Adult Enteral Nutrition Clinical Practice Guideline

EVIDENCE INFORMED PRACTICE TOOLS

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Winnipeg Regional Health Authority
Caring for Health
Office régional de la santé de Winnipeg
À l'écoute de notre santé

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WRHA Adult Enteral Nutrition
Clinical Practice Guideline

This Clinical Practice Guideline does not replace sound clinical judgment or WRHA site policies, but provides guidance on best practices for enteral nutrition support for adults.

Purpose and Intent

Enteral Nutrition (EN) is the provision of nutrients via the gastrointestinal tract, either orally or through a feeding tube. For the purpose of this Clinical Practice Guideline, enteral nutrition will refer to tube feeding (TF).

The decision for or against enteral nutrition should be a collaborative decision involving the patient, family/substitute decision maker, the patient's physician and other healthcare professionals involved in the care of the patient as appropriate. To promote and facilitate discussions and to support clinical decision-making related to enteral nutrition, please refer to the WRHA Adult Enteral Nutrition – Starting a Collaborative Conversation Clinical Practice Guideline http://www.wrha.mb.ca/extranet/eipt/files/EIPT-034-001.pdf
Consideration for patient discharge location is important as mode of feeding/nutrition support may affect options for discharge from an acute care facility to a long term care facility if that is required.

This clinical practice guideline is intended for use in all sectors of the WRHA and provides information relating to the initiation and monitoring of tube feeding for adults. It is intended as a resource for nurses and a reference for standards of practice for dietitians, pharmacists, nurses and physicians across the region. For information regarding tube feeding in Pediatrics, refer to WRHA Pediatric Clinical Nutrition Handbook:
http://www.wrha.mb.ca/extranet/nutrition/manuals.php

Practice Outcomes

1. Provide appropriate nutrition support to adult patients.
2. If enteral nutrition is used to provide nutrition support, ensure safe initiation and provision of enteral feeding.
3. Minimize complications of enteral feeding and standardize practice for addressing any complications that arise.

Background

This clinical practice guideline was undertaken initially as a project of the WRHA Nutrition Advisory Subcommittee to update/revise the WRHA Adult Enteral Nutrition Manual. It is the work of a multi-disciplinary group of Nutrition Support specialists in Dietetics, Nursing, Pharmacy and Medicine.

It attempts to integrate the most current research in medical nutrition therapy in order to achieve evidence-based practice. The literature was reviewed and updated using scientific and clinical practice journals, manuals and books. Recommendations were therefore made using an evidence-based decision making process. When there was a lack of literature, expert opinion was used, based on consensus from the working group members and consultation with regional experts.

Indications for Enteral Feeding

When oral intake is inadequate to meet nutritional needs or is contraindicated, and the gastrointestinal tract is at least partially functioning, enteral nutrition is preferred to parenteral nutrition (TPN) as the optimal method of nutritional support. Every effort should be made to feed via the gastrointestinal tract. However, when the gut is non-functioning/inaccessible or when complete bowel rest is required, TPN is indicated. TPN is not indicated as an option based on patient refusal of enteral nutrition option.

Enteral nutrition offers advantages over parenteral nutrition in terms of:

- May enhance immune function, maintain gut flora/integrity/function
- Ease in establishing feeding route
- Lower cost of product (TF versus TPN solution)
- Decreased risk of infection, venous thrombosis, metabolic imbalance

Enteral nutrition is indicated when a patient is unable or unsafe to orally maintain/improve nutritional status:

- Protein-calorie malnutrition (PCM) or risk of PCM with inadequate oral intake (>2-5 days)
- Normal nutritional status with prolonged inadequate oral intake (> 7-10 days)

Contraindications to Enteral Feeding

- perforation of gastrointestinal (GI) tract
- gastrointestinal ischemia (hemodynamically unstable)
- complete mechanical bowel obstruction
- complete non-mechanical bowel obstruction
- high output enterocutaneous fistula involving proximal small bowel
- inability to access GI tract

Patient/substitute decision maker consent should be obtained prior to intiating enteral feeding.

Nutritional Assessment

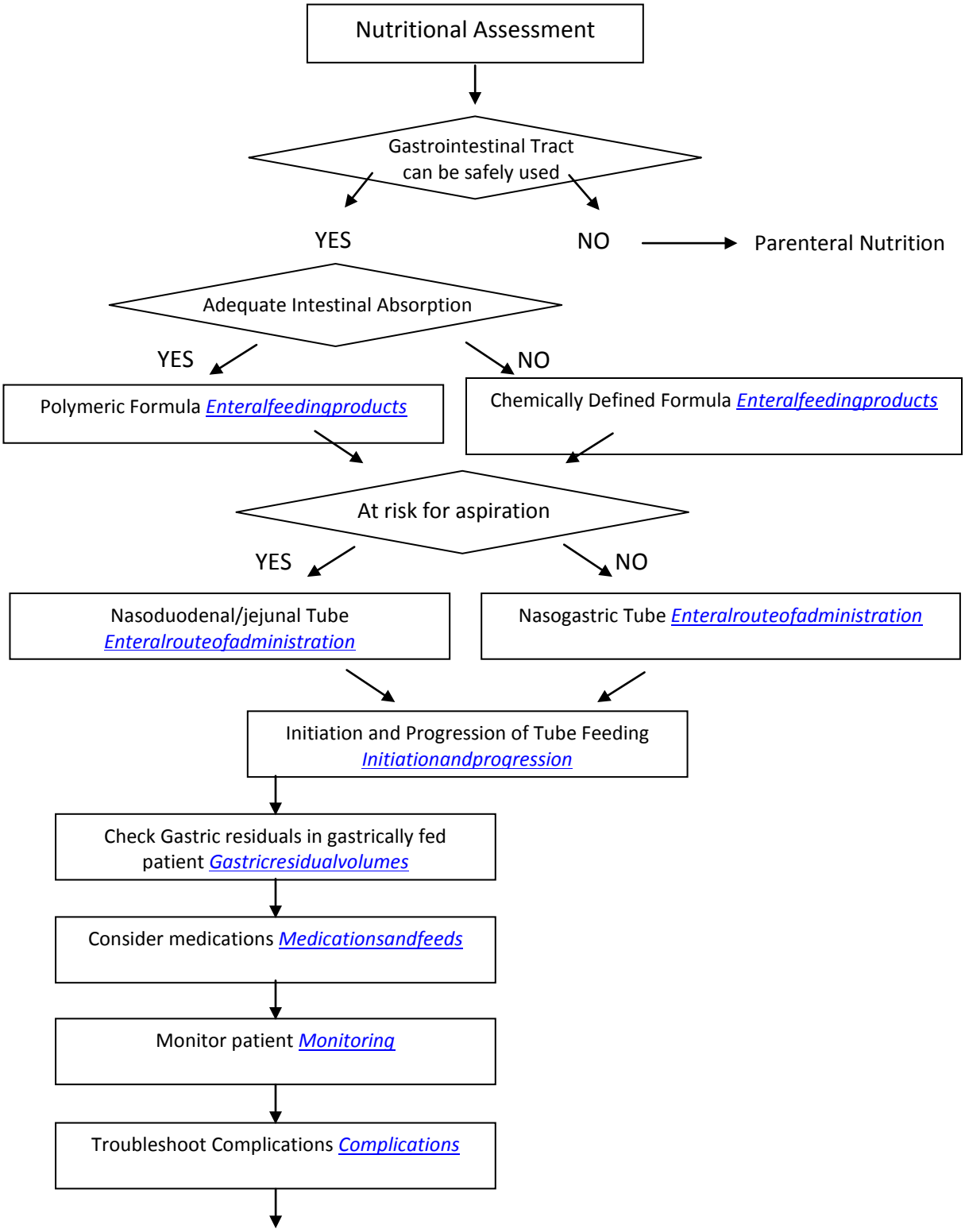
Consult the unit clinical dietitian for initial nutritional assessment, recommendations regarding appropriate enteral formula, administration and goal rate as well as ongoing monitoring of nutritional status.

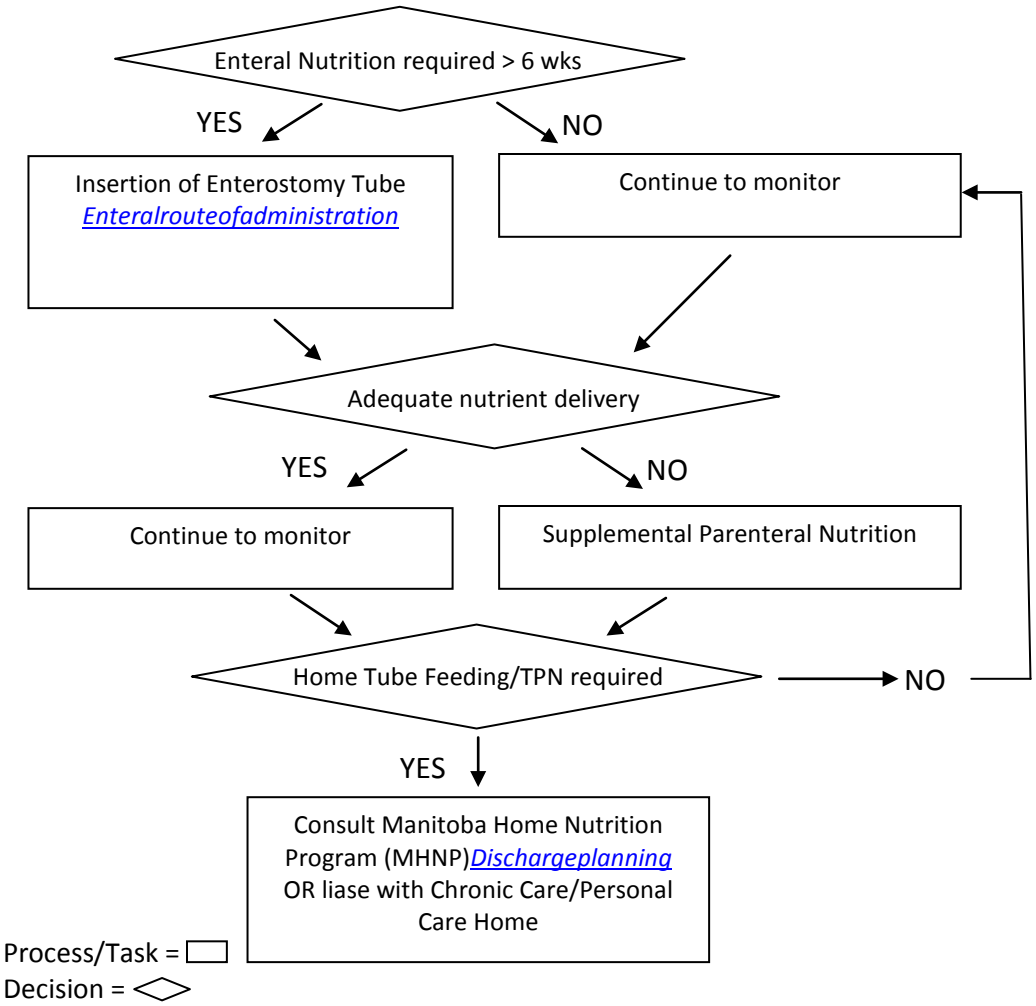
The medical order, either written or electronically ordered should specify:

- Formula requested
- Initial flow rate, progression of feeding and goal rate
- Route of administration (e.g. nasogastric (NG), orogastric (OG), jejunal, gastrostomy tube, percutaneous endoscopic gastrostomy (PEG) or PEG-jejunal)
- Volume and frequency of free water flushes per 24 hours

ALGORITHM FOR ENTERAL FEEDING ADMINISTRATION

You can move directly to specific pages by pressing control and Click on hyperlinks which are the italicized words in some process/task boxes





ROUTES OF ADMINISTRATION

The route for enteral feeding must be individualized. Factors determining the route include the condition of the GI tract and the anticipated duration of feeding. Enteral feeding may be administered by an oroenteric or nasoenteric tube or by an enterostomy tube.

ENTERAL NUTRITION ROUTES OF ADMINISTRATION

	NASOENTERIC FEEDING			ENTEROSTOMY FEEDING	
	Nasogastric[1]		Nasoduodenal/nasojejunal	Gastrostomy	Jejunostomy/ PEG_J
Expected length of enteral nutrition	< 6 weeks		< 6 weeks	> 6 weeks	> 6 weeks
Indications/ Benefits	• Easiest to insert • Most physiologic manner of feeding • Continuous or intermittent		• Indicated if not tolerating gastric feeds. Impaired gastric emptying or high risk for reflux and aspiration	• PEG is non-surgical procedure so is preferred to surgical gastrostomy • Allows feeding if nasal intubation not possible e.g. esophageal obstruction	• Allows feeding when upper GI tract not functional but normal small bowel function
Contraindications	• Complete obstruction of GI tract above or below stomach • Severe reflux • Facial or cranial trauma • Caution with esophageal varices		• Obstruction of GI tract above or below duodenum • Intolerance to small bowel feedings	• Complete obstruction of GI tract below stomach	• Distal intestinal obstruction
Type of tube used	8-14 FR Polyurethane DEHP free Non-weighted tip Inserted on ward by nurse or physician Normal insertion length 50-60 cm Can be in place for up to 30 days	8-12 FR Polyurethane DEHP free Weighted With or without radiopaque stylet (facilitates tube passage) Greater patient comfort Reduced risk of aspiration Inserted on ward by nurse or physician Normal insertion length 50-60 cm Can be in place for up to 30 days	Tube placement more difficult; optimal placement is 4th portion of duodenum or past ligament of Treitz 8-12 FR Polyurethane DEHP free Weighted or nonweighted tip Radiopaque stylet to facilitate tube passage Normal insertion length > 80 cm to pass beyond pylorus Insert in radiology, endoscopy suite or at bedside by nurse or physician **trained in proper technique**	12-28 FR silicone DEHP free Inserted in OR, endoscopy suite or bedside with endoscope Extend 30-38 cm from skin with a cap or plug Kept in place with cross-piece, tubing, bolster, external bumper or retention disk. Life span of PEG tube 1-2 years	8-12 FR passed over a guide wire into small bowel through previously placed PEG
Verifying initial placement	**Abdominal xray is gold standard** Aspiration of abdominal contents [2] Recommended length from nares to end of feeding tube = 50-60 cm		**Abdominal xray MUST BE DONE if not inserted under videoflouroscopy**	Confirmed and documented by physician at time of procedure	Confirmed and documented by physician at time of procedure

	NASOENTERIC FEEDING		ENTEROSTOMY FEEDING	
	Nasogastric	Nasoduodenal/Nasojejunal	Gastrostomy	Jejunostomy
Ongoing verification	Measure external tube length from nares to end of feeding tube every shift; Observe aspirates: gastric are grassy green, brown, clear to off-white mucous or sediment, intestinal are light to dark golden yellow or brownish-green; respiratory are watery, straw coloured or mucous with or without streaks of bright red blood	Measure external tube length from nose to end of feeding tube every shift	Mark tube where it exits and measure external length q shift; check placement routinely during continuous feeds, before intermittent feeds, during medication administration or irrigation	Mark tube where it exits and measure external length every shift; check placement routinely during continuous feeds, before intermittent feeds, during medication administration or irrigation:

[1]Orogastric tubes are used in specific areas, primarily in the Intensive Care Units. Other units primarily provide nasogastric tube feedings.

[2] Aspiration of abdominal contents:

pH measurement of contents aspirated from pre-pyloric feeding tube is only valid if stomach empty for 4-6 hours and ***is invalid if antacids have been used***

range of pH values gastric fluid 0-5
lung fluid >6
Do NOT aspirate if small bowel feeding tube used

Adapted from Perry AG, Potter DA, Ostendorf WR. 2014. Clinical nursing skills and techniques, 8th edition in Mosby Skills, Nursing Skills Online accessed May 14, 2015.

Once the tube position is confirmed the tube should be securely anchored to the nose using skin protectant and Feeding Tube Attachment Device.

If displacement of the tube is suspected hold tube feedings; consult physician. In most cases an abdominal x-ray should be done. If a complication secondary to insertion is suspected (e.g. viscus rupture) a CT may be appropriate; consult physician.

DOCUMENTATION

Documentation of the insertion time, type, size and position of the tube is done by the nurse or physician who inserted the tube.
Documentation of the external tube length from nares to end of feeding tube is done by the nurse q shift for nasogastric, nasodoudenal and nasojejunal feeding tubes.

ENFit

A new industry design standard for enteral feeding is being adopted to enhance patient safety and prevent tubing misconnections. The ENFit connector will be phased in for feeding tubes, feeding syringes and feeding administration sets.

Replacement Balloon Gastrostomy Tubes

- Refer to site policies and procedures, such as http://hschome.hsc.mb.ca/policies/wordpolocies/80/120/297.pdf
- gastrostomy tubes should be replaced when leaking, damaged, malpositioned or irreversibly occluded
- a replacement balloon gastrostomy tube is usually inserted when the gastrostomy tube tract is well formed and further endoscopy is not needed
- an inadvertently dislodged gastrostomy tube should be replaced as soon as possible because the tube tract can close within a few hours
- during the maturation process (4–6 weeks), only a physician should insert the replacement tube which is usually performed under fluoroscopy or contrast study
- once the gastrostomy tract is well matured, nurses may insert the replacement tube upon a physician's order, depending on their knowledge, experience and facility policies
- a spare replacement balloon gastrostomy tube should always be available in the facility; replacement tubes should be the same diameter as the original tube
- these tubes are made of silicone and are available in sizes 12-28 FR DEHP-free

Low Profile Devices

- Refer to site policies and procedures such as http://hschome.hsc.mb.ca/policies/policydetail.asp?=4025
- cosmetically appealing to patients but may also be beneficial to children or confused adults who tend to pull at the tube
- may decrease the likelihood of pyloric obstruction from inward migration of the tube
- composed of an internal and external stabilizer, shaft, connecting tube and an anti-reflux valve to keep gastric contents from leaking onto the skin
- may be used as a replacement device after the stoma tract has healed
- initial replacement should be performed by a physician
- choosing the appropriate shaft length is important; if the shaft is too short the patient may develop pressure necrosis of the skin. If the patient has a change in weight (10 lb/4.5kg weight gain or loss) the shaft length will need to be reassessed.
- The gastrostomy tube is made of silicone, DEHP free; PEG made of polyurethane

Surgical Feeding Gastrostomy/Jejunostomy Tubes

- surgical gastrostomy tubes are usually large bore tubes and feedings are started in 24-48 hours once gastric function returns (confirmation with the surgical team is recommended regarding initiation of tube feeds)
- surgical jejunostomy tubes are a smaller bore tube (8-10 FR polyurethane catheters)
- for replacement of the surgical feeding gastrostomy tubes refer to Replacement Balloon Gastrostomy Tubes
- for replacement of the surgical feeding jejunostomy tubes, the physician will need to replace the tube in the endoscopic, radiographic or surgical suite.

ENTERAL FEEDING ADMINISTRATION

METHODS OF ADMINISTRATION

	CONTINUOUS	INTERMITTENT	BOLUS
Usual volume delivered	25-150 ml/hr over 12-24 hours	235-500 ml over 30-90 minutes several times/day	200 – 500 ml over <15 minutes several times/day
Delivered by	Pump	Pump or Gravity	Syringe
Used for gastric feeds	Yes	Yes	Yes
Used for small bowel feeds	Yes	No	No
Risk for abdominal distention, aspiration	Low	Higher	Highest

ENTERAL FEEDING PRODUCTS

Selection of the appropriate product is based on the individual patient's medical condition, nutritional status and digestive/absorptive capabilities. Due to periodic contract changes, formulas available may change. Composition of products can change; the product label is the best source of information when exact nutrient content is required.

TYPE OF PRODUCT	POLYMERIC	CHEMICALLY DEFINED (SEMI-ELEMENTAL/ELEMENTAL)
Examples	Isosource VHN, Isosource VHP Fibre Free, Isosource HN	Vital Peptide 1.0, Vivonex Plus
Protein source	Intact protein from casein (milk), soy	Free amino acids or short-chain peptides
Fat source	Safflower, canola, soy oils (may contain others), medium chain triglycerides (MCT)	Higher MCT content than polymeric; also contain safflower, soy oil; some are very low in total fat
Carbohydrate source	Maltodextrin, corn syrup solids, soy polysaccharides (may contain others)	Maltodextrin, sucrose, cornstarch
Liquid/powder	Ready to use liquid	Ready to use liquid, powder for some
Osmolality	~ 300 – 800	~ 300 - 650
Fibre containing	May or may not	Most are low fibre
Suitable for oral supplementation	Yes	Not usually
Vitamin K content	Larger than usual oral intake	Larger than usual oral intake
Lactose Content	Low lactose content	Low lactose content or lactose free
Gluten Free	Yes	Yes

Disease Specific (Specialty) Enteral Feeding Products

Specialty enteral products designed for patients with specific medical conditions that may respond to nutrient manipulation exist. Within its mandate, the WRHA Nutrition Advisory Subcommittee establishes working groups to examine the literature for evidence supporting the use of specialty products. The following have been reviewed:

A. Disease-Specific: Diabetes/Abnormal Glucose Tolerance and Respiratory Compromise:
   - There is insufficient evidence to support the routine use of low carbohydrate, modified fat formulas for diabetes (2015) or low carbohydrate, high fat formulas for respiratory compromised patients (2002).

B. Disease-Specific: Inflammatory Bowel Disease (IBD):
   - There is insufficient evidence to recommend Modulen IBD over other enteral formulas as nutrition therapy for inducing remission in IBD (2014)

C. Immune Enhancing:
   - Peptamen AF is considered safe for use in most populations; there are some populations that should not be fed with Peptamen AF and for those it is recommended that the physician be consulted prior to use and contraindications reviewed.

D. Open versus Closed Feeding Systems:
   - There is insufficient evidence to recommend the use of closed systems as superior to open systems with appropriate infection control practices (2014).

As new evidence is available, these will be reviewed again and other new products will be reviewed to determine whether there is sufficient evidence to suggest that a product be recommended for use as nutrition therapy and added to the WRHA Enteral Formulary. In order for a product to be added to the formulary a WRHA Enteral Parenteral Nutrition Formulary Addition Request form must be completed. See Appendix A.

Modular Nutrient Sources

Protein, carbohydrate and fat are available in modular form. They can be used to more closely meet a patient's nutritional requirements. When modular products are added to enteral nutrition products they should be added in a sterile tube feeding room if added directly or given as a flush if provided at the bedside as per the clinical dietitian's recommendations.

PRODUCT	NUTRIENT PROVIDED	Rationale
Beneprotein®	Protein (whey protein isolate)	Used when protein needs are not met by enteral product alone
Medium chain Triglycerides ®{MCT oil)	Fat as MCT oil	Used when patient is unable to hydrolyze long chain fats, has poor mucosal absorption of LCT or defective lymphatic transport of fat; ketogenic diets
Polycal®	Carbohydrate	Carbohydrate/energy supplement (e.g. when patient on protein restricted diet)
Glutamine	Amino acid glutamine	Conditionally essential amino acid for $\geq$ 20% total body surface area full thickness or partial thickness burns

Water Requirements

- water requirements are based on the patient's fluid status
- the volume of water from all sources (i.e. enteral feeding, flushes, intravenous and oral, water given with meds) should be calculated and measured against requirements
- water requirements in a normal, healthy adult are 1 mL/kcal
- the amount of additional water needed depends on the free water content and concentration of formula used
    - In most commercial tube feeding formulas with caloric densities of 1 kcal or 1.5 kcal/mL approximately 80% of the product volume is free water
    - For products with caloric densities greater than 1.5 kcal/mL approximately 70% of the product volume is free water.

INITIATION AND PROGRESSION

Handling and Storage of Tube Feed Products/Minimize Bacterial Contamination of Tube Feeds

- Unopened tins/tetra-briks of tube feeding should be stored at room temperature. Stock should be rotated to prevent use of out-of-date products. Discard products that have exceeded manufacturer's expiration date.
- Use good hand washing technique when decanting formula and handling delivery sets.
- Once a tin/tetra-brik is opened, cover unused portion with plastic wrap, label with date and time and store in refrigerator. Discard all opened containers if not used within 24 hours.
- Products that require reconstituting should be mixed in a central location (e.g. tube feeding area of kitchen) following food safety procedures.
- Products reconstituted and/or specially prepared on site are sent to the units in dated containers. Upon arrival to the nursing unit, refrigerate immediately and until use. If not used within 24 hours, discard.
- If a patient does not tolerate cold formula, place a measured amount of formula in a lukewarm water bath to remove the chill.

Tube Feeding (General Guidelines)

- all tube feedings should be shaken well prior to use.
- formula should be administered at room temperature. Heating could alter the nutritional composition and cold formula may cause gastric discomfort because the liquid is not warmed by the mouth and esophagus. If an intermittent feed needs to be warmed, place a measured amount of the formula in a lukewarm water bath to remove the chill.
- fill the container and flush the tubing with the formula to remove the air in the tubing. This prevents excess air from entering the gastrointestinal tract once tube feed is initiated.
- document the type and volume of formula and the amount of free water given.
- formula (open enteral system) can be hung safely at room temperature up to 8 hours or as per site policy; hang time for special mixes should not exceed 4 hours.
- monitor the patient's tolerance to the tube feeds: bowel sounds, abdominal distention, nausea/emesis, gastric residual volumes, diarrhea, constipation, intake/output, respiratory pattern, daily weight and serum chemistry.
- notify the physician and dietitian of the patient's intolerance to the tube feeding.
- tube feeding bags are dated and changed every 24 hours or as per site policy; cap is attached to pole.

- minimize disruption in providing enteral nutrition when patient must be NPO for procedures or tests. Whenever possible and in the best interests of the patient, elective procedures should be prebooked/given scheduled elective time. The NPO time should be based on the type of procedure, e.g. procedures not involving the GI tract such as orthopedic limb and plastic procedures or tracheostomy for a ventilated patient may have feeds continue until call to the OR and gastric suctioning done prior to leaving unit IF anesthetist/surgeon agreeable.

Reducing the Risk of Pulmonary Aspiration

- elevate the head of the bed 30 – 45 degrees during tube feeding administration unless contraindicated
- maintain 30 - 45 degree position for 1 hour post intermittent feedings
- monitor for intolerance of tube feeding: nausea/emesis, abdominal distention, increased gastric residuals, abdominal discomfort and decreased bowel sounds
- administer tube feeding post pylorus for patients who are at risk for gastric aspiration
- the use of dye and other colorants for the purpose of detecting or monitoring potential pulmonary aspiration is prohibited
- the addition of blue dye to enteral feeds in order to detect pulmonary aspiration is poorly standardized, has low sensitivity for detecting aspiration and has been associated with deaths in critically ill patients due to absorption of the colouring
- See WRHA Directive http://home.wrha.mb.ca/prog/phamacotherapy/files/AddofDyetoTubeFeedsMar_000.pdf

Gastric Residual Volumes

The use of gastric residual volumes (GRV) as a predictor of tube feed intolerance is controversial and may not be based on physiologically sound information. There is no consensus in the literature on the level of GRV that is considered safe with thresholds ranging from 120-500 mL.

GRV should only be checked for patients receiving gastric feeds. Do not aspirate small bowel feeding tubes for residual volumes.

GRV can vary with patient position (supine vs. upright), tube position (antrum vs. fundus), tube type (small bore vs. large bore), size of the aspirating syringe, and method of feeding (bolus vs. continuous).

GRV should be considered in the context of the patient's disease, medications and electrolyte abnormalities which may lead to an ileus or delayed gastric emptying. The risk of aspiration may be increased in patients with trauma or head injury, altered mental status or those heavily sedated and/or on catecholamines. Prokinetic agents may be useful in some patients.

Endogenous secretions should also be considered. Physiologically, it has been estimated that a daily contribution of 1500 mL of salivary output and 3000 mL of gastric secretions would generate an average of 188 mL/hr of endogenous secretions alone in the normally fed adult. In addition, tube feeds may infuse at rates of 25-125 mL/hr. Assuming gastric emptying of 35-50% per hour, GRV may vary 279-464 mL in 4-6 hours. This should be considered in the decision to hold tube feeds based on GRV. Stopping at low arbitrarily selected volumes may not be clinically appropriate or physiologically sound.

GRV have a low sensitivity as a marker for aspiration. Low GRV does not guarantee tolerance to feeding and a single high GRV does not necessarily predict intolerance because subsequent values may decrease. A trend may be more valuable than the use of a cut off value. Increases in GRV may precede clinical deterioration or sepsis.

Monitoring GRV for all patients, as a rule:

- **stop feeding immediately for overt regurgitation and aspiration**
- check GRV q4h for continuous feeds or prior to each intermittent feed. Frequency may be reduced once goal regime is achieved and tolerance is well established
- **if GRV ≤ 200 mL (unit patient) or ≤ 500 mL (ICU patient),** refeed aspirate, continue TF, recheck GRV in 4 hours
- **if GRV > 200 mL (unit patient) or > 500 mL (ICU patient),** discard aspirate, hold TF, notify physician
- use GRV in combination with other assessment parameters.

Care of the Patient with Nasal/Oral Feeding Tubes

- daily inspection of the mouth, nares and pharynx for ulceration, skin irritation, coiled feeding tube, pressure necrosis and lesions.
- clean nares daily with warm water.
- check the tape on the nose or mouth or the fixator device and change every 3-5 days or as needed; pressure necrosis may occur from incorrect taping.
- perform oral hygiene q 2 hours.

Care of the Patient with a Gastrostomy/Jejunostomy

- for additional information on the procedure see http://hschome.hsc.mb.ca/policies/wordpolicies/80.120.295.pdf
- for the first 48 –72 hours the stoma tract is considered an open wound; dressings of drainage sponge or pre-cut gauze are to be placed over the feeding tube/stoma and the skin should be cleansed with sterile normal saline and dried thoroughly (or as per facility P+P).
- after 48 – 72 hours the healed stoma should be left open to air without a dressing and the skin should be cleansed with soap and warm water and dried thoroughly (or as per facility P+P).
- carefully clean under the discs/bumpers/bolsters to keep them dry.
- observe the skin for signs of infection: foul- smelling drainage, unusual tenderness, swelling or redness
- check for excessive pressure from the external bumpers and discs; they should be just above the skin level. Skin disc is initially kept tight against abdomen to ensure stomal tract develops. Position of the skin disc should not be adjusted for the first 4 weeks. Monitor position and document q shift.
- after 4 weeks external bolster should be positioned to allow approximately 0.5 – 1 cm space between abdomen and bumper/retention disc when disc is gently pulled up.
- dressings should not be placed under the external bolster as the dressing may cause the internal bolster to apply pressure to the stomach wall which may force the tube out of the stomach and into the peritoneum.
- if a dressing is required, only a single layer of gauze should be placed under the bumper/retention disk.
- After stoma has matured, for balloon and PEG gastrostomy tubes only: rotate tube 360 degrees daily to prevent tube from adhering to sides.
- do not pinch gastrostomy tubing .
- if a peristomal wound infection should occur, topical antibiotics (medical order required) may be prescribed or consult nutrition support nurse/wound care specialist. If not improving or more severe infection, systemic antibiotics and/or infectious disease consult may be required.

- hypergranulation tissue may develop if the site remains moist and can be eliminated by cauterizing with silver nitrate sticks (medical order required) or application of hydrocortisone cream 1.0 % twice daily topically and reassess in 5-7 days. In the home environment, when mild cases of hypergranulation tissue are present and the peristomal skin is intact, warm salt water compresses can be used as a less invasive treatment. To reduce and prevent hypergranulation tissue by this method:
    - Dissolve 1-2 teaspoons of table salt with 120 mL warm water.
    - Soak gauze in warm salt water solution and apply to stoma (hypergranulation tissue) for 5-10 minutes, 3-4 times per day for 7-14 days.
    - Solution made should be discarded daily.
- **maintain good oral hygiene.**

Tube Stabilization (Gastrostomy/Jejunostomy)

- gastrostomy tubes may have anchor sutures which may be removed once the tract is healed (physician order needed to remove the sutures)
- jejunostomy tubes usually are secured with sutures at all times
- if a balloon replacement tube is used, the water in the balloon is to be checked 1 x/week

Maintenance of Feeding Tube Patency

To ensure tube patency:

- schedule routine water flushes of the tube (minimum 20 mL for adults) every 4-6 hours for continuous feedings as well as before and after each intermittent feeding, medication administration and after checking for gastric residuals; use 60 mL syringe for flushes as smaller syringes may provide too much force and cause damage to the tube
- if tube is not in use, flush twice daily with minimum 30 mL water (use sterile water in patients who are immunocompromised)
- check with the pharmacist regarding compatibility of medications given into the tube or use of medication elixirs; refer to Medications and Enteral Nutrition Section, page 15
- refer to the Mechanical Complications Section for further recommendations, page 17

Obstructed Feeding Tubes

Causes of tube occlusion include:

- formula residue or coagulation of intact protein formulas
- lack of routine tube irrigation/flushing
- medication/formula interaction
- inadequate crushing of medications given through the tube
- frequent withdrawal of gastric contents
- to restore tube patency, refer to the Mechanical Complications Section and to site specific policies and procedures, page 17

Replacement of Feeding Tubes

- nasal/oral tubes should be replaced only when it is necessary (e.g. problems at the site of insertion or occlusion of the tube)
- gastrostomy tubes should be replaced when there is malfunction, breakage of the balloon, occlusion or degradation of the tube
- refer to Replacement Balloon Gastrostomy Tubes page
- gastrostomy tubes should be replaced every 6 months
- **whenever a tube is replaced, placement of the new tube should be verified**

MEDICATIONS AND ENTERAL FEEDING

Every available drug form has the potential to cause undesirable effects or interactions with enteral feeding formulas when administered to the tube-fed patient. Undesirable effects include: gastrointestinal intolerance due to the high osmolality of the medication, or occlusion of the feeding tube by drug particles or viscous syrups. Interaction can occur with feeding formulas, thereby altering the rate and/or absorption characteristics of the drug. Small bowel feeding tubes are narrow, curve throughout the bowel and are therefore very prone to "plugging", especially with solid or crushed medications. Administer medications via the oral route when possible.

When medications are to be administered though the feeding tube the following guidelines apply:

- Use the liquid dosage form whenever possible. **If the medication is available as a solid only, check with the pharmacist prior to crushing, as this may alter the absorption characteristics of the medication or plug the tube.** Elixirs and suspensions are generally favoured over syrups.

- Dilute hypertonic medications with 10-30 mL of water; crush tablets to a fine powder and mix with 30 mL water unless otherwise instructed. Capsules may be opened in some circumstances – **check with pharmacy. If the medication contains a significant amount of sorbitol, is enteric-coated, is hazardous/cytotoxic or is a sustained-release preparation, then an alternative dosage form should be considered.**

- When drawing up medication, syringes designed for intravenous use should not be used.

- Each drug must be administered separately. Flush the tube with 15-30 mL of warm water before administering the drug, and with 5-10 mL of warm water between each drug. Flush tube with 15-30 mL water after last medication given, before resuming feeding. Use a syringe no smaller than 60 mL to avoid excessive pressure and potential tube rupture. Flushing clears the tube, helps to propel the drug into the gastrointestinal tract and warns you if the tube is plugged. In some cases, flushing volumes may need to be revised to meet patient fluid restrictions.

- Reconnect feeding bag unless otherwise indicated. For example, with some medications, (phenytoin, warfarin or any other therapy where the absorption of the medication is significantly impaired with continuous feeding), one alternative is to have enteral feeds held at least one to two hours prior to and after the dose. Adjustment of the tube feeding regimen may be needed to account for any downtime of the formula infusion; see Appendix B.

- In some situations, enteral feeding may be continued unaltered, and the drug dosage of the interacting medication titrated upward to override the interaction (e.g. phenytoin, warfarin, ciprofloxacin). The pharmacist should assist with the dosing of these patients.

- Do not mix drugs directly with the enteral formula as this may lessen the therapeutic effects of the drug and/or disrupt the feeding emulsion.

- For specific examples, refer to Appendix B.

MONITORING

Nutritional/Metabolic Parameters

The following parameters are useful in assessing nutritional and metabolic status prior to and during enteral nutrition support.

Suggested Monitoring of Enteral Feeding°*

Parameter	*Critical Illness/Initiation of Feeding*	*Stable Patients*	*Long term monitoring of stable patients***
Body Weight	Daily[a]	Weekly	Monthly
Intake/Output	Daily[a]	Daily	Daily
S-albumin	Weekly[b]	Weekly[b]	q6 months
S-prealbumin	Weekly[b]	Weekly[b]	As per medical order
S-sodium, S-potassium	Daily, then 3x/week	1-2x/week	q 6 months
S-urea, S-creatinine	Daily, then 3x/week	1-2x/week	q 6 months
S-glucose	Daily	Weekly[c]	As per medical order
S-calcium, magnesium, S-phosphate	Daily, then 2-3x/week	Weekly	q 6 months
Liver function tests	Weekly	prn	As per medical order
Bowel function	Daily	Daily	Daily

***** Frequency of monitoring should be increased if problems are suspected.
** ***Suggested*** frequency of monitoring for chronic/long term care setting or patients in home setting; follow site policy/medical orders/Manitoba Home Nutrition Program recommendations.
[a] Daily weight changes are indicative of fluid shifts and may not be relevant to nutritional status.
[b] Not useful when patient in catabolic phase of illness.
[c] If patient has diabetes or is undergoing steroid therapy, increase frequency of monitoring.

° Adapted from Dietitian's Handbook of Enteral and Parenteral Nutrition, 2nd Ed., Skipper, A (ed). 1998, p.452.

COMPLICATIONS ASSOCIATED WITH ENTERAL NUTRITION

Mechanical Complications Associated with Enteral Nutrition

Complication	Usual Cause	Management Considerations
Nasopharyngeal irritation, nasal/mucosal erosions, esophageal/laryngeal ulceration and stenosis, acute sinusitis	• Prolonged use of large bore feeding tube	• Use soft, small bore (<10 F) feeding tube. • Position and tape tube to reduce pressure on nares; use other nostril for tube placement. • Remove tube for severe sinusitis • Consider gastrostomy/jejunostomy feeding tube. • Appropriate medical intervention if infection is present, i.e. antibiotic therapy.
Obstruction of the feeding tube	• Administration of medications via the feeding tube	• Use liquid form of the drug (i.e., elixirs/suspensions rather than syrups) when possible. Check with the pharmacist prior to crushing/diluting medications due to potential altered pharmacologic effect. • Do not add medications directly to the enteral formula. • Do not mix medications together; administer separately and flush tube with 10-15 ml of warm water between medications using a 60 mL syringe. • Avoid instilling bulk-forming agents down the feeding tube (e.g. metamucil). • Attempt to restore tube patency by irrigating tube with warm water first using 60 mL syringe. • If tube remains clogged contact physician. The following solution may be tried with physician order: • Activated pancreatic enzyme [1 tablet Pancrelipase (VIOKASE 10, 440 units) and 1 tablet sodium bicarbonate (325 mg) crushed and dissolved in 5 mL warm water]. Instill solution with 60 mL syringe, wait 5-20 min; irrigate with warm water.

Complication	Usual Cause	Management Considerations
	• Precipitation of casein protein due to formula contact with acidic fluid	• Flush feeding tube with 20-30 ml water using 60 mL syringe pre and post checking gastric residual volume to minimize mixing of formula with acidic gastric juice.
	• Inadequate flushing of feeding tube	• Flush feeding tube with 20-30 ml water q4-6h using 60 mL syringe if on continuous feeds/ pre and post each intermittent/bolus feeding.
Tube displacement	• Coughing, vomiting	• Replace tube and verify position by abdominal x-ray (gold standard) or aspirating gastric contents and testing pH if NPO for at least 4 hours and not on antacids. All small bore feeding tubes must have gastric or small bowel placement confirmed by x-ray before initial use.
Buried bumper syndrome	• Excessive traction between internal and external bumper; malnutrition, poor wound healing, weight gain, stiff internal bumper (polyurethane)	• Allow 1.5 cm of space between external bumper of PEG tube and skin; mobilize and loosen PEG from outside every other day; buried tube will need to be pulled out and replaced with a new pull type following insertion of a guide wire through the tube; deep impaction will require surgical intervention

Gastrointestinal Complications Associated with Enteral Nutrition

Complication	Potential Cause	Management Considerations
Nausea, vomiting, abdominal cramps, distention	• Ileus, partial or complete bowel obstruction	• Hold tube feeding and investigate possible gastrointestinal pathology.
	• Medications	• Review of medications (e.g. narcotics, chemotherapy, inotropes , antibiotics). • Assess need for antiemetics.
	• Inappropriate formula administration (rapid increase in rate/volume)	• Initiate and advance formula rate gradually (see Initiation and Progression); temporarily reduce rate then advance in 10-25 ml increments Q4 to 12 hours or as tolerated. • Try low fat, low fibre formula.
	• Lactose intolerance	• Use low-lactose formula.
	• Nutrient malabsorption	• Use formula with hydrolyzed nutrients.
	• Infusion of cold formula	• Feed formula at room temperature. • Remove formula from refrigerator in time to allow it to warm to room temperature, or use warm water bath but **DO NOT** heat formula.
High gastric residuals	• Delayed gastric emptying	• Check gastric residuals before each intermittent feed, or every 4 hours for patients on continuous feeds. Hold feeds if not within accepted guidelines (see Gastric Residual Volumes). • Elevate head of bed 30°or more. • Consider prokinetic medications. • Consider feeding into small bowel past the ligament of Treitz. • Try energy dense product.
	• Gastric outlet obstruction	• Hold tube feed and investigate possible gastrointestinal pathology.
Aspiration	Reflux secondary to: • Delayed gastric emptying	• Administer feeds by continuous infusion using an enteral feeding pump.

Complication	Potential Cause	Management Considerations
	• Medications that relax the lower esophageal sphincter • Altered gag reflex • Decreased level of consciousness • Dysphagia	• Check gastric residuals as above. • Feed into the small bowel past the ligament of Treitz.
	• Displaced feeding tube in pharynx, esophagus or lung	• Monitor tube position by aspirating gastric contents or x-ray. Reposition/replace if necessary. Refer to site specific nursing policies and procedures.
	• Head of bed not elevated adequately	• Elevate head of bed 30° or more during feeding and one hour post intermittent/bolus feeding.
Constipation	• Dehydration	• Assess fluid status; supplement fluid as required.
	• Inadequate fibre intake	• Use fibre-containing formula. • Ambulate patient when possible. • Investigate possible gastrointestinal pathology before using laxatives, prokinetic agents and enemas.
	• Fecal impaction	• Rectal exam and digital disimpaction. • Stool softener and laxative. • Assess fluid status and supplement fluid as required.
Diarrhea	• Infection/Enteric Pathogens	• Check stool for C. difficile toxin or other pathogens. • Appropriate antibiotic treatment (Metronidazole or Vancomycin) if toxin positive, endoscopic confirmation or empirically in severe cases pending investigations.
	• Concomitant medications, e.g. antibiotics, sorbitol-containing elixirs, hypertonic medications, antacids containing magnesium, electrolyte supplements	• Review current medications. • Discontinue or substitute antibiotics whenever possible. • Discontinue sorbitol-containing elixirs and substitute with alternative form of the medication i.e. tablet form. • Administration of probiotic: Lactobacillus acidophilus preparation to help restore normal gastrointestinal flora. • Dilute medications with a minimum 30 ml water to reduce osmolality, if not fluid restricted.

Complication	Potential Cause	Management Considerations
		• Administer anti-diarrheal agents as clinically indicated when other causes ruled out.

	• Maldigestion/malabsorption secondary to:
	  • Mucosal atrophy
	  • Decreased pancreatic enzyme activity
	  • Hypoalbuminemia (<25g/l)
	  • Severe malnutrition
	  • Diarrhea related to: e.g. short bowel, bile salt malabsorption, IBD, celiac disease, radiation enteritis
		• Use a low fat formula.
		• Use an elemental formula.
		• Administer pancreatic enzymes as indicated.
		• Investigate micronutrient/ macronutrient deficiencies.
		• Appropriate treatment of underlying disease/condition.

	• Lactose Intolerance	• Use a low-lactose formula (most commercial formulas are low lactose).
	• Inappropriate increments in tube feed volume	• Initiate and advance formula rate gradually (see Initiation and Progression). • Temporarily reduce rate to previously tolerated level, then advance by 10-25 ml increments as tolerated. • If on intermittent/bolus feeding, change to continuous feeding.
	• Bacterial contamination of formula/equipment	• Use clean handling technique for preparation, transfer and administration of formula. • Change feeding bags, delivery sets and syringes every 24 hours (label with date and time) or as per facility policy and procedure. • Fill tube feeding bag with a maximum eight hour supply of formula or 4 hours for special mix formula. • Refrigerate opened, unused formula and discard after 24 hours (label with date and time)

Metabolic Complications Associated with Enteral Nutrition

Complication	Potential Cause	Management Considerations
Hypernatremia	• Dehydration	• Appropriate rehydration. • Monitor fluid balance (accurate intake/output record, weight and serum electrolytes).
	• Excessive sodium (Na) intake	• Assess sodium intake (intravenous and enteral).
Hyponatremia	• Overhydration	• Restrict free water. • Diuretic therapy if indicated.
	• Excessive sodium loss • Low sodium intake	• Under physician's direction, increase sodium intake intravenously or by the addition of table salt to the formula. • Monitor fluid balance (accurate intake/output record, weight and serum electrolytes).
Hyperkalemia	• Metabolic acidosis • Renal failure	• Correct metabolic acidosis. • Assess renal function.
	• High potassium (K) intake	• Assess potassium sources, (content of tube feed, therapeutic supplementation).
	• Excessive potassium supplementation	• Change tube feed product if necessary. • Restrict or discontinue potassium supplementation.
Hypokalemia	• Low potassium intake • Diuretic therapy	• Potassium supplementation. • Reassess diuretic agent.
	• Excessive losses (diarrhea, emesis, malabsorption)	• Replace gastrointestinal losses.
	• Severe malnutrition • Refeeding syndrome	• See Refeeding syndrome (below).
Hyperphosphatemia	• Renal failure	• Assess renal function.
	• High phosphorous (PO_4) intake	• Assess phosphorous sources (content of tube feed, therapeutic supplementation).
	• Excessive phosphorous supplementation (laxative/enema with phosphate salts)	• Change tube feed product if necessary. • Phosphate binders.

Complication	Potential Cause	Management Considerations
Hypophosphatemia	• Excessive losses (diarrhea, emesis, malabsorption) • Severe malnutrition • Refeeding syndrome • Drug-induced (phosphate binding antacids, steroids, insulin).	• Phosphate supplementation. • See Refeeding syndrome (below). • Review medications.
Hypermagnesemia	• Renal failure • Dehydration • High magnesium (Mg) intake • Excessive magnesium supplementation (Mg containing medications, antacids, laxatives)	• Assess renal function. • Assess magnesium sources (content of tube feed, therapeutic supplementation). • Change tube feed product if necessary. • Review medications.
Hypomagnesemia	• Excessive losses (diarrhea, emesis, malabsorption, large wounds/burns) • Severe malnutrition • Refeeding syndrome • Drug-induced (diuretics, antibiotics, anti-neoplastic medications)	• Magnesium supplementation. • See Refeeding syndrome (below). • Review medications.
Refeeding Syndrome	• Aggressive re-institution of feeding to malnourished patients, characterized by acute intracellular shifts/ depletion of electrolytes (S-K, Mg and PO4), sodium retention, fluid overload and hyperglycemia	• Daily monitoring of electrolytes: serum potassium, magnesium and phosphorous until stable. Replace as necessary prior to initiating feeding. Continue to monitor until normal without requiring replacement. • Correct vitamin and trace element deficiencies. Consider supplementations of thiamin, multivitamin and B complex. Begin nutritional support conservatively. Start with 100-150 g of carbohydrates/day and increase to goal over 2-3 days. • Daily monitoring of serum glucose. • Monitor fluid status: accurate intake/output record and weight .

Complication	Potential Cause	Management Considerations
Hyperglycemia	• History of diabetes mellitus • Temporary insulin resistance • Corticosteroid therapy, certain antibiotics, sympathomimetic amines, hydrochlorothiazide diuretics	• Routine monitoring of serum glucose. • Administer insulin. • Treat underlying cause of hyperglycemia, i.e. infection. • Adjust medications.
Hypercapnia	• Overfeeding	• Do not overfeed total calories. • Indirect calorimetry if possible.
Fluid Overload	• Administration of large volumes of fluid (intravenous or enteral) • Use of large volumes of water to flush the feeding tube	• Monitor fluid balance (accurate intake/output record, weight and serum electrolytes, urea and creatinine). • Restrict fluid intake. • Diuretic therapy if indicated. • Select a more concentrated formula.
Dehydration	• Fever • Inadequate fluid intake • Excessive fluid losses (emesis, diarrhea or enterocutaneous fistula) • Osmotic diuresis	• Monitor fluid balance (accurate intake/output record, weight and serum electrolytes, urea and creatinine). • Supplement with additional water, either enterally or intravenously. • Review water requirements.
Low serum zinc	• Increased losses (prolonged diarrhea, gastrointestinal fistula, burns, wounds) • Acute illness	• Zinc supplementation.
Essential fatty acid (EFA) deficiency	• Severe malnutrition • Prolonged use of low fat enteral formula • Malabsorption of fat	• Adequate provision of essential fatty acids, specifically linoleic acid (3-5% of total caloric intake as EFA).

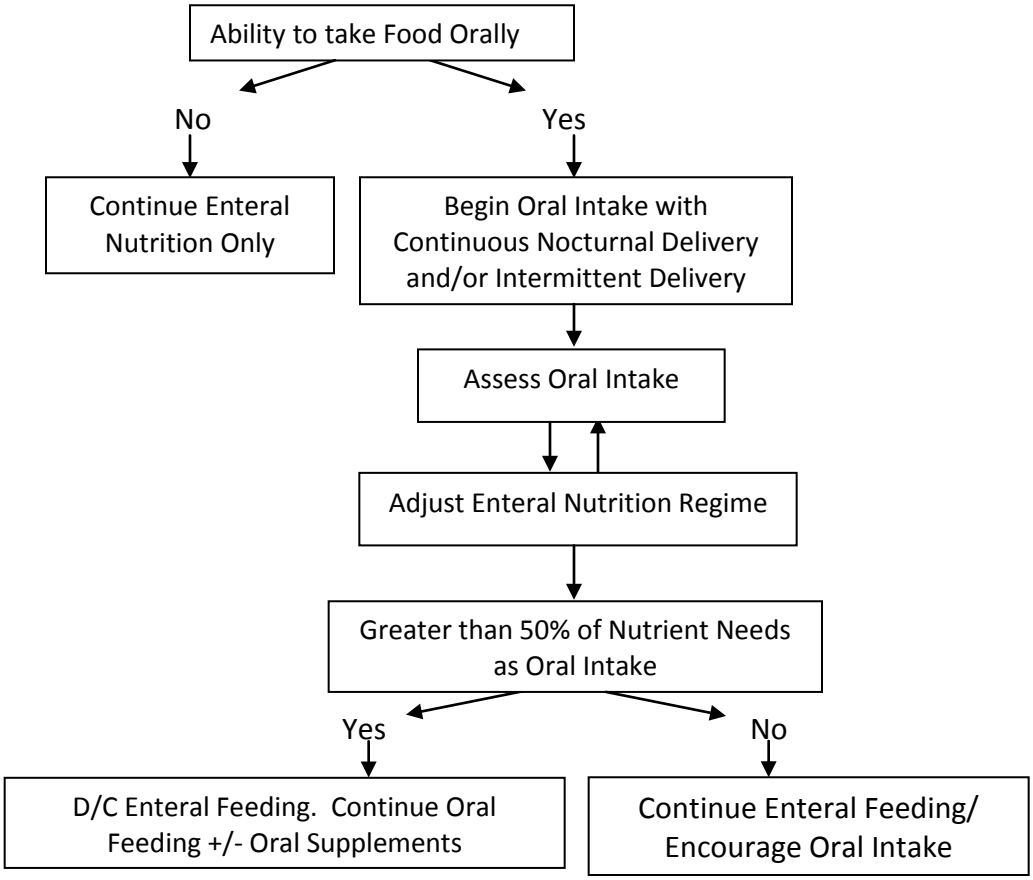
TRANSITIONAL FEEDING

Transitional feeding refers to the gradual progression from one mode of nutritional therapy to another while attempting to maintain adequate nutritional intake. In this case, patients are "weaned" from enteral nutrition to oral feeding.

General Guidelines:

- assess the patient's ability/desire to commence oral intake
- advance diet as tolerated; provide oral supplements, if indicated
- allow family/friends to bring in consistency appropriate favourite foods
- perform accurate daily calorie counts to assess oral intake
- monitor and document tolerance to feeding, e.g. dysphagia, nausea, emesis, abdominal distention, diarrhea
- gradually reduce enteral feeds depending on calorie counts/tolerance
- to stimulate appetite during the day consider cyclic tube feeding to provide 8-12 hours of feeding during the night or intermittent delivery
- discontinue enteral feeds once tolerance to oral diet is demonstrated and a consistently adequate intake is consumed (>50% of estimated requirements)
- keep enteral feeding tube patent with free water flushes until decision to remove tube is made

Transitional Feeding Algorithm



DISCHARGE PLANNING

For patients who will require enteral nutrition support outside of hospital, refer to Manitoba Home Nutrition Program: http://home.wrha.mb.ca/prog/homecare/files/sp_MHNP_overview.pdf

The Manitoba Home Nutrition Program (MHNP) is a centralized specialty multidisciplinary team managed by a Nursing/Home Care Team Manager and a Clinical Nutrition Manager. The MHNP team consists of dietitians, nurses and medical directors. This is the single point of entry for both pediatric and adult clients needing home tube feeding or home parenteral nutrition.
The referral form for the MHNP is available at: http://www.wrha.mb.ca/extranet/nutrition/forms.php

Tube feeding is a chronic care indicator, therefore there is more ease in admission to a chronic care bed (Riverview Health Centre, Deer Lodge Centre) for a patient on long term tube feeding. For patients who are being discharged to a Long Term Care (LTC) facility, coordinate discharge with LTC program if patient is accepted to a Personal Care Home (PCH) on a tube feeding or returns to their previous PCH with a tube feeding.

APPENDIX A

Winnipeg Regional Health Authority | Office régional de la santé de Winnipeg

Enteral & Parenteral Nutrition Formulary Addition Request

Send the completed form and attendant documentation to: Winnipeg Regional Health Authority
Medical Staff Office
c/o Kirsten Ryan
155 Carlton Street
Winnipeg, MB R3C 4Y1

Contact a dietician if you require assistance with the completion of this Formulary Addition Request. Print or type. Ensure complete information is submitted.

A. PRODUCT INFORMATION

☐ Enteral Nutrition Product ☐ Parenteral Nutrition Product

Product Name:

Manufacturer:

Product Description (include volume(s), concentration, container type):

☐ Ready to Use (RTU) ☐ Requires Preparation or Dilution

Cost/tin or container: $ Cost/100 kcal: $

B. JUSTIFICATION FOR REQUEST (See attached review)

Include the following information on a separate sheet of paper:

- specific indication(s) for use
- nutritional attributes
- volume to meet RNI
- special precautions/contraindications
- comparative data with available Formulary enteral or parenteral nutrition products in terms of clinical efficacy/ safety/ advantages and disadvantages

References (i.e. peer reviewed, controlled studies) to **support** these claims should be attached to the submission.

C. CRITERIA FOR USE

1. Will this replace an existing Formulary product?

☐ **YES**, specify which

☐ **NO**, list reasons why not:

2. Are you recommending this product be restricted to a specific physician, service, program or facility?

☐ No ☐ Yes If yes, specify

Reason(s) why restrictions recommended:

3a. Summarize the product's role in therapy:

3b. List specific criteria for use:

1.

2.

3.

3c. Identify the major advantages of this product that warrant it being added to Formulary.

4. Additional information in support of request (attach separate page)

D. RANKING OF NEW PRODUCT REQUESTS

*All requests for addition of new therapeutic agents to the WRHA Enteral & Parenteral Nutrition Formulary must include a ranking of **'place in therapy'** using the following scale. The level of supporting evidence must also be assessed. This ranking process should begin with the initial request submission and be reviewed / revised at each process step so that the final recommendation to the Medical Advisory Committee of WRHA includes a consensus as to **'place in therapy'** for the requested agent.*

Place in Therapy *(Check One Category)*

☐ **Category 1**. A product that provides a breakthrough or substantial therapeutic benefit or substantial advantage in safety and tolerance compared to the best available therapeutic agent for that disease.

- A breakthrough product is the first one sold in Canada that effectively treats or prevents a particular illness.
- A product yielding a substantial therapeutic benefit is one that has increased efficacy over the best available treatment for that disease or condition. The efficacy arbitrarily should be at least 25% greater than that achieved with the best available therapy with respect to clinically important endpoints.

  Clinically important endpoints may include the time required to achieve the therapeutic effect, the length of treatment required, number needed to treat, and route of administration.
- A product is considered to yield substantial advantage in safety and tolerance if it causes a major reduction in serious adverse reactions. A major reduction is arbitrarily considered to be a reduction of at least 25% in severity or frequency of a serious adverse reaction.

☐ **Category 2**. A product that provides moderate therapeutic or safety and tolerance advantage compared to the best available therapeutic agent for that disease.

- A new product providing moderate therapeutic or safety and tolerance advantage is defined as one which is less than 25% more efficacious or safe than the best available current therapy for that disease.

☐ **Category 3**. A product that is essentially equivalent to existing therapies with little or no therapeutic or safety advantage.

Grading Level of Evidence *(Check One Grade)*

The strength of the data supporting the conclusion of increased efficacy or safety and tolerance shall be categorized as A, B, or C, according to the following table (from Guyatt, GH. JAMA 1995; 274:1800-04:

Grade of Recommendation	Level of Evidence
☐ **GRADE A**	**Level I** ▪ randomized controlled trials (RCT) ▪ treatment effects or safety and tolerance data from individual studies consistent ▪ low false positive and low false negative errors
☐ **GRADE B**	**Level II** ▪ randomized controlled trials (RCT) ▪ treatment effects or safety and tolerance data from individual studies are different ▪ high false positive and high false negative errors
☐ **GRADE C**	**Level III** ▪ non-randomized concurrent cohort studies **Level IV** ▪ non-randomized historic cohort studies **Level V** ▪ case series

E. USAGE AND COST IMPACT ESTIMATES

1. ***Indicate*** *other potential uses* ***for the product and the Programs, Specialties or Departments most likely to use the product. Indicate where it would most likely have a significant impact on the budgets, resources or operation of other programs or departments. Attach additional supporting documentation if available.***

2. a) Indicate any 'one-time' capital or operating costs associated with the use of this product.

(e.g. special pumps, tubing, adapters, administration systems)

b) **ESTIMATE** annual incremental cost of adding this product to WRHA Enteral & Parenteral Nutrition Formulary. The incremental cost refers to all anticipated costs associated with using the requested nutrition product **LESS** any savings realized from **not** using other products that will be displaced by the requested agent. Use a separate sheet of paper for this information if needed.

	WRHA Region
Estimated annual usage based on the recommended criteria for use (# of patients x volume to meet RNI x duration of therapy)	
Unit Cost (from Section A)	
Other costs required for the administration or monitoring of this product (e.g. laboratory tests, staffing, administration systems or equipment, enteral or parenteral pumps). Specify	**$ 0.00**
Less anticipated savings from decreased use of: [name product(s), tests, staffing, etc.]	
Net Annual Incremental Cost	

F. CONFLICT OF INTEREST DISCLOSURE

The WRHA requires full disclosure on the part of the requester of any potential conflict of interest situations this request may create. Outline below the specifics of any funding that you, or to your knowledge, your department or program, have received in the last 5 years from the company that manufactures or markets this product. This includes any research funding or grants, professional retainers, or educational support.

G. SIGNATURES

Requesting Physician -- *I recommend the addition of this product to the WRHA Enteral & Parenteral Nutrition Formulary.*

_____ , MD Dept: _____ Date: _____

Department or Section Head - *I have reviewed the Justification, Criteria for Use and Cost Implications with members of my Dept or Section.*

☐ Reviewed and agree with adding product ☐ Reviewed and disagree with adding product

_____ , MD Date: _____

Administration Director -- *I have reviewed the Justification, Criteria for Use and Cost Implications.*

- ☐ Medication and ancillary costs can be covered within existing Program resources
- ☐ Reviewed and disagree with adding product
- ☐ Requires additional funding outside of existing Program. Request will be sent to Medical Advisory Committee by Coordinating PTC for further deliberation.

_____ , Director Program: _____ Date: _____

WRHA NUTRITION ADVISORY SUB-COMMITTEE ACTION

The product requested is ranked as: Category _____ Level of Evidence _____

☐ Approved with the following criteria for use or restrictions _____

_____

☐ Rejected for the following reason(s): _____

_____

Signature: _____ Date: _____

WRHA Nutrition Advisory Committee Chairperson

APPENDIX B---Medications and Enteral Feeding Guidelines

When medications are to be given through a feeding tube the following guidelines apply:

- Use the liquid dosage form when possible. **If available as a solid only, check with the pharmacist before crushing as this may alter the absorption characteristics of the medication or plug the tube**. Elixers and suspensions are usually favoured over syrups.

- Dilute hypertonic medications with 10-30 mL of water. Hypertonic medications may not be well tolerated when delivered into the small intestine. The stomach, though, is able to dilute hyperosmolar substances with gastric juices before transferring the contents into the duodenum. However, if the hypertonic medications are administered too rapidly into the stomach, they may be "dumped" into the small bowel, resulting in osmotic diarrhea.[4,5] Crush tablets to a fine powder and mix with 30 mL water unless otherwise instructed. Capsules may be opened in some circumstances – **check with pharmacy. If the medication contains a significant amount of sorbitol** (osmotic laxative)**, is enteric-coated, is hazardous/cytotoxic or is a sustained-release preparation, then an alternative dosage form should be considered**.

- When drawing up medication, syringes designed for intravenous use should not be used.

- Each drug must be administered separately. Flush tube with 15-30 mL warm water before giving drug, with 5-10 mL warm water between each drug, and 15-30 mL water after last medication given. Use a syringe no smaller than 30 mL. Flushing volumes may need to be revised for patient fluid restrictions.

- Reconnect tube feeds unless otherwise indicated. Some medications (i.e. phenytoin suspension) may have absorption significantly impaired with continuous tube feeding; one alternative may be to hold enteral feeds pre and post dose. In some situations enteral feeding may be continued and drug dosage be titrated upwards to override the interaction. Pharmacy should be involved with the dosing of these patients.

- Do not mix drugs directly with the enteral formula.

Examples of Physical Incompatibility

Drug	Impact	Recommendations
Aluminum Hydroxide	Leads to tube blockage	Use alternate acid suppressive agent: H2-blocker or proton pump inhibitor
Sodium phosphates		Use oral phosphate products; flush pre & post drug administration and continue feeds
Carbamazepine (Tegretol)	Adheres to feeding tube	Use the carbamazepine suspension; dilute with equal parts water; flush pre & post drug administration and continue feeds MONITOR DRUG LEVELS
Ciprofloxacin (liquid) (fluoroquinolone)	High risk of feeding tube blockage with a suspension; plus, ciprofloxacin binds to divalent ions in the feed	Use tablet formulation; disperse tablets in water immediately prior to dosing. As feeds may decrease the oral bioavailability of ciprofloxacin, increase the oral dose by 1.5 x (e.g. 500 mg daily to 750 mg daily). Flush pre & post drug administration and continue feeds [1] **OR**

		Hold feeds 1 hour before and 1-2 hours after dose*; flush pre & post drug administration **OR** Use IV formulation
Cholestyramine	Can clog tube	Use alternate medication.

Examples of Pharmacokinetic Incompatibility

Drug	Impact	Recommendations
Phenytoin (Dilantin)	Reduction in absorption (variable)	Administer the parenteral solution enterally; dilute with 30 mL water; flush pre & post drug administration and continue feeds [2,3] **OR** Hold feeds 1-2 hours pre and post administration with suspension.* Reduce drug frequency to BID instead of TID if possible **OR** Change to IV route MONITOR DRUG LEVELS
Penicillin V Potassium	Unpredictable absorption	Hold feeds 2 hours pre and 1 hour post administration*
Fluoroquinolones (Ciprofloxacin, levofloxacin)	Reduction in absorption (variable)	See ciprofloxacin above, and discuss specific fluoroquinolone with pharmacist. **OR** Hold feeds 1 hour pre and 2 hours post administration.*
Warfarin (Coumadin)	Binds to protein in feeds AND antagonized by Vitamin K present in feeds	Administer crushed tablet diluted with 15 mL of water; flush pre & post drug administration, and continue feeds. Adjust warfarin dose based on INR.
L-thyroxine (Synthroid, Eltroxin)	Formula with soy content may inhibit absorption	Administer crushed tablet diluted with 15 mL of water; flush pre & post drug administration and continue feeds **OR** Hold feeds 1 hour pre and post administration* If duration of tube feeds greater than 1-2 weeks – adjust L-thyroxine dose based on TSH
Theophylline	Feeds may increase theophylline metabolism; reduction in serum levels	Use the theophylline oral solution and dilute with equal parts water; flush pre & post drug administration, and continue feeds **OR** Hold feeds 1 hour pre and post administration* MONITOR DRUG LEVELS
Levodopa/carbidopa (Sinemet)	High protein feeds inhibit drug's blood brain barrier transport; diets that do not exceed 0.8g/kg	None

	of protein are reported to eliminate this problem	
Itraconazole Voriconazole		Recommendations vary per reference: Administer itraconazole solution/voriconazole suspension; flush pre & post drug administration and continue feeds **OR** Hold feeds 1 hour (voriconazole) or 2 hours (itraconazole) pre and 1-2 hours post administration*

*Increase hourly feed volume so daily feed is equivalent to continuous 24 hour feeds.

Note: These incompatibilities are only a sampling of possible drug – feed interactions. For more information on these and other drugs, please contact your pharmacy.

Partial list of liquid drugs with osmolarity ≥3000 mOsm/kg (Hypertonic medications)

- Acetaminophen with codeine elixir
- Amantadine hydrochloride solution, 10 mg/mL
- Chloral hydrate syrup, 100 mg/mL
- Dextromethorphan hydrobromide syrup, 3 mg/mL
- Docusate sodium syrup, 4 mg/mL
- Hydroxyzine hydrochloride syrup, 2 mg/mL
- Lactulose syrup, 0.67 g/mL
- Lithium citrate syrup, 1.6 mEq/mL
- Metoclopramide hydrochloride syrup, 1 mg/mL
- Multivitamin liquid

Partial list of liquid drugs with higher sorbitol content

- Acetaminophen liquid
- Amantadine hydrochloride solution
- Charcoal liquid, with sorbitol
- Isoniazid syrup
- Lithium citrate syrup

- Metoclopramide hydrochloride syrup
- Pseudoephedrine syrup
- Sodium polystyrene sulfonate suspension
- Theophylline oral solution

Note: This is only a sampling of drugs with possible osmolarity/sorbitol content problems. For more information on these and other drugs, please contact your pharmacy

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Crush, dissolve and dose instructions for cytotoxic and non-cytotoxic hazardous medications
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