeding pump to deliver a steady rate over a longer duration. Gastrostomy tubes are less prone to blocking due to their shorter length and larger bore. Very fine bore tubes may need to be flushed even more frequently ie two-hourly</td>
</tr>
<tr>
<td>Poorly crushed medication</td>
<td>Flush with warm water, using gentle pump action, may take 30 minutes. Review medications and administration technique.</td>
<td>Review medications</td>
</tr>
<tr>
<td>Pureed food put down the tube (not recommended)</td>
<td>Check that parent/ carer is not putting puree food down tube.</td>
<td></td>
</tr>
</tbody>
</table>
# Vomiting and Nausea

<table>
<thead>
<tr>
<th>Causes</th>
<th>Action</th>
<th>Other intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constipation</td>
<td>Seek medical / surgical review</td>
<td></td>
</tr>
<tr>
<td>Delayed gastric emptying</td>
<td>Seek medical/ surgical review.</td>
<td></td>
</tr>
<tr>
<td>Inappropriate feeding position</td>
<td>Ensure the infant or child is in the correct position during and for 30 minutes after feeding.</td>
<td></td>
</tr>
<tr>
<td>Bolus volume too large</td>
<td>Review feeding regimen</td>
<td></td>
</tr>
<tr>
<td>Feeding too quickly</td>
<td>Cease feeds for at least 1 hour and resume at a slower rate.</td>
<td></td>
</tr>
<tr>
<td>Hyper-osmolar feed</td>
<td>Review formula, consider iso-osmolar.</td>
<td></td>
</tr>
<tr>
<td>Feed is too cold</td>
<td>Formula to be at room temperature</td>
<td></td>
</tr>
<tr>
<td>Obstruction</td>
<td>Cease feeds immediately. Seek medical review.</td>
<td></td>
</tr>
<tr>
<td>Build up of air/ gas in the stomach</td>
<td>Regularly vent the stomach before feeding</td>
<td></td>
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Issues in long term enteral feeding

Transition from Tube to Oral Feeds 1. 2. 3. 5. 11.

Transitional feeding

Transitional feeding describes the process by which a tube-fed patient returns to an oral diet and ceases tube feeding. The ultimate goal of transitional feeding is that the patient’s full nutritional needs will be met with oral intake alone. Ideally, the transition will be a smooth process, which may take a few days or several weeks. Abrupt cessation of tube feeding is not recommended, as nutritional status may be compromised. Reductions in the tube-feeding rate should be made in proportion to increases in oral intake.

Options for transitional feeding

Transitional feeding strategies aim to promote the patient’s normal appetite and encourage an increase in oral intake, so that reliance on the tube feeding is gradually reduced. Satiety and lack of appetite are common barriers to achieving an adequate oral diet.

Ceasing feeds during meal times
This aims to improve the patient’s appetite and oral intake at mealtimes. The tube feeds are stopped approximately 1-2 hours before each main meal. Feeds can resume when the patient has finished eating, or 1-2 hours afterwards.

Nocturnal feeding
Feeding during overnight hours (8-16 hours) is less satiating than daytime feeding, and therefore encourages oral intake during the day. It also has the advantage of allowing more time for patient activities such as physiotherapy. By tube-feeding overnight it is possible to satisfy nutritional requirements not met orally. The length of the overnight feeding cycle will also depend upon the patient’s tolerance of increased enteral feeding rates. A more energy dense formula (such as 1.5kcal/mL or 2kcal/mL) can be useful for meeting the patient’s needs using a lower feed rate.

Bolus feeding
Bolus feeding during the day may be used as an alternative to continuous overnight infusion. Administer bolus feeds at times separate from oral meals to minimise impact on appetite. Bolus size can be adjusted according to the intake at the previous meal.
Monitoring during transitional feeding 1. 2. 3. 5. 11

Oral intake
Food charts can be used to record the child’s oral intake. Energy, protein and fluid intake should be compared with the child’s requirements (for example by calculating the percentage of requirements being met by oral intake). The tube-feeding regimen should be adjusted accordingly, decreasing tube feeding rate or infusion time as the oral intake increases.

Fluid balance
When the rate or volume of tube feeding is reduced, it is important to monitor the patient’s fluid input to ensure that requirements are still being met. The frequency and volume of water flushes may need to be increased if the patient’s oral fluid intake remains inadequate. (This is particularly common when the oral diet has a modified texture and/or fluids are thickened). Any changes to the patient’s IV fluids should also be noted, as these often change during the transitional period, and additional (or larger) water flushes may be needed.

Swallow function
Where dysphagia has been the indicator for enteral nutrition, a speech pathologist will assess, monitor and review the patient’s swallow function. The Speech pathologist will advise on the appropriate texture and consistency of the oral diet (food and fluids) to minimise aspiration risk. The patient’s level of alertness will affect their ability to eat, drink and use strategies that assist in safe swallowing. The dietitian and speech pathologist should liaise closely, to ensure successful coordination of enteral and oral feeding for the patient.

Discontinuing enteral feeds
The goal of transitional feeding is the eventual cessation of tube feeds, but it is important that this occurs at the appropriate time and in consultation with the relevant Health Professionals (Medical, Allied Health and Nursing).

Stopping the feeds 1. 2. 3. 5. 11
In general, tube feeding may be ceased once the patient is able to maintain an adequate oral intake (for both nutrition and hydration). This may require improvement in their swallowing, their gut function, or their general wellbeing, and the time required for this will differ between individuals.

If the infant / child is able to consume 65-75% of their nutritional requirements orally, it may be appropriate to discontinue the tube feeding and use oral supplements to meet the remainder of their requirements. For other patients, it may be prudent to ensure that the full requirements can be met orally before feeds are stopped, and perhaps continue some form of nutrition support (such as intermittent tube feeding) to achieve a further improvement in the patient’s nutritional status, even when the patient has an adequate oral intake. For some patients, additional fluids, or medications, may be easier to give via the feeding tube and this may continue for some time after tube feeding has ceased.

Removing the feeding tube
The time frame for removing the tube will vary greatly between patient types and the reason for feeding tube insertion.
# References


7. American Society for Parenteral and Enteral Nutrition (ASPEN) Guidelines for the of Parenteral and Enteral Nutrition in Adult and Paediatric Patients ‘Journal of Parenteral and Enteral Nutrition 1993; 17(4); Supplement


10. NSW Health - Oro/ Nasogastric Feeding Tube for Children Policy - Policy Document PD2013 000


18. Academy of Breastfeeding Medicine Protocol Committee, ‘ABM Clinical Protocol #8: Human Milk Storage - Information for Home Use for Full-Term Infants’, Breastfeeding Medicine, 2010; 5(3); 127-130


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<td>Methany, N, &amp; Titler, MG. Assessing Placement of Feeding Tubes. American Journal of Nursing, 2001; 101(5); 36-45.</td>
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<td>Hendry PJ, Akyurekli Y, McIntyre R, Quarrington A, Keon WJ. Bronchopleural complications of oro/nasogastric feeding tubes. Critical Care Medicine 1986; 14(10); 892-4</td>
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<td>The Children’s Hospital at Westmead, Homecare Guidelines: Gastrostomy Homecare - 0/C:06:8314-01:01 November 2009</td>
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<tr>
<td>40</td>
<td>The Children’s Hospital at Westmead, Homecare Guidelines: Transpyloric Feeding Tubes Aug 2010</td>
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Appendices

To accompany the ‘Paediatric HEN - Tube Feeding - A Multidisciplinary Resource for Health Professionals’, the Kids on HEN Project Working Party also developed:

1. a series of Factsheets for the Parents/ Carers of Infants/ Children on HEN
   - ‘What is tube feeding’
   - ‘Your Child’s Tube Feeding Formula’
   - ‘Looking after your Child’s Feeding Equipment’
   - ‘Caring for your Child’s Nasogastric Tube’
   - ‘Your child’s new gastrostomy button’
   - ‘Common problems with your child’s gastrostomy’
   - ‘Trans-Gastric Jejunal Device’
   - ‘Common Problems with tolerance’
   - ‘Transitioning from tube to oral’
   - ‘A Clean Mouth is Crucial for Children with Special Needs’

2. tools to improve communication / coordination of care
   - Parent / Carer HEN Education Checklist
   - Paediatric Discharge on HEN Checklists
   - HEN Summary