

**Summary - Diet, Dysmotility, and Tube Feeding**  
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This presentation offers practical tips for both working on improving nutritional status for those who battle gastrointestinal (GI) dysmotility as well preventing malnutrition from the types of GI issues that cause dysmotility. The primary focus of this presentation will be on tube feedings or Enteral Nutrition.

Nutrition support options for patients with GI dysmotility fall into four categories (slide 3):

1. Diet -- Patients can work on this area by making alterations, including:
  - Nutrient-specific modifications -- increasing fiber, adding fats, or lowering carbohydrate intake.
  - Hydration changes -- increasing fluid intake to promote adequate hydration.
  - Ingestion modifications -- small meals, more frequent meals, and drinking fluids with solid foods to improve absorption and motility.
2. Enteral Nutrition (EN) -- delivery of nutrients and/or hydration through a feeding tube that is placed in the GI tract. EN is used for patients who cannot tolerate any oral intake and to supplement intake for patients who can tolerate small amounts of food.
3. Parenteral Nutrition (PN) -- nutrition support that bypasses the GI tract completely as nutrients are infused intravenously to meet all or partial nutritional needs.
4. Intravenous Hydration -- fluids and electrolytes administered intravenously.

Benefits of Nutrition Support (slide 4)

- Provides an alternative route for nutrition when eating is not possible or not enough calories are being absorbed -- intake does not meet the body's demands for energy and nutrients.
- Provides bowel rest when needed.
- Improves surgical results for malnourished patients.

Initiating nutrition support is a difficult decision. A plan is developed by a nutrition care team who has been working with an individual patient over time (slide 5). Anatomy, disease, current nutritional status, and growth are just a few parameters assessed. A plan begins with an evaluation of GI function, which may include imaging, functional testing, and more. A thorough assessment of overall nutritional status follows, examining parameters such as: diet and weight history, food allergies, meal patterns (size and frequency), medications, lab data, and bowel movement patterns. Symptom evaluation and identification of trigger points help to develop a nutritional plan that

minimizes negative symptoms. For example, document food triggers that set off abdominal cramping. After the full assessment, a decision is made regarding the benefit of nutrition support for the individual.

Benefits of Enteral Nutrition -- using the GI tract for nutrition has many benefits over parental nutrition in the patient who cannot tolerate oral feedings (slide 6):

- Maintains the health of the GI tract.
- Reduces the inflammatory process.
- Stimulates the growth of the villi lining the small intestine.
- Improves GI transit time.
- Cost-effective.

Selection of EN formula is dependent on factors such as bowel anatomy, area of GI tract affected by the underlying condition or disease, and EN formula characteristics (slide 7). Removal of specific areas of the bowel, for example, would affect which formula would provide the best nutrition. EN formula characteristics include intact nutrients (similar to food), polymeric (partially digested nutrients), hydrolyzed, or semi-elemental or elemental (almost completely digested nutrients, osmolarity (concentration), and fiber content.

Delivery of EN is dependent upon length of therapy (week, months, or years), delivery method, and the type of feeding tube (slide 8). Delivery methods include bolus delivery (push full amount of feed more like eating several meals per days), gravity drip, or continuous feeds over a 12- or more-hour period via a pump (most common).

Enteral Tube Location (slide 9) -- named by insertion site and where tube ends.

- Nasogastric (through nose to stomach) -- Low risk, easy to place tube to test tolerability of feeds. Good for short-term use.
- Nasointestinal (through nose to small intestine) -- Low risk, easy to place, short-term use, bypasses the stomach.
- Gastrostomy -- Surgically placed through stomach wall into the stomach (G-tube) or endoscopically placed (PEG)
- Jejunostomy -- Surgically placed through the abdominal wall to the small intestine (J-tube) or endoscopically placed (PEJ). J-Tubes are used when the stomach is malfunctioning.

Benefits of early tube placement are multifaceted (slides 10-12) and include prevention of dehydration and electrolyte abnormalities, prevention of weight loss and malnutrition, and improvement of fatigue. Continued assessments such as physical exams, lab tests, weight changes, bowel movement patterns, and hydration all determine tolerance to EN. Slow weight gain ( $\frac{1}{2}$  -1 pound per week) is the typical goal of treatment. Improving EN tolerance can be achieved by modifying the plan via formula changes, rate changes, raising the head of bed to 30 degrees, and altering medications to improve absorption

and transit time. Adjustments are common and providers and patients need patience with the process.

Impact of Diet on EN Tolerance -- Common factors to formula intolerance (slide 13)

- Small frequent meals are easiest to tolerate --  $\frac{1}{4}$  to  $\frac{1}{2}$  cup at a time to gauge response. Small frequent portions are associated with less GI pain and cramping.
- Continue to add new foods to the diet. Retry foods, in smaller amounts, that were not tolerated in the past.
- Chew your food well! Chewing is the first step in digestion has a direct impact on GI tolerance.
- Liquids tend to be easier to tolerate and can increase caloric intake. When fullness increases as the day progresses, switch over to higher caloric liquids.
- Do not lie down after a meal. Sitting, standing, and walking help move food through the GI tract.

### **Avoiding Dietary Fiber**

Fiber slows the movement of food through the GI tract. Fiber attracts water and forms a gel within the stomach and intestine, slowing the moving of food. Research demonstrates that patients with dysmotility who consume a high-fiber diet experience more abdominal pain, discomfort, nausea, and vomiting, which then contributes to a poor oral diet. Foods to avoid are listed on slide 14 and include whole grains, brown rice, popcorn, skins, nuts, seeds, uncooked vegetables, beans, tough cuts and processed meats. Foods to choose include white bread and rice, refined grains, cooked or canned fruits and vegetables, dairy, baked or broiled tender meats and poultry, tofu, ground meats, smooth peanut butter, and eggs.

### **Dietary Fat**

Fats are effective in increasing caloric intake in a smaller volume. Again, patients with dysmotility who also consume a high-fat diet experience more GI pain and negative symptoms. Small amounts of liquid fats at each meal, however, move through the GI tract at a steady rate, minimizing discomfort. Foods to choose and avoid are listed on slide 15. Avoid: crackers, chips, fried foods, 2% to whole milk dairy products, higher fat meats. Choose: white bread and rice, refined grains, cooked or canned vegetables and fruits, skim or 1% milk products, egg whites, skinless chicken or turkey, lean pork, beef, lamb, veal, fish, shrimp, and crab.

Medications for Dysmotility include prokinetic agents, antiemetic drugs, laxatives and stool softeners, analgesics, gastric acid suppressants, somatostatin analogs, and antibiotics (slide 16). This list may open up discussion with healthcare providers as possible avenues to aid dysmotility.

Fluids can be delivered through a feeding tube to help maintain hydration and/or the health of the GI tract (slide 17). This choice works well as a first step for patients working to come off of IV or parental nutrition. Enteral hydration also benefits patients

who can maintain their body weight, but battle recurrent dehydration, and patients unable to meet 100% of their hydration needs with EN formulas and/or diet.

Parental Nutrition is used for patients who are unable to maintain enteral access as well as for patients whose GI tracts are non-functioning (slide 18). PN is a lifesaving form of nutrition for patients who cannot use their GI tract. PN can prevent dehydration and electrolyte abnormalities, and cut down on ER visits and hospitalizations, positively impacting quality of life.

Combination therapy involves using EN and PN at the same time as a bridge to transition off of PN to EN and also to feed a functioning lower GI tract when unable to maintain nutritional status without PN support (slide 19). Reducing PN volume while increasing EN volumes is a common transition strategy. Use of a PN holiday is another tool to help transition to EN. The patient does not use PN one day a week, for example, so see how fluid and nutritional states are affected. If the PN holiday works well, more days without PN are added gradually. Motility rehab uses a combo of nutritional support (oral, EN, or PN), medical management (surgical or medical techniques), and pharmacological management to help improve motility and GI function.

Although EN via tube feedings are low risk to trial, such a step should be discussed in detail before taking action. A second opinion to validate the need for tube feeding is recommended for medically complex children. The GI tract is a muscle and is subject the same variability of symptoms of other organ symptoms in patients with Mito. Be open to retrying foods, formulas, and feeding plans that have not worked in the past.

In summary, many nutrition support options are available for patients with intestinal failure or severe GI dysmotility. Transitioning nutritional support takes time and flexibility to determine tolerance to the nutrition support regimen. For complex cases, working with a team of clinicians who specialize in intestinal rehabilitation is critical. ThriveRx has educational programs and services available at [info@thriverx.net](mailto:info@thriverx.net) or by calling 1-888-684-7483.

### **Additional Resources**

ThriveRx

MitoAction Clinical Conference (2014) - "Dysmotility and Nutrition Management." Dr. Fran Kendall.

Children's G-tube Book When Jeremy Jones' Stomach Stopped Working - A Story for Children with G-tubes.

The Oley Foundation - Striving to enrich the lives of those living with home intravenous nutrition and tube feeding through education, advocacy, and networking.

MitoAction Presentation - "Current Topics in IV Therapy for Hydration and Nutrition."

"Artificial Nutrition: Principles and Practice of Enteral Feeding," Lloyd, David, et.al. (2004)

MitoAction Presentation - "Nutrition for Mitochondrial Disease Patients."

MitoAction Presentation - "G-tubes, J-tubes, TPN! Where Do We Begin?"

