 <p style="text-align: center;">C R E D I T • V A L L E Y THE CREDIT VALLEY HOSPITAL</p>	<p>CLINICAL PRACTICE GUIDELINE</p>	<p>PROFESSIONAL PRACTICE</p>
<p>TITLE: Adult Enteral Nutrition (EN)</p>		
<p>DATE OF ISSUE: 2005, 10</p>	<p>PAGE 1 OF 19</p>	<p>NUMBER: CPG 1-2</p>
<p>SUPERCEDES: New</p>	<p>ISSUED BY: _____ TITLE: Chief of Medical Staff</p>	
	<p>ISSUED BY: _____ TITLE: President</p>	

Purpose:

To provide interdisciplinary guidelines for the administration of Enteral Nutrition (EN) to adults.

Definition:

The non-volitional delivery of nutrients by tube into the gastrointestinal tract. Enteral nutrition may be implemented for individuals who can not, should not, or will not eat adequately and in whom the benefits of improved nutrition outweigh the risks.

Clinical Considerations:

Enteral nutrition support should be considered in patients with inadequate oral intake for 7-14 days, or in those patients in whom inadequate oral intake is expected over a 7 – to 14-day period. Enteral nutrition for ventilated, critically ill patients should be started within a 24-48 hours of admission to ICU, if the patient is hemodynamically stable.

Selection Criteria:

All patients being considered for specialized nutritional support should have a nutritional assessment completed by a Clinical Dietitian and/or a physician.

Inclusion:

Enteral nutrition should be used in patients who cannot meet their nutrient requirements by oral intake as documented by a Clinical Dietitian and/or physician. A functioning gastrointestinal tract is required for the use of EN. Whenever possible, the patient and / or family will be involved in the decision process to implement EN. See flow chart for Delivery of Enteral Nutrition Support for Adults. (Appendix I)

Contraindications:

- Shock and hemodynamic instability
- Intestinal obstruction
- Prolonged ileus
- Insufficient absorptive capacity of the intestinal tract
- Intractable vomiting
- Severe diarrhea
- Enteral access unobtainable
- Severe enterocolitis
- Gastrointestinal ischemia

Relative Contraindications:

- Patients with perceived poor quality of life e.g. patients with dementia and end-stage terminal disease.

Responsibilities:

Only a Physician may order enteral nutrition. Physicians may initiate Enteral Nutrition support by completing one of the following: Preprinted Physician order: Enteral Nutrition Medical/Surgical Units (Adult) or Enteral Nutrition ICU. After completing a nutritional assessment, a Clinical Dietitian may complete the preprinted Physician order which must be co-signed by the Physician. (Policy: Physician Orders M-165)

Treatment and Monitoring:**Choice of Enteral Route:**

See Benefits and Complications of Feeding Tubes (Appendix II)

Feeding Tube Insertion:

Nasogastric/Nasoenteric: Tubes are placed using a stylet. All hospital Physicians can place nasogastric/nasoenteric feeding tubes (e.g. Kaofeed or Corpak tubes). A chest x-ray is required to confirm the placement of the tube prior to initiating feeds (Salem sumps/Levine tubes are not recommended as feeding tubes).

Gastrostomy: At Credit Valley Hospital gastrostomy feeding tubes may be placed by a gastroenterologist, radiologist or a surgeon.

Jejunostomy: May be placed radiologically or surgically

Formula Selection:

The Clinical Dietitian or a Physician will determine the most appropriate type of feeding formula based on the patients' clinical and nutritional status. The Dietitian will also determine the initial and goal rate of the feeding formula.

See the Medical Nutritional Formulary for formulas available at CVH. (Appendix III)

Methods of Administration:

Continuous: Administered at a constant steady rate over a 16-24 hour period.

Cyclic: Administered at a constant increased rate over 8-16 hours, often overnight.

Intermittent: Infused at specific intervals throughout the day. The volume of desired feeding is divided over several feedings per day. Feedings are usually given over a 30-60 minute period.

Bolus: Rapid administration of formula (less than 15 minutes) into the GI tract by syringe or feeding bag. Bolus feeding occurs 4-6 times per day.

Initiation of Enteral Feeding:

Feedings will be initiated full-strength at a rate of 10-40 mL/hour. Feedings will be advanced by 10-20 mL/hr every 8-12 hours, as tolerated, until the desired rate is achieved. Hypertonic solutions will also be initiated full-strength at a rate of 10-40 mL/hour and increased more gradually as tolerated.

Temperature:

Feedings will be administered at room temperature in order to decrease the incidence of GI side effects, such as cramping.

Bacterial Contamination:

- Clean-handling techniques will always be used.
- The feeding set (bag and tubing) will be changed daily.
- Recommended hang-time is 8-12 hours for canned, ready-to-use formulas. Recommended hang-time for formulas reconstituted from powder is 4-6 hours.
- Open cans of formula should be refrigerated and stored in a covered, labelled container for no more than 24 hours.

Prevention of Aspiration:

- The head of the bed will be elevated at least 30-45 degrees.
- Placement of the feeding tube will be checked by x-ray prior to administration of Tube feeding.
- Check residuals (see Table 1, page 4) for nasogastric and gastrostomy feeding tubes.
- Examine abdomen for distension

Patency:

- Feeding tubes will be irrigated every 4 hours with 20-60 mL water with continuous feeds. For intermittent or bolus feedings, tubes will be irrigated before and after each delivery with 20-60 mL water.
- Each time a feeding is stopped, the tube will be flushed with 20-60 mL water.
- In case of clogging, the tube will be flushed using a 60 mL syringe containing 30-60 mL water. Smaller volumes may be necessary in fluid-restricted patients.
- Cotazym flush, using 1 capsule of cotazym with 300mg sodium bicarbonate and 25 mL water and clamping for 1 hour, can be tried at the discretion of the physician

Medications:

- Consult a pharmacist regarding type and administration of medication through the feeding tube.

It is recommended that medications should be administered by a route other than the feeding tube. See Procedures for Administering Medications via Enteral Tube (Appendix IV), Pharmacokinetics of Administering Medications that interact with continuous Enteral Nutrition (Appendix V) and Oral Dosage Forms that Should Not be Crushed (Appendix VI)

Monitoring:

- Daily intake and output
- Weekly weights
- Daily oral care
- Daily feeding Tube site care
- Patients with a history of diabetes mellitus or patients undergoing steroid therapy should have serum glucose tested daily until therapy is terminated. Long-term diabetic patients receiving enteral feedings should have glycosylated hemoglobin checked q 3 months.
- Monitor abdominal distension
- Record number and consistency of bowel movements.
- Monitor daily electrolytes, urea, creatinine until tube feeding goal is reached, then 2-3 times per week serum electrolytes and minerals (phosphorous, calcium, and magnesium), and weekly blood count. Depending on the patient's medical condition, lab tests and frequency may vary at the discretion of the physician. **It is the responsibility of the physician to reassess the frequency of further lab testing based on patients' medical condition.**
- Baseline and weekly reassessment of macro/micronutrient and fluid requirements.
- Gastric residuals will be assessed at least every 6 hours and prn (when feeding into the stomach) and for all patients considered at risk for aspiration
- Residuals may be difficult to obtain in patients with soft, small-bore feeding tubes (smaller than 10F) which tend to collapse.

Table 1: Nasogastric feeding tubes - Guidelines for Checking Residuals in Continuous Enteral Nutrition

< 200 mL Residual	200 – 300 mL Residual	> 300 mL Residual
<ul style="list-style-type: none"> • Continue tube feeding • Advance to goal rate 	<ul style="list-style-type: none"> • Hold tube feeding • *Reinstill residual into NG tube and recheck in 2 hours • If residual is \leq 200 mL when rechecked, restart feeding • If residual is $>$ 200 mL when rechecked, hold gastric feeding and consider motility agent or small-bowel feeding 	<ul style="list-style-type: none"> • Hold tube feeding • *Reinstill residual into NG tube • Contact physician • Hold feeding for 12 hours • After 12 hours, retry gastric feeding • If residual is still $>$ 300 mL, consider motility agent or small-bowel feeding

*Aspirated residuals should always be reinstilled via the nasogastric feeding tube

Gastrostomy Feeding Tubes – Guidelines for Checking Residuals:

If residuals are \geq 100 mL:

- Hold tube feeding
- *Reinstill residual and recheck in 2 hours
- If residual is \leq 100 ml when rechecked, restart feeding
- If residual is $>$ 100 ml when rechecked, hold feeding and consider motility agent or small bowel feeding

*Aspirated residuals should always be reinstilled via the gastrostomy feeding tube

If gastric feeds are not tolerated within 48 hours, consider use of a motility agent and/or accessing the small bowel.

Potential Complications of Enteral Feeding:

Gastrointestinal:

Diarrhea:

- Frequently defined as 3 or more liquid stools per day.
- Rarely due to formula itself. It is often multifactorial and may be associated with malfunction of the GI tract, bacterial overgrowth, or the presence of toxins.

Table 2

Cause of Diarrhea	Corrective Action
Medications e.g. Antibiotics, antacids, potassium and phosphate supplements, sorbitol-containing medications	Check for <i>Clostridium Difficile</i> , if negative, consider antidiarrheal agents and call pharmacist to review medication.
Bolus feeding, volume overload and rapid administration	Return to the last-tolerated rate and monitor. If bolus feeding, consider continuous feeding.
Hyperosmolar formula	Initiate tube feeding at a low rate (e.g. 10 mL/hour) and increase gradually as patient tolerates. Consider changing to an isotonic formula.
Malabsorption	Consider partially-hydrolyzed or elemental feeding formula.
Hypoalbuminemia (< 25 g/L)	Reassess rate, osmolality and volume of feedings and advance cautiously.
Contaminated Formula	Use clean technique at each stage of handling of enteral solutions.
Decreased Bulk	Consider fibre-containing formulas, and bulking agents e.g. pectin (Certo) and banana flakes.

Nausea and/or Vomiting:

Feedings should be discontinued immediately when vomiting occurs to prevent possible aspiration.

Table 3

Causes of Nausea and or Vomiting	Corrective Action
Patient Position	Patient should be positioned on the right side to facilitate the passage of gastric contents through the pylorus.
Rapid Infusion	Decrease rate to the level previously tolerated and advance gradually.
Delayed Gastric Emptying	Stop feeding for 1-2 hours and check residuals as per above guidelines. Consider a motility agent. Encourage ambulation if appropriate. Switch to continuous feeds if using intermittent or bolus feeds.
GI Tract Obstruction	Stop feeding. Determine etiology of obstruction, treat and reinstate feeding as able.

Constipation:

- Defined as no stool for 3 or more days

Table 4

Causes of Constipation	Corrective Action
Dehydration	Calculate the patient's fluid requirements and provide free water. Monitor intake and output.
Inadequate Fibre	Consider a fibre-containing formula and/or bulk laxative.
Dysmotility	Rule out ileus or gastroparesis, otherwise consider a fibre-containing formula and motility agents. Encourage ambulation and adequate fluids.
GI Tract Obstruction	Stop feeding. Determine etiology of obstruction, treat and reinstate feeding as able.

Mechanical Complications:

Mechanical complications may result during placement of the feeding tube, from the presence of a feeding tube, or when the tube becomes clogged. See Mechanical Complication of Tube Feeding (Appendix VII)

Metabolic Complications:

Refeeding Syndrome:

- The refeeding syndrome is a metabolic complication associated with aggressive administration of nutrition support to stressed, nutritionally compromised patients.
- Characterized by generalized fatigue, lethargy, dizziness, muscle weakness, edema, cardiac arrhythmias, and hemolysis.
- Symptoms occur due to the rapid shift of electrolytes, including potassium, phosphorous, and magnesium from the extracellular to intracellular space, along with sodium and water retention and rapid fluxes in insulin production in response to the carbohydrate load.
- Patients at risk: cancer cachexia, eating disorders, alcoholism, elderly, any patient with extremely poor intake > 5 days.

Prevention

- Correct significant electrolyte abnormalities prior to initiating of enteral feedings
- Enteral feeding should be initiated at a low rate and advanced slowly. Ongoing supplementation of electrolytes during enteral support may be necessary.

Other metabolic complications: involve fluctuations in laboratory values, fluid status, and clinical conditions that may be exacerbated by formula composition or amount delivered.

Patient / Family Education

Members of the health care team are responsible for assessing and meeting the learning needs of the patient and/or family. Information regarding the reason for Enteral Nutrition, method, safety and procedures will be explained. If Home Enteral Nutrition is indicated, health care team members will arrange equipment and formula for home use and ensure appropriate training and education are in place prior to discharge.

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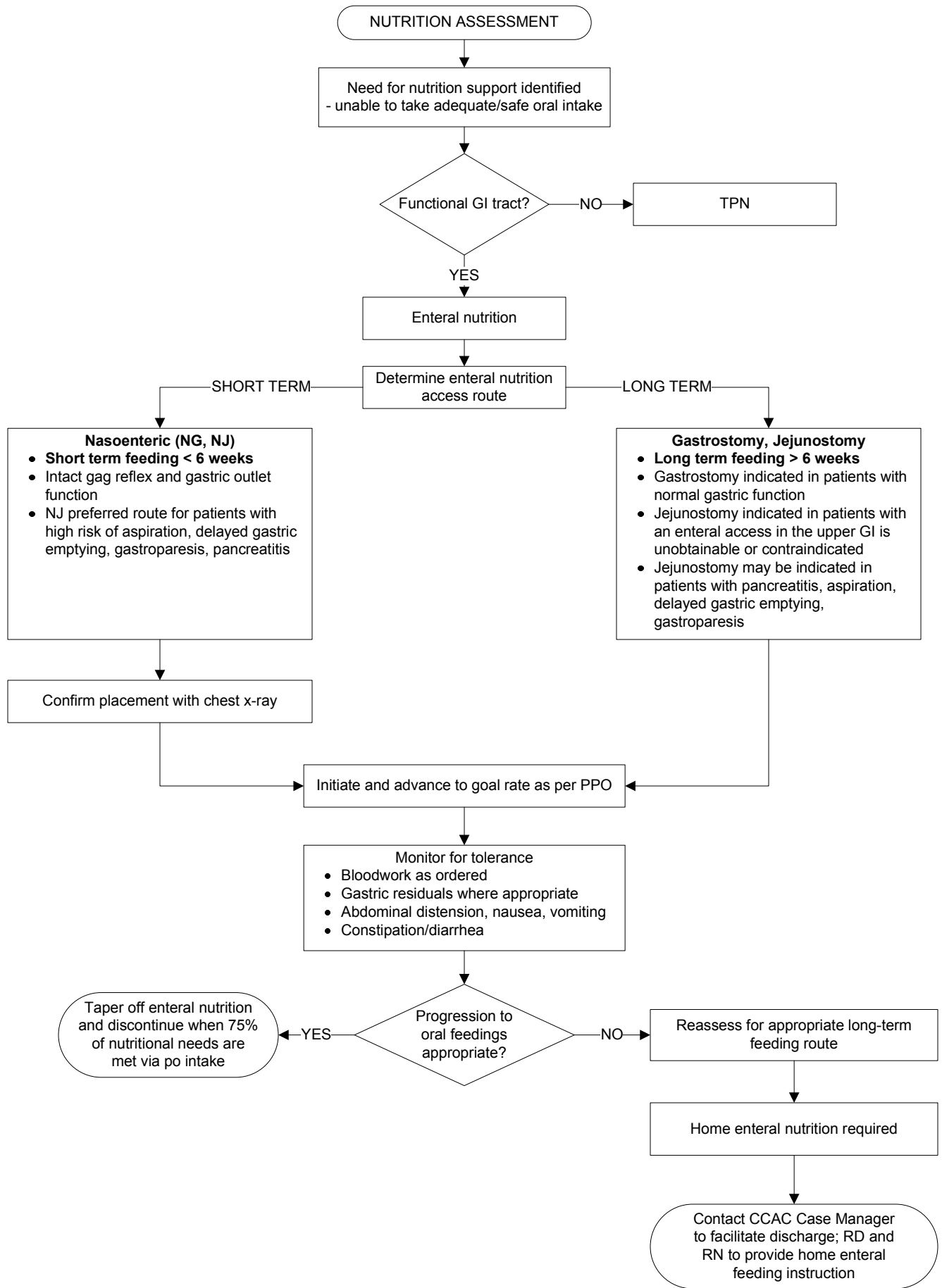
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Approval:

- Nutrition Practice Committee: December 05, 2005
- Nursing Practice: May 12, 2006
- Pharmacy and Therapeutics: May 09, 2006
- Program Steering Committee: Medicine: April 20, 2006
Surgery: March 28, 2006
Oncology: March 30, 2006
Renal: May 16, 2006
- Professional Practice Advisory Committee: May 29, 2006
- Medical Practice Committee: April 18, 2006
- Medical Advisory Committee:

Appendix I
 Delivery of Enteral Nutrition Support for Adults



Appendix II
Benefits and Complications of Feeding Tubes

Feeding Route	Indications	Advantages	Disadvantages/Complications
Nasogastric	<p>Unable to take adequate/safe oral intake</p> <p>Requires normal gastric motility, and gastric outlet function</p> <p>Short-Term feeding (<6weeks)</p>	<p>Ease of placement and removal</p> <p>No surgery required</p> <p>Low cost</p> <p>Intermittent/bolus feeding possible</p>	<p>Greater risk of pulmonary aspiration versus nasointestinal feeds</p> <p>Requires monitoring of gastric emptying</p> <p>Increased risk of tube displacement</p> <p>Sinusitis</p> <p>Pneumothorax from tube misplaced in lungs</p>
Nasoduodenal or Nasojejunal (may be placed under fluoroscopy or by endoscopy)	<p>Preferred route for patients at high risk of pulmonary aspiration, delayed gastric emptying, gastroparesis, gastric dysfunction due to trauma or surgery, and gastroesophageal reflux disease (GERD)</p> <p>Nasojejunal tube past Ligament of Trietz is appropriate for patients with pancreatitis</p>	<p>Decreased risk of pulmonary aspiration versus nasogastric feedings</p> <p>Beneficial in patients with gastroparesis</p> <p>Lower frequency of nosocomial pneumonia</p> <p>Intermittent/bolus feeding possible</p>	<p>May require endoscopy or fluoroscopy for placement</p> <p>Risk of tube migration/displacement</p> <p>Sinusitis</p> <p>Pneumothorax from tube misplaced in lungs</p>
Gastrostomy (can be radiologically, surgically, or percutaneously placed via endoscope, laparoscope, or fluoroscope)	<p>Long-Term enteral feeding (>6 weeks)</p> <p>Indicated in patients with normal gastric function</p> <p>Not a good choice for patients with significant reflux or aspiration</p>	<p>Intermittent/bolus feeding possible</p> <p>Can be placed via laparoscopy, endoscopy, or fluoroscopy may be placed at bedside</p> <p>Patient comfort</p> <p>Large-bore tube allows medication administration and/or gastric decompression</p>	<p>Increased risk of aspiration in high risk individuals</p> <p>Requires monitoring of gastric emptying</p> <p>Stoma care required: potential risk of infection/skin excoriation at stoma site</p> <p>Potential for tube dislodgement</p>

Appendix II

Benefits and Complications of Feeding Tubes

<p>Jejunostomy (can be surgically or percutaneously placed)</p>	<p>Enteral access in upper GI unobtainable or contraindicated</p> <p>Short or long-term feeding</p> <p>Impaired gastric motility</p> <p>GERD/aspiration potential</p> <p>Gastric dysfunction due to trauma or surgery</p>	<p>Jejunum functional for early postop feeding</p> <p>Decreased aspiration risk</p> <p>Can be placed via laparoscopy, fluoroscopy, or endoscopy</p>	<p>Tube patency, smaller-bore tubes may clog</p> <p>Stoma care required: Potential risk of infection/skin excoriation at stoma site</p> <p>Potential for intraperitoneal leakage</p> <p>Cannot check residuals</p>
<p>Combined gastrostomy/jejunostomy</p>	<p>Useful in patients requiring gastric suction or decompression with otherwise intact intestinal tract</p>	<p>May be weaned to gastric feedings over time</p> <p>Decreased aspiration risk</p>	<p>Tube patency; smaller-bore tubes may clog</p>

Appendix III
The Credit Valley Hospital
Medical Nutritional Formulary

Per 1000 ml

Category	Product	Vendor	Flavours	Pack Size	Cost/Case	Cost/Unit	Stocked	Energy (Kcal/KJ)	Volume to Meet RNI ²	Osmolality (mOsm/kg H ₂ O)	Free Water (ml)	Protein (g)	Fat (g)	CHO (g)	Na (mmol)	K (mmol)	Ca (mg)	Folate (mg)	Fe (mg)	Phos (mg)	*NPC:N Ratio
ORAL SUPPLEMENTS																					
Standard Liquid	Boost	Novartis	Vanilla, Chocolate, Strawberry	4 x 6 x 237 ml	\$12.96	\$0.54	YES	1010/4242	950	610-670	850	43	18	173	47	44	1160	0.3	16	1160	150:1
Energy Dense	Boost Plus	Novartis	Vanilla, Chocolate, Strawberry	4 x 6 x 237 ml	\$14.15	\$0.59	YES	1520/6384	950	720	780	59	58	200	47	44	1160	0.3	16	1160	164:1
Pudding	Boost Pudding	Novartis	Vanilla, Chocolate	12 x 4 x 142g	\$71.00	\$1.48	YES	1889/7957	N/A	N/A	648	54	71	260	37	58	1969	0.6	21	1575	230:1
Low Fat/Clear Fluid	Resource Fruit Beverage	Novartis	Wildberry, Peach	27 x 237 ml tetra	\$38.15	\$1.41	YES	770/3200	1880	700	881	37	2	150	13	1.1	570	0.20	9.5	680	107:1
TUBE FEEDINGS																					
Standard Polymeric HN with Fibre and FOS	Isosource HN w/Fibre	Novartis	Vanilla	24 X250 ml	\$14.00	\$0.58	YES	1200/5020	1000	435	813	53	42	157	49	46	1000	0.3	12	1000	118:1
Standard Polymeric with Fibre	Isosource HN w/Fibre	Novartis	Vanilla	24 x 250 ml	\$14.00	\$0.58	YES	1200/5020	1000	435	813	53	42	157	49	46	1000	0.3	12	1000	118:1
Standard Polymeric High Nitrogen with Fibre	Isosource VHN	Novartis	Vanilla	24 x 250 ml	\$36.07	\$1.50	YES	1000/4180	1250	300	847	62	29	130	57	41	800	0.48	14	800	77:1
Standard Polymeric HN without Fibre	Isosource HN	Novartis	Vanilla	24 x 250 ml	\$14.00	\$0.58	NO	1200/5040	1000	435	813	53	42	151	49	46	1000	0.3	12	1000	118:1
Semi Elemental	Peptinex DT	Novartis	Unflavoured	24 x 250 ml	\$90.00	\$3.75	NO	1000/4200	1500	460	830	50	17	164	43	31	670	0.4	12	670	115:1
Energy Dense	Resource 2.0	Novartis	Vanilla, Orange Creme	27 x 237 ml tetra	\$40.00	\$1.48	YES	2000/8400	948	790	700	90	88	220	35	39	1100	0.4	19	1100	116:1
MODULAR																					
Carbohydrate	Polycose Powder/100g	Abbott	Unflavoured	6 x 350 g	\$18.96	\$3.16	YES	380/1588	---	900 per standard dilution	---	---	---	94	4.8	0.26	<30	---	---	<5	---
Protein	Beneprotein Powder/100g	Novartis	Unflavoured	6 x 277 g	\$59.95	\$9.99	YES	357/1493	---	---	---	85.7	---	---	21.7	2.56	---	---	---	42.9	---
FAT-Emulsion	Microlipid	Novartis	Unflavoured	6 x 8 x 89ml	\$104.70	\$2.18	NO	4500/18900	---	---	---	---	500	---	---	---	---	---	---	---	---
FAT-Elemental	MCT (new formulation)	Novartis	Unflavoured	6 x 946 ml	\$172.15	\$28.69	NO	7700/32240	N/A	N/A	N/A	0	940	0	0	0	0	0	0	0	N/A
Amino Acid	Glutasolve	Novartis	Unflavoured	56 x 22.5 g	\$92.65	\$1.65	NO	90kcal/22.5g	N/A	312	N/A	15/22.5g	0	7/22.5g	0	0	0	0	0	0	N/A
SPECIALIZED																					
Glucose Intolerance and Renal-High Nitrogen	Resource Diabetic	Novartis	Vanilla, Strawberry	24 X 250 ml	\$31.00	\$1.29	YES	1060/4452	1250	450	848	64	47	95	42	36	930	0.42	9.5	930	79:1
Paediatric Polymeric	Resource Just for Kids	Novartis	Vanilla	27 x 237 ml tetra	\$23.50	\$0.87	YES	1000/4200	1200	390	853	30	50	110	26	29	1140	0.4	14	800	185:1
Paediatric Semi Elemental	Pediatric Peptinex DT	Novartis	Unflavoured	24 x 250 ml	\$90.00	\$3.75	NO	1000/4200	1200	290	852	30	39	138	30	26	1140	0.4	14	1000	189:1
Renal-Hemodialysis	Novasource Renal	Novartis	Vanilla	27 x 237 ml tetra	\$40.00	\$1.48	YES	2000/8400	10000	700	709	74	100	200	39	21	1300	1	18	650	140:1
Renal-Non dialysis	Suplena	Abbott	Vanilla	24 x 237 ml	\$48.88	\$2.04	YES	2000/8360	940	600	719	30	96	250	34	28.7	1390	1.06	19	740	393:1
Semi Elemental/Stress-Trauma	Traumacal	Novartis	Vanilla	24 x 250 ml	\$54.00	\$2.25	YES	1500/6270	1300	560	780	82	68	143	51	36	750	0.2	9	750	91:1
Semi Elemental/Fluid Restriction	Peptamen 1.5	Nestle	Unflavoured	24 x 250 ml	\$160.00	\$6.67	YES	1500/6300	1000	450	770	60	58	190	44.6	48	1000	0.8	27	1000	131:3

*NPC:N=Non Protein Calorie: Nitrogen

²RNI=Recommended Nutrient Intake for adults aged 25-49

All Products are gluten-free

Procedures for Administering Medications Via Enteral Tube²³

Recommended Practice or Technique	Rationale
Flush catheter with 15-30 mL water before and after administering medication.	Clear catheter lumen of inadequately crushed medication or formula residue. Evaluate the patency of the catheter. Prevent physical and pharmacokinetic incompatibilities (drug-drug, drug-formula interactions).
Do not crush enteric-coated or sustained-release formulations. Use alternative drug formulations or therapeutically similar drug, ie, elixir form	Sustained release or long-acting: avoid potential adverse effects associated with higher than expected peak concentration followed by subtherapeutic levels. Enteric-coated: avoid stomach irritation or destruction of drug by gastric acids.
Dilute highly viscous and hyperosmolar liquid medications with 10-30 mL water before administration.	Prevent obstruction of tube by viscous solutions. Prevent physiological incompatibilities: <ul style="list-style-type: none"> ▪ Irritation to the gastric mucosa ▪ Gastric distention and diarrhea due to hyperosmolar drug formulation
Do not add medications to enteral feeding formula.	Prevent physical and pharmacokinetic incompatibilities: <ul style="list-style-type: none"> ▪ Viscosity, consistency, and particle size ▪ Changes in drug potency and bioavailability Avoid formula contamination. Ensure receipt of entire dose.
Administer each medication separately. Flush with 5 mL of water between medications.	Prevent pharmacokinetic incompatibilities (drug drug interactions).
Consult with pharmacist about availability of liquid dosage form, alternative dosage equivalents, and drug-nutrient compatibilities.	Avoid or manage problems: obstruction, incompatibilities, and gastrointestinal intolerance. Determine alternative therapies or formulations.

Appendix V
Pharmakokinetics of and Recommendations for Administering Medications that Interact with Continuous Enteral Nutrition¹

Medication	Drug-Nutrient Interaction	Type of Interaction	Recommendations
Carbamazepine (suspension)	Yes	↓absorption: may adhere to tubing	Hold enteral nutrition at least 2 hr before and after dose; monitor levels
Quinolones	Yes (calcium, iron, magnesium)	Absorption↓	Hold enteral nutrition at least 2 hr before and after dose; monitor levels
Penicillin V Potassium	Yes	Unpredictable absorption	Hold enteral nutrition at least 2 hr before and after dose; monitor levels
Phenytoin Sodium (suspension)	Yes (phenytoin-calcium or phenytoin- protein complexes)	Absorption ↓by 70-80%, ↓ serum drug levels	Hold enteral nutrition at least 2 hr before and after dose; monitor levels
Theophylline	Yes	Absorption ↓by 60-70%; metabolism ↑	Hold enteral nutrition at least 2 hr before and after dose; monitor levels

Appendix VI
Oral Dosage Forms That Should Not Be Crushed

Generic Name	Brand Name(s)	Formulation	Alternative Products/Comments
5-Aminosalicylic acid	Asacol [®] , Mesasal [®] , Pentasa [®] , Salofalk [®]	Enteric-coated, delayed-release tablet	Pentasa [®] tablets disperse in small amount of water; olsalazine (Dipentum [®]) capsules* are another option
Acetylsalicylic acid (ASA)	Novasen [®] , Entrophen [®]	Enteric-coated tablet	ASA 80 mg chewable tablet (for 81 mg enteric-coated); plain tablet (for 325 mg)
Bezafibrate 400 mg	Bezalip [®]	Extended-release tablet	Bezafibrate 200 mg tablet is an immediate-release tablet*
Bisacodyl	Dulcolax [®]	Enteric-coated tablet	Alternative oral laxative tablet (e.g., Senokot [®] , cascara)
Budesonide	Entocort [®]	Controlled-release capsule	Capsule may be opened and granules mixed with food; granules should not be crushed
Bupropion	Wellbutrin SR [®] , Zyban [®]	Sustained-release tablet	Crushing destroys sustained-release properties – may be crushed if dose and frequency are adjusted
Carbamazepine	Tegretol CR [®]	Controlled-release tablet	Carbamazepine immediate-release tablets*
Codeine	Codeine Contin [®]	Sustained-release tablet	Codeine immediate-release tablets*
Diclofenac	Voltaren [®]	Enteric-coated tablet	Alternative NSAID
Diclofenac/misoprostol	Arthrotec [®]	Enteric-coated tablet	Alternative NSAID plus misoprostol
Diltiazem	Cardizem CD [®] , Tiazac [®]	Controlled-delivery capsule, Extended-release capsule	Capsule may be opened and granules mixed with food; granules should not be crushed
Dipyridamole/ASA	Aggrenox [®]	Extended-release capsule	In dysphagic patient – open capsule, crush ASA tablet inside; sprinkle dipyridamole pellets on food In tube-fed patient - alternative antiplatelet agent or regular dipyridamole plus chewable ASA (crushed)
Divalproex	Epival [®]	Enteric-coated tablet	Crushing may affect absorption and result in stomach upset; consider valproic acid syrup*
Felodipine	Plendil [®] , Renedil [®]	Extended-release tablet	Alternative calcium channel blocker
Gliclazide	Diamicron [®] MR	Modified-release tablet	Gliclazide immediate-release tab 80 mg ≈ 30 mg MR tab
Hydromorphone	Hydromorph Contin [®]	Controlled-release capsule	Capsules may be opened and the beads sprinkled on food; beads should not be crushed
Ketoprofen	Enteric-coated tablet		Alternative NSAID
Lansoprazole	Prevacid [®]	Capsule containing enteric-coated granules	Capsules may be opened and granules sprinkled on food; granules should not be crushed
Levodopa/carbidopa	Sinemet CR [®]	Controlled-release tablet	Sinemet [®] immediate-release tablets*
Metoprolol	Betaloc Durules [®] , Lopresor SR [®]	Slow-release tablet	Metoprolol immediate-release tablets*
Morphine sulphate	MS Contin [®]	Sustained-release tablet	M-Eslon [®] extended-release capsules may be opened and granules mixed with food; granules should not be crushed
Morphine sulphate	M-Eslon [®]	Extended-release capsule	Capsules may be opened and granules mixed with food; granules should not be crushed
Morphine sulphate	Kadian [®]	Sustained-release capsule	Capsules may be opened and pellets sprinkled on food; pellets should not be crushed

Appendix VI
Oral Dosage Forms That Should Not Be Crushed

Nifedipine	Adalat XL [®]	Extended-release tablet	Adalat PA [®] tablets may be crushed*
Omeprazole	Losec [®]	Enteric-coated, delayed-release tablet	Lansoprazole capsules may be opened and sprinkled on food; omeprazole MUPS [®] may be dispersed in water for administration through feeding tube
Oxycodone	Oxycontin [®]	Controlled-release tablet	Oxycodone immediate-release tablets*
Pancrelipase	Cotazym ECS [®] Creon [®]	Capsules containing enteric-coated microspheres	Capsules may be opened and microspheres mixed with food; microspheres should not be crushed Regular pancrelipase capsules (Cotazym [®]) are another option; higher doses or acid suppression may be required
Pantoprazole	Pantoloc [®]	Enteric-coated tablet	Lansoprazole capsules may be opened and sprinkled on food; omeprazole MUPS [®] may be dispersed in water for administration through feeding tube
Potassium chloride	K-Dur [®] , Slow K [®]	Slow-release tablet	Micro-K [®] capsules may be opened and granules sprinkled on food; potassium chloride liquid (Roychlor [®]) is another option
Procainamide	Pronestyl-SR [®]	Sustained-release tablet	Procainamide immediate-release capsules*
Quinidine bisulfate	Biquin Durules [®]	Extended-release tablet	Quinidine sulfate tablets – need to adjust dose since quinidine bisulfate 250 mg ≡ quinidine sulfate 200 mg*
Sulfasalazine	Salazopyrin ENTabs [®]	Enteric-coated tablet	Regular sulfasalazine tablets
Venlafaxine	Effexor XR [®]	Extended-release capsule	Capsule may be opened and pellets added to food; pellets should not be crushed or chewed
Verapamil	Chronovera [®] , Isoptin SR [®]	Extended-release tablet Sustained-release tablet	Verapamil immediate-release tablets*

* Dosage and frequency of administration will need to be adjusted

Appendix VII
Mechanical Complications of Tube Feeding (TF)

Problems	Possible Causes	Prevention or Therapy
High Gastric residuals	<p>Delayed gastric emptying</p> <p>Head of bed not elevated at least 30° during and 30 minutes after feeding</p>	<p>Check gastric residuals before initiating TF and every 4 hours for continuous nasogastric TF; if residuals cannot be checked due to collapse of tube from external suction or small bowel TF, monitor abdominal girth (distance between anterior superior iliac crests); hold TF if abdominal girth >8-10 cm from baseline girth</p> <p>Position end of tube distal to ligament of Treitz; use continuous TF administration; ambulate if allowed</p> <p>Maintain head of bed at least 30° (during feeding and 30 minutes after feeding intermittent/bolus TF to allow gravity to help with gastric emptying</p>
Obstruction of feeding tube lumen	<p>Inadequate irrigation of feeding tube</p> <p>Insoluble compound formation due to drug-nutrient interaction or altered stability of TF formula</p> <p>Undissolved formula due to insufficient mixing</p> <p>Precipitation of caseinates in TF formula caused by lowered pH from solutions injected into feeding tube such as fruit juice or carbonated beverages</p>	<p>Flush feeding tube with water bolus (usually 20-60 mL) before and after TF is interrupted</p> <p>Maintain patency by flushing feeding tube with 20-60 mL water every 4 hours for continuous feeding or before and after intermittent/bolus feedings</p> <p>Use liquid elixirs when possible</p> <p>Consult pharmacist regarding crushed or diluted medications due to potential altered pharmacologic effect after mechanical manipulation</p> <p>For declogging feeding tube: Once daily flush tube with cotazym 1 capsule, sodium bicarbonate 300mg and 25 mL water and clamp 1 hour</p>

Appendix VII
Mechanical Complications of Tube Feeding (TF)

<p>Acute otitis media</p>	<p>Pressure of nasoenteric tube causes opening of eustachian tube, thus allowing bacterial infection of middle ear Prolonged use of large-bore tubes made of nonbiocompatible materials such as rubber or vinyl</p>	<p>Consider gastrostomy, gastrostomy-jejunal, or jejunostomy TF</p> <p>Use soft, small-bore(<10 F) feeding tubes composed of biocompatible materials such as silicone or polyurethane</p>
<p>Acute sinusitis</p>	<p>Nasoenteric tube occluded sinus tract</p> <p>Prolonged use of large-bore tubes made of nonbiocompatible materials such as rubber or vinyl</p>	<p>Use other nostril for nasoenteric tube placement</p> <p>Use soft, small-bore (<10 F) feeding tubes composed of biocompatible such as silicone or polyurethanes</p> <p>Consider gastrostomy, gastrostomy-jejunal, or jejunostomy TF</p>
<p>Skin irritation and excoriation at ostomy site</p>	<p>Leakage of gastric or intestinal secretions from stoma site</p>	<p>Use appropriate enterostomal therapy</p> <p>Ensure ostomy catheter anchored via retention device to avoid dislodgement</p>
<p>Tube displacement</p>	<p>Coughing</p> <p>Vomiting</p> <p>Peristalsis of gastrostomy tube into lower bowel</p>	<p>Consider use of feeding tube bridle, modified nasal cannula, or naso-tube clip</p> <p>Replace tube and verify tube placement prior to initiating feedings</p> <p>Ensure Ostomy catheter anchored via retention device to avoid dislodgement</p>