



# Enteral Nutrition

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- Indications and Contraindications
- Tube feed conversation
- Routes of Administration
- Formula Selection
- Water flushes
- Complications
- Case Studies

# Consequences of Malnutrition

Negative outcomes associated with malnutrition

- Impaired immunity
- Pneumonia
- Delayed wound healing
- Impaired function
- Lower quality of life
- Increased length of stay, readmission
- Higher hospital costs
- Death



# Nutritional status often deteriorates in hospital - Why?

- Pts kept NPO or IV fluids only for procedures and tests
- Failure to recognize increased nutritional needs associated with illness
- Weight not recorded/monitored
- Lack of awareness on the part of the health care team (protecting mealtimes, accessibility to food/water, positioning)
- Patients do not eat well in hospital



## Indications for Enteral Feeding

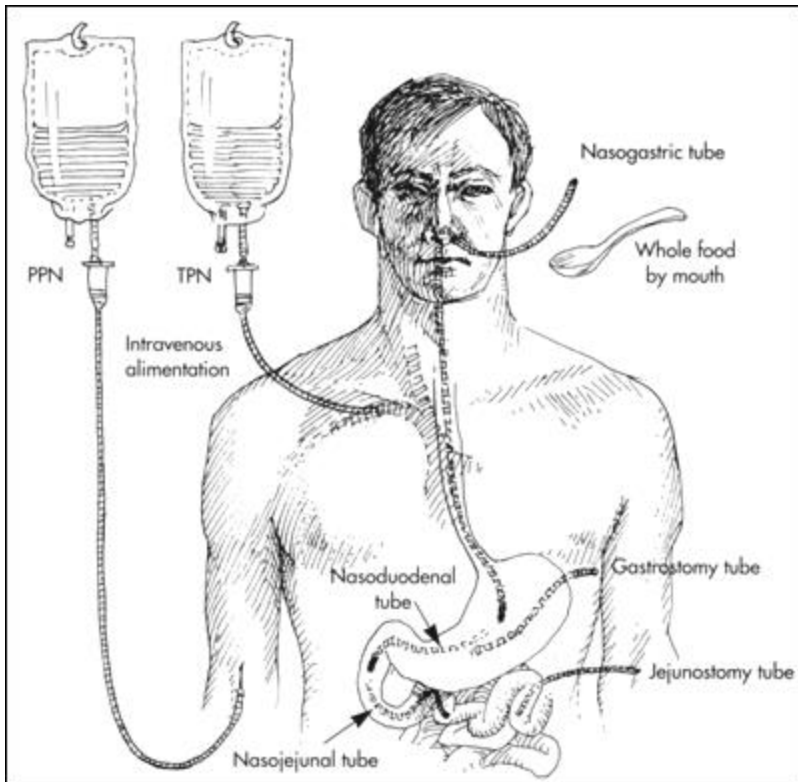
Unable to orally maintain/ improve nutritional status:

- Malnutrition or risk of malnutrition with inadequate oral intake (>2-5 days)
- Normal nutritional status with prolonged inadequate oral intake (>7-10 days) e.g. CVA with dysphagia, critically ill, Cancers, trauma, burns, major surgery, Pancreatitis, and IBD.
- Oral intake is contraindicated e.g. pt NPO per SLP

## Contraindications to Enteral Feeding

- Perforation of gastrointestinal tract
- Gastrointestinal ischemia
- Complete bowel obstruction
- High output enterocutaneous fistula
- Inability to access GI tract
- Patient refusal

# Methods of Feeding



- Oral
- Enteral Nutrition (enteric, via the gut)
  - *Tube Feeding*
- Parenteral Nutrition (PN, TPN, intravenous)

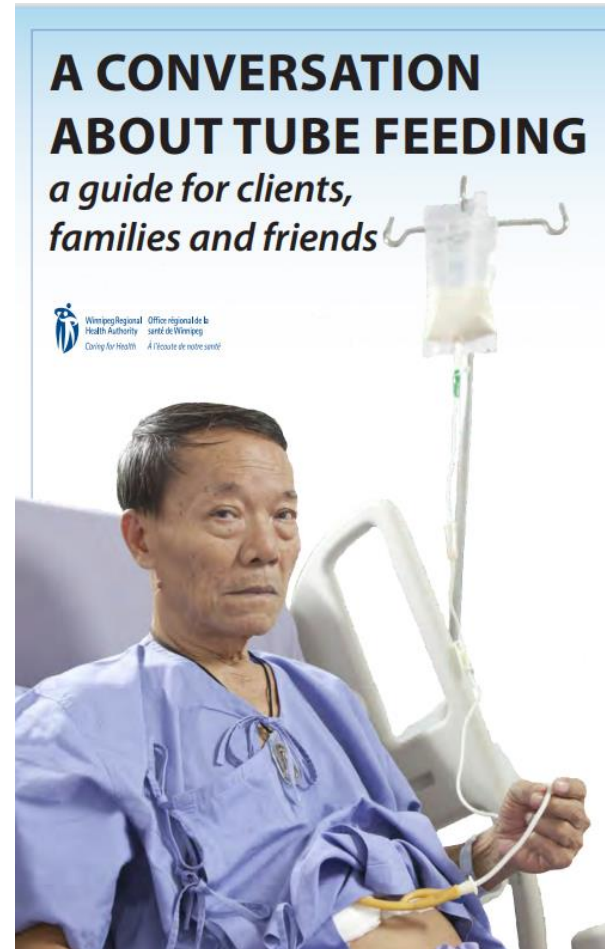
# Tube Feed Conversation



## A CONVERSATION ABOUT TUBE FEEDING a guide for clients, families and friends healthcare professional guide

<p><b>Health Care Professional Guide Pamphlet Information</b></p> <p>If you are reading this booklet, you or someone you care about is having problems with eating and drinking. There are several ways to address this problem:</p> <ul style="list-style-type: none"> <li>• careful intake by mouth</li> <li>• tube feeding</li> <li>• intake by mouth and tube feeding</li> </ul>	<p><b>Healthcare Professional Guide</b></p> <p>All team members have a role in hearing client concerns and addressing/forwarding concerns in the interest of provision of best care. While content will obviously be tailored to client's needs, the points below are intended to be reminders of discussion that may be pertinent and some dialogue. Tube feeding is not a simply a technical issue, there are other factors that need to be considered. Remember to elicit concerns clients, family and caregivers have during the course of the discussion.</p>
<p><b>Introduction:</b> This booklet will focus on tube feeding. Tube feeding is one of the ways used when a person cannot eat or drink enough for their body's daily needs or when some people think is not safe for someone to swallow food or liquids by mouth. This booklet is a starting place for conversations about tube feeding and is intended to offer some facts that can help make these choices. Decisions to start, carry on, or stop tube feeding can be very difficult to make. Through some questions and answers, this booklet will talk about issues and concerns that have raised questions for others.</p>	<p>Ask your client about prior experience/ exposure to tube feeding and elicit comments/concerns about tube feeding. For Example:</p> <ol style="list-style-type: none"> <li>1. Have you ever known anyone who has been fed by a tube?</li> <li>2. What do you know about tube feeding?</li> </ol>

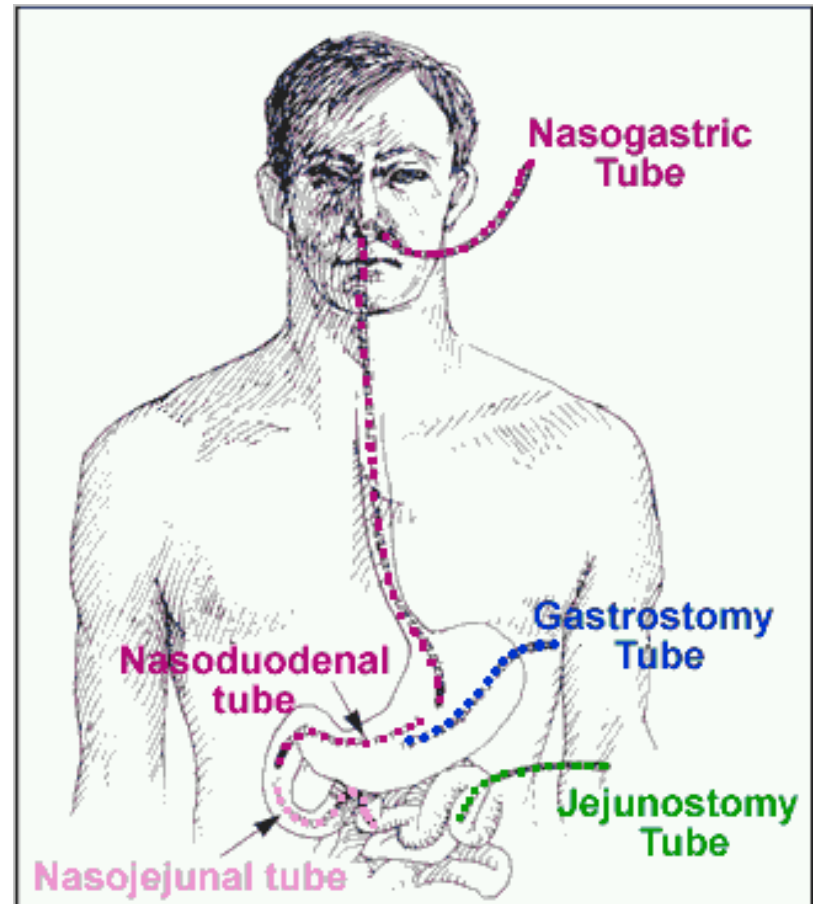
[wrha.mb.ca](http://wrha.mb.ca)





# Enteral Nutrition: Routes

- Naso-enteric
  - NG/NJ
- Tube enterostomy
  - GT
  - JT





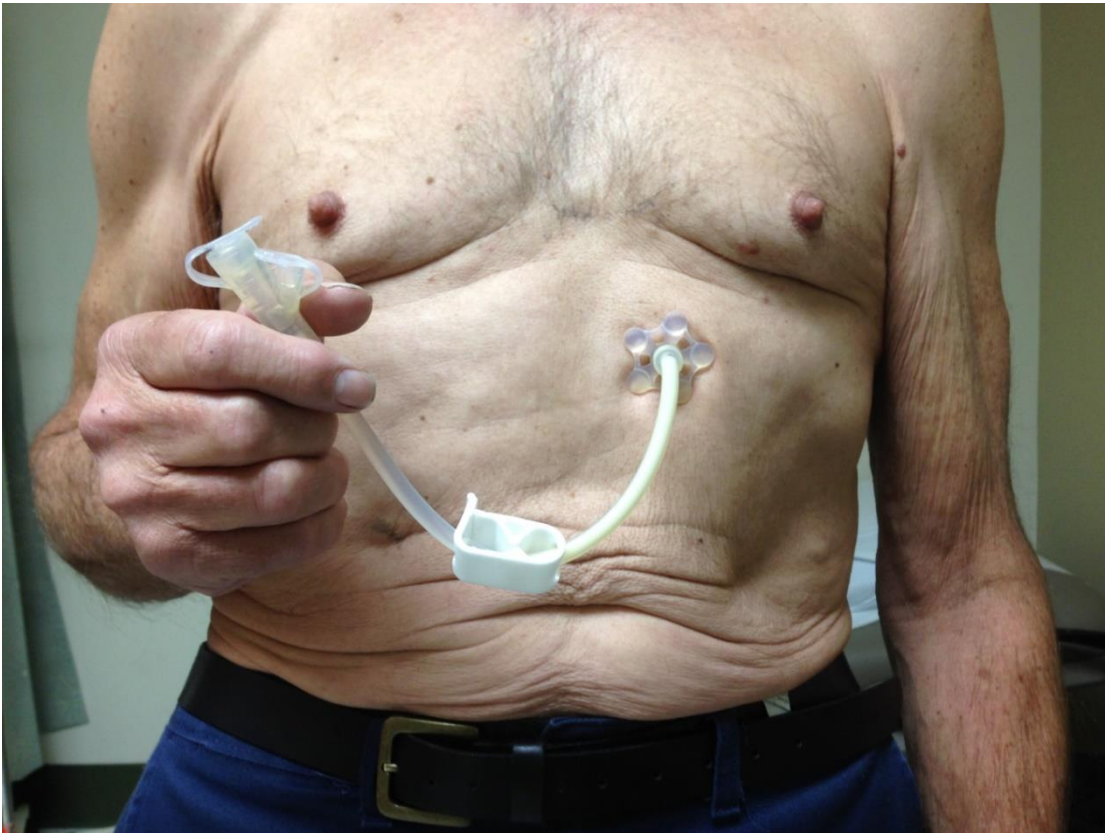
# Responsibilities of the Team

Physician	Dietitian	Nurse
Communicates with patient and family, explains tube feeding and what to expect		
-Orders tube to be placed -Requests approp. bloodwork	-Orders formula, rate, flushes, extras -Recommends bloodwork	-Places tube if NG
-Verifies placement of tube -Orders replacement of electrolytes	-Follow ups -Requests replacement of electrolytes	-Sets up tube feed equipment, utilizes pump, provides flushes
-May order formula, rate if no RD available	-Adjustments of formula, rate, etc	-Documents/reports on tolerance of tube feed
-May order TF to be stopped or adjusted	-Communication with family or PCH re: discharge	-Provides medications via tube, troubleshoots mechanical issues

# Nasogastric or Nasojejunal Tube



# Tube Enterostomy – Percutaneous Endoscopic Gastrostomy (PEG)



# Low Profile Gastrostomy Tube (Button)



# Enteral Nutrition Assessment and Planning

## Nutrition Assessment

Determine Feeding Access, timeline, short or long term plan

Calculate Protein, Energy and Fluid Requirements

Meds, IV infusions

Formula Selection

Rate, Route, Flushes, extras

# Formula Selection

1. Polymeric Formulas
2. Elemental Formulas
3. Specialty Formulas
4. Modular Nutrient Sources

# Enteral Nutrition: Formulas

## – Standard (polymeric)

- *For patients with normal digestion/absorption*
- *1.0 – 2.0 kcal/ml*
- *With or without fibre; most lactose/gluten free*
- *Moderate to high protein content*
- *Examples: Isosource with/without Fibre 1.0, 1.2, 1.5, Resource 2.0, Jevity 1Cal/1.2 Cal/1.5 Cal, Osmolite*



## –Elemental/Semi-elemental

- For patients with compromised GI function or possibly pancreatitis
- RTU or powdered
- Free amino acids and/or peptides
- Generally low fat or contain mostly MCT fat
- May have palatability
- Examples: Vital Peptide 1 Cal/1.5 Cal, Peptamen Prebio, Peptamin 1.5, Vivonex

## - Specialized

- *Renal - low K/Mg/PO<sub>4</sub>; ~2 kcal/ml*
- *Hepatic - BCAA*
- *Immune-enhancing*
- *Diabetes – lower CHO*





# WRHA Modular Nutrient Sources

Protein Module – Beneprotein protein powder

Glutamine – specific for burn patients

CHO Module – Polycal

Fat Module – MCT oil

# Enteral Nutrition: Methods of Delivery

## Continuous

Via enteral feeding pump

Usually over 24 hours, but can also be adjusted to other amount of hours, ie: 12 hours at night

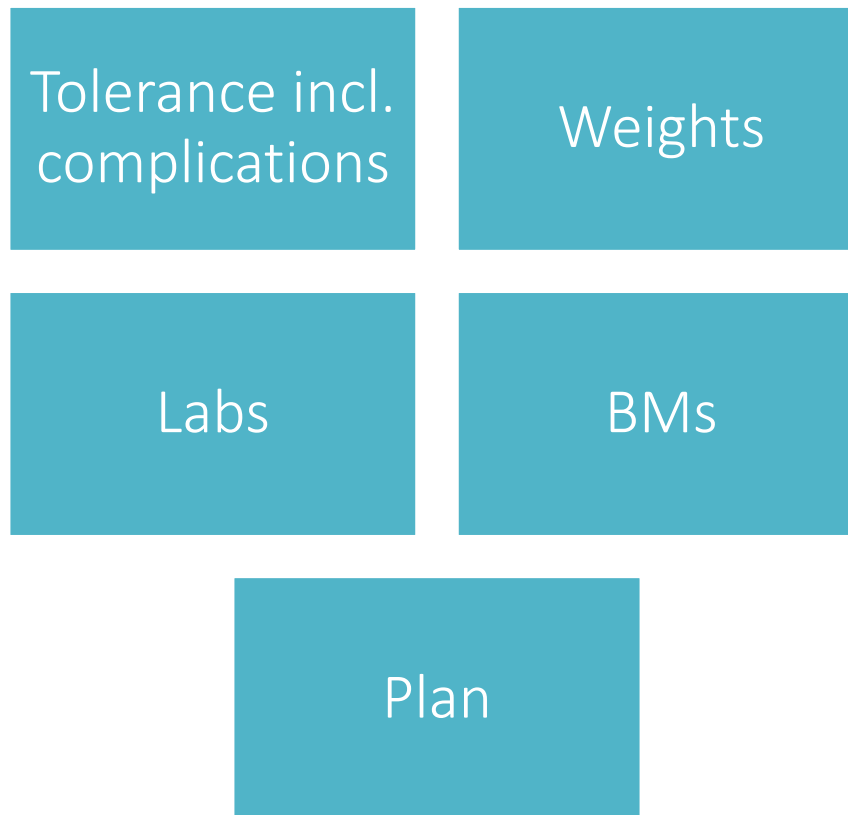
## Intermittent (bolus)

Via pump, gravity drip or syringe

## Initiation of Tube feeds:

Generally we start with continuous, and advance to intermittent

# Monitoring



# Enteral Feeding-Monitoring Parameters

GI Complications	Mechanical Complications	Metabolic Complications
<p>Diarrhea</p> <ul style="list-style-type: none"> <li>generally not caused by TF, look at medications (many have high osmolarity or may contain sorbitol), rule out <i>C. difficile</i>, colitis</li> <li>Provide formula at room temp.</li> </ul> <p>Aspiration</p> <ul style="list-style-type: none"> <li>keep HOB elevated <math>\geq 30</math> degrees, good mouth care, and make sure to feed post-pyloric</li> <li>HOB should remain elevated for ~1hr post intermittent feeds</li> </ul> <p><b>*Monitor Bowel function (frequency and consistency)</b></p>	<p>Tube Displacement</p> <p>Blocked Feeding Tube:</p> <ul style="list-style-type: none"> <li>Medications can easily block a small bore feeding tube.</li> <li>Flush with warm water</li> <li>Activated pancreatic enzymes may be effective. (talk to pharmacy/refer to your clinical handbook for guidance)</li> </ul> <p><b>*Never use cola or meat tenderizer or juice as an attempt to clear the clogged tube.</b></p>	<p>Hyperglycemia</p> <p>Electrolyte imbalances <i>Hyper/hypo: Na, Mg, K, Po4</i></p> <p>Fluid overload/dehydration</p> <ul style="list-style-type: none"> <li>Important to monitor bloodwork/hydration status</li> </ul> <p>Refeeding Syndrome</p> <ul style="list-style-type: none"> <li><i>K, Mg, Po4</i></li> </ul> <p><b>Monitor Labs: Na, K, crea, urea, CRP</b></p>

# Checking tolerance: Gastric Residual Volumes (GRV)

Historically used to check tolerance to gastric feeds: Feed 4 hours, aspirate stomach contents to ensure emptying

Low sensitivity as marker for aspiration, practice largely discontinued

Only for feeding into stomach, not small intestine feeds

Stomach produces up to 3000 ml of gastric secretions daily

Unit patient - accept GRV <200ml

ICU patient- accept GRV up to 500 ml

# Medications and Enteral Feeding

Medications given through Feeding Tube Recommendations:

- Use liquid form if available
- Never add meds directly to TF
- Many meds can be crushed
- If crushing, mix each med **separately** in 30 ml warm water
- Flush tube with 10 ml water between each med
- Flush 30ml pre and post each med administered

# Determining Requirements

## Energy Requirements:

- Predictive Equations: Mifflin-St. Jeor, Harris-Benedict Equation x AF/SF, Penn State Equation for Critical Illness
- Empirical Method: 25-35 kcal/kg (Critical Care)
- Indirect Calorimetry

## Protein Requirements:

- Non-Stressed 0.8 g/kg – 1.0 g/kg
- Mild-Moderate Stress 1.2-1.5 g/kg (up to 2.0 g/kg)
- Burns 25% of Energy
- Major Trauma/Acute Spinal Cord Injury 1.5 -2.0 g/kg

## Fluid Requirements:

Water requirements in a normal healthy adult are:

- 1ml/kcal
- Requirements increase above normal with fever, excessive sweating, fistula drainage, diarrhea, vomiting and large open wounds
- Requirements may be less for fluid overloaded person

Volume of water from all sources should be considered (IV's, oral, TF, flushes)



# Free Water Flushes

**Free water depends on the water content and concentration of the formula used:**

In TF formulas 1.0-1.5kcal/ml

- 80% of the volume is free water

In TF formulas 2.0kcal/ml

- 70% of the formula is free water

**Calculating and Ordering Flushes:**

Flushes should make up the rest of the volume needs after adding up other fluids

- If on continuous feeds, give free water q4h to q6h
- ie: Provide Free water flush of 100ml q 4 hours
- If on intermittent or bolus feeds, flush before and after the feed. Water can also be added to the feeding bag.
- Sterile water should be used for immunocompromised patients

# Guidelines for Ordering TF

*Sample TF order:*

*“Start tube feed Isosource Fibre 1.5 via NG tube at 25 ml/hr; as tolerated, increase rate by 10-15ml q4h to goal rate of 65ml/hr. Free water flush 60 mL q4h.”*

As above, the chart note and order should specify:

1. Formula requested
2. Route of administration (gastric vs. intestinal)
3. Initial flow rate
4. Progression of feeding including goal
5. Volume and frequency of free water flush/24 hr

# Case Study Mrs. B

- 80 y.o. with CVA
- Previously ate well
- SLP recommends NPO
- Risk of aspiration
- Needs ~1575 kcal, 70 g protein
- Calculate the hourly goal rate using Isosource 1.0 High Protein vs Isosource Fibre 1.5



# Answer Case Study 2

1.  $\frac{1575 \text{ kcal}}{24 \text{ hr}} = 65.6 \text{ kcal/ hour}$

2. If using Isosource 1.0, 1 cal/ml, her rate is 66ml/hr.  
 $66\text{ml/hr} \times 24 = 1584 \text{ ml}$  and 1584 calories

3. If using Isosource 1.5 kcal/mL:

$\frac{65.6\text{kcal/hr}}{1.5 \text{ kcal/mL}} = 43.7 \text{ mL/hour}$  (round up to **45**)

1.5 kcal/mL

$45 \text{ mL/hr} \times 24\text{hr} = 1080 \text{ ml} \times 1.5 \text{ kcal/mL} = 1620 \text{ kcal}$

# Answer Case Study 2 (cont.)

1. Protein requirements: ~70g per day

2. If using Isosource 1.0, there is 64 g protein in 1000ml and patient will receive 1584 ml/d, solve for x with cross multiplication:

= **108** g protein/day

3. If using Isosource 1.5 with fibre, there is 68 g protein in 1000ml and patient will receive 1080ml/d, solve for x with cross multiplication:

= **73** g protein/ day

# Case Study 1

Calculate the free water flush required for these tube feeds assuming water requirements are 1ml/kcal. Assume no other fluids are being provided to patient

**Note** 80 % of product is water.

# Answer Case 1 Free Water

1. 1575 kcal required = 1575 ml required

2. Iso 1.0: 1584 ml x 80% free water = 1270 ml

1575 ml – 1270 ml = ~**300** ml add'l water needed

300 ml ÷ 6 = **50** ml q4h

3. Iso 1.5: 1080 ml x 80% free water = 864ml

1575ml – 864 ml = ~**710** ml add'l water needed

710 ÷ 6 = **120** ml q4h



# Resources

- WRHA Clinical Nutrition Handbook
- WRHA Adult Enteral Nutrition Manual
- ASPEN Nutrition Support Core Curriculum-  
3rd edition, 2017
- Product Pocket Guides
- [www.nestlehealthscience.ca](http://www.nestlehealthscience.ca)
- [www.abbottnutrition.ca](http://www.abbottnutrition.ca)