

The Who, What, When, Why, and How of the Blenderized and Pureed By G-tube Diets

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Objectives

- Discuss the history and future of blenderized formulas
- Understand the difference between blenderized tube feedings and Puree by G-tube Diet (PGBT)
- Determine the appropriate use of blenderized tube feedings and indication of PGBT diet
- Assess the benefits and disadvantages of each of these diets as well as understand the challenges the RD may face
- Learn how to create and monitor use of the diet in the outpatient GI clinic



History of Formulas

Around 3000 BC

- first “tube feeds” using reeds and animal bladders in Egypt and Greece Around 3000 BC. The “formula” was a mixture of wine, milk, whey, broth that was fed rectally

18th-19th Century

- Oro-gastric feedings using whale bone covered in eel skin. Fed mixtures of jellies, beaten eggs, sugar, milk and wine.

1960-1970's

- Introduction of commercial standardized formulas

21st Century

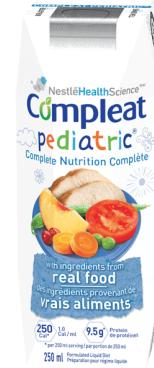
- Interest in “holistic” approach and returning to natural foods



WHAT Is In a Blend?

Commercial Products

- Compleat Pediatric (1.0, 0.6 kcal/mL)
- Liquid Hope/Nourish
- Real Food Blends



Homemade blends

- Utilize baby foods, real foods, or a blend of both
 - Blenderized tube feed (thin)
 - PBGT (thick)



Blenderized Tube Feed



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WHAT is a Blenderized Tube Feed (BTF)?

- “Typical diet”
- Thin blend that is different from a Pureed by G-tube Diet (PBGT)
- Consists of either regular foods or baby foods blended together with a liquid
- Can be used in conjunction with formula administration
- Also called: Blended Diet, Blenderized formula, Homebrew, Homemade formula, Blended Foods, Thin Blend, Pureed Diet



WHY Do We Use It?

- Parent of a patient requesting a more “natural” product
 - Greater connection between patient and family around “meal time”
 - Increased dietary diversity
- Patient unable to tolerate commercialized formula
 - Corn syrup solids, soy oil, etc.
 - High Osmolality
- Possible increase in oral food intake for kids with oral aversion or delayed feeding skills
- Issues with insurance company



WHY Do We Use It?

- Improved bowel function
 - Phytochemical and fibers
 - Lack of processed ingredients (i.e. thickeners, emulsifiers, preservatives)
 - Greater nutrient absorption
 - 15-20% increase in calorie need
- Parental report and observation of
 - reduction in seizure activity
 - Increased satiety
 - Improved skin tone and texture



WHO May Use It?

- >6 months corrected age
- Multiple foods accepted
- Medically stable
- Clean and healed G-tube site at least 8 weeks post-placement
- At least a 14 or 16 French tube
- Family is willing and able to work closely with RD



WHEN is it Contraindicated?

- <6 months corrected age
- Inadequate “safe” foods
- NG, NJ, Jejunostomy, Continuous feeds
- Volume restriction
- Lack of adequate weight gain on current regimen
- Immunocompromised
 - Increased risk of infection/contamination
- Genetic or metabolic conditions
- Unstable housing/resources
- Insufficient funds for supplies
- increased preparation time, increased nutrition monitoring



WHAT is Required for BTF?

- Blender (Blendtec, Vitamix, Ninja, etc)
- Measuring cups, spoons, and scales
- Strainer
- Syringe and tube extensions
- Airtight storage containers
- Adequate refrigerator/freezer space for storage
- Freezer bags, Pitchers, and Jars (need to refrigerate or freeze immediately)



HOW Do We Give It?

- Plunger Syringe
 - Push using 60 mL slowly over 10-15 minutes
 - Allows for varying degrees of thickness
- Gravity Syringe
 - Needs to be very thin
- Pump
 - Need 14-16 French
 - Run <2 hours for food safety reasons
 - Can possibly put on ice and ensure stays cold (<40 degrees) however would still limit to <4 hours



HOW to Create It

1. Assess patient's current intake and nutrient needs

2. Use FoodProcessor to create and analyze the recipe

3. Start with fluid (milk source or formula)

4. Add proteins, grains, vegetables, and fruits

- Encourage variety of food options daily and discuss with family appropriate foods to include

5. Add source of fat (oil, avocado, nut butter)



HOW to Create It

6. Assess the recipe for adequacy of calories, macronutrient distribution, micronutrient content

7. If needed, add multivitamin or individual supplements (calcium, vitamin D)

8. Table salt or salt alternatives to meet sodium and potassium needs

9. Add water to meet maintenance fluid needs

10. Write document for parent that explains transitioning to diet, food safety practices, preparation, and administration. Handouts provided as well



PBGT diet



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WHAT Is It?

- Thick Blend consisting of baby foods and either formula or milk
- Use baby foods for consistency and sterilization, ease of preparation, eliminates the need for a blender without clogging the tube
- Therapeutic diet
- Minimum of 30 kcal/oz
- 15-20% higher calorie than receiving on commercialized formula
 - More fiber, real foods

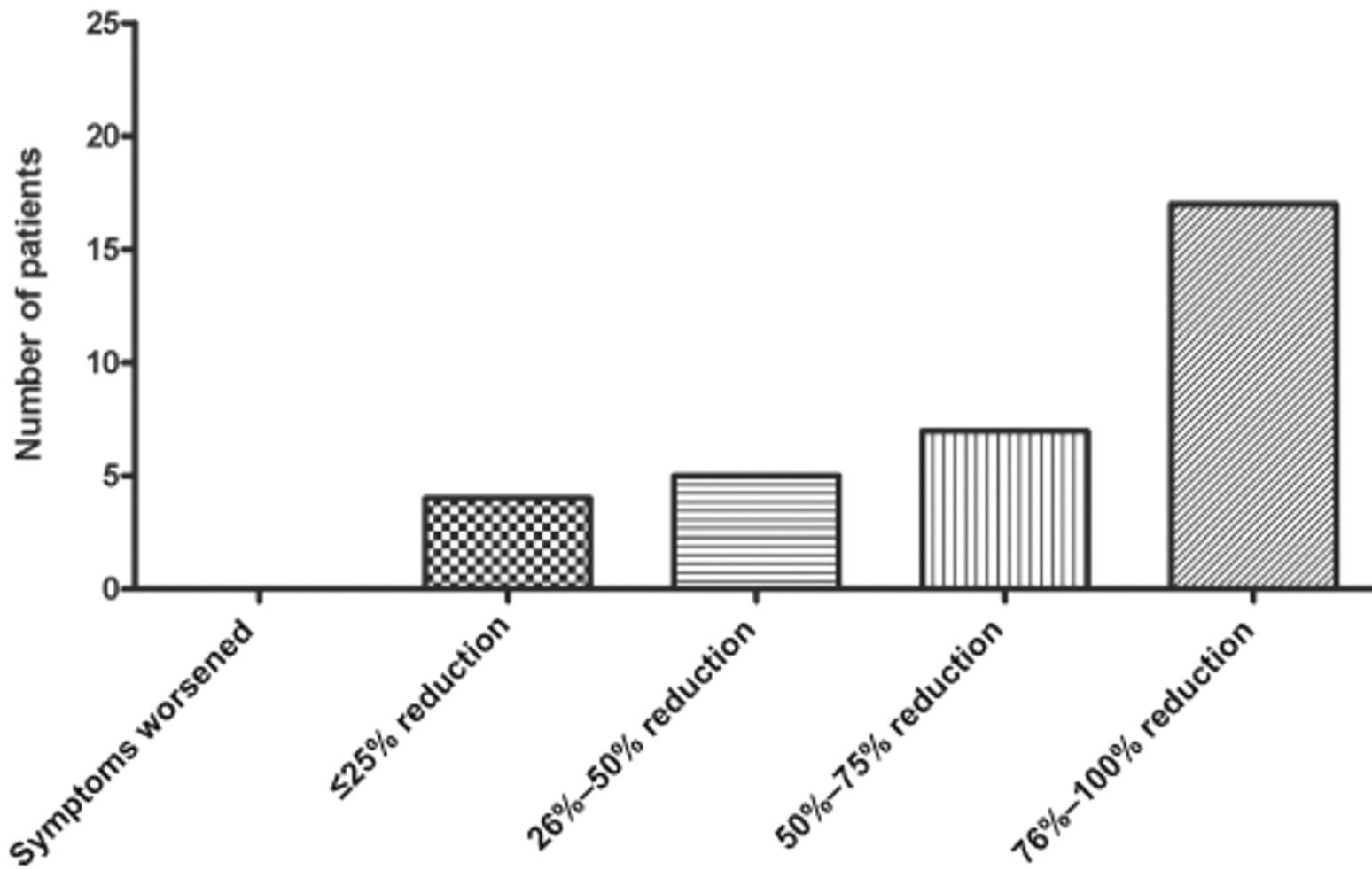


When do we use the PBGT Diet?

- Children with gagging/retching following fundoplication
- For those who are volume sensitive
- Child not tolerating current tube feeding regimen on commercial formula
- Poor oral intake
- Study by Pentiuk et al.
 - 33 children with G-tube and Nissen fundoplication
 - 52% had 76-100% decrease in retching and gagging
 - 73% had at least 50% improvement in symptoms
 - No parents reported a worsening of symptoms
 - 57% of these children also improved their oral intake of foods



Figure 1. Reduction of gagging and retching in children (n = 33) using the pureed by gastrostomy tube diet as reported by their parents.

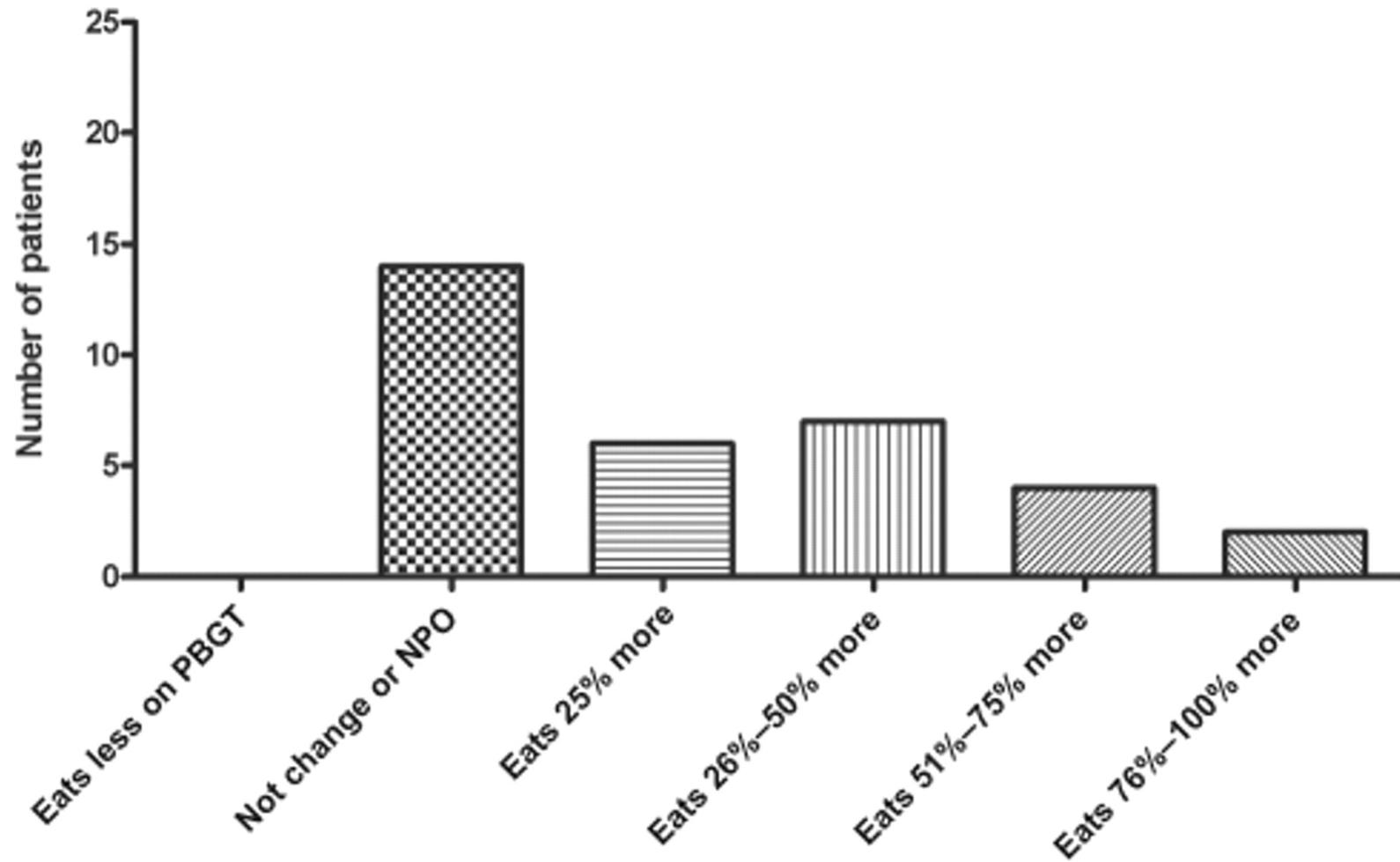


Scott Pentiuk et al. JPEN J Parenter Enteral Nutr
2011;35:375-379

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Figure 2. Change in oral intake in children (n = 33) using the pureed by gastrostomy tube diet as reported by their parents.



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WHAT are Some of the Benefits?

- Decrease in gagging and retching
 - Causes not entirely understood
 - Higher viscosity causes slower emptying of the stomach and decrease in dumping syndrome
 - Pureed foods can stimulate a different hormonal response that have positive effect on GI motility
- Increase in oral intake
 - Possibility from decrease in gagging and retching
 - Discontinuation of continuous feeds
- Parents report decrease in constipation
- Immediate improvement in symptoms



HOW to Create the PBGT Diet

Start with protein source

- Milk or formula is the base (typically limited to 4-8 oz)
- Infant meat/yogurt for additional protein
- Will receive very small amount protein from cereals



Carbohydrate Source

- Stage 2 fruits and vegetables. Variety can be used daily
- Again, limit volume to 2-3 jars



Thickener/Carbohydrate

- Grains for additional carbohydrate and calories/fiber
- Infant cereal (typically 8 tbsp)
- Cornstarch or white granulated sugar can be used



HOW to Create the PBGT Diet

Additional Fat

- Typically 1-2 tbsp of omega 3/6 blend (flax, canola, olive, walnut, avocado, hemp, fish oil)



Add supplements

- Typically require added salt or salt substitute depending on electrolyte deficiencies
- Complete Multivitamin or individual vitamin supplementation (calcium, vitamin D may be needed as well)



Fluid

- After recipe meets nutrition needs, then calculate total volume and free water
- Water needs to be given either overnight continuously or as boluses at least 1-2 hours before or following the bolus feeds



Example PBGT Recipe

- 8 Fluid Ounces of Pediasure Peptide
- 1 jar sweet potato (4 oz)
- 1 jar infant meat (~2.5 oz)
- 1 jar green beans (4 oz)
- 1 jar banana (4 oz)
- 6 oz (container) whole milk plain greek yogurt
- 1/2 cup of dry infant rice or oatmeal cereal
- 2 tablespoon of canola or olive oil
- 6 tablespoon of cornstarch
- **¼ teaspoon of Morton’s lite salt (important not just table salt because this product contains potassium and iodine as well)**
- Makes ~1200 calories (about 50 kcal/oz), 37% fat, 50% carbohydrate, 13% protein (3 g/kg) protein and approximately 730 mL of fluid



HOW to Prepare and Administer

- Mix all ingredients in wide mouth jug and stir together
- No need to use blender
- Draw up formula into 60 mL syringes
- Give 2-4 oz bolus feed every 2-3 hours
- Water boluses given at least one hour prior to or after formula bolus
- Alternatively, water can be given continuously overnight
- While transitioning to bolus feeds can give 50% of needs as nighttime continuous feed
- Tell caregivers to give variety of foods daily
- Use Pam spray for easier administration



WHAT We Tell the Caregivers

Sample Instructions

Puree By Gtube Diet (PBGT) Diet for _____

The PBGT diet is for the treatment of gagging, refluxing, Nissen funduplications, and volume intolerance. This diet requires a **14-16 French G-tube** and is administered via **Plunger Syringe**. You will first start with a 1 oz. bolus pushed slowly over 10 minutes. You will gradually increase bolus to the goal of 2-4 oz. After preparing the formula you will draw up the formula into 60 ml syringes. This recipe should make 20 oz.

Recipe: Wash hands, clean area and all utensils.

Initially, need to continue 50% of estimated needs (375 calories) by continuous feed of the Pediasure overnight. 47 mL for 8 hrs. Eventually, _____ should be able to tolerate entire PBGT recipe by bolus feeds and we can d/c nighttime Pediasure. Once she can tolerate 60 mL boluses, you can decrease to 47 x 6 hours overnight and once she is tolerating 90 mL boluses, can decrease to 4 hour overnight. Once she is tolerating 100% of daytime bolus, we can discontinue the overnight altogether.

Begin with 1 oz (30mL) of puree mixture given through 60 mL syringe. This can be given every 3 hrs (about 5 times during the day).

Example schedule:

10 pm – 6 am = Pediasure 47 mL for 8 hours

8 am – 30 mL puree

11 am – 30 mL puree

2 pm – 30 mL puree

5 pm – 30 mL puree

8 pm– 30 mL puree

Do 30 mL for a couple of days, and can increase by 1 oz (30 mL) at a time as tolerated every few days. Suspect the final volume will be around 570 mL (19 oz). Eventual goal should be around 100 mL of puree (3.5 oz), 5 times daily. It should take about 10-15 minutes to push the mixture slowly through the tube.



WHAT We Tell Caregivers

RECIPE:

- 8 Fluid Ounces of Pediasure
- 1 jar sweet potato (4 oz)
- 1 jar infant meat (~2.5 oz)
- 1 jar green beans (4 oz)
- 1 jar banana (4 oz)
- 1/4 cup of dry infant rice or oatmeal cereal
- 1 tablespoon of canola or olive oil
- 2 tablespoon of cornstarch
- ¼ teaspoon of table salt

Makes ~780 calories (about 40 kcal/oz), 37% fat, 53% carbohydrate, 2.5 g/kg protein and approximately 570 mL of volume .

Ingredients can all be added to wide mouth container and shaken or stirred. There is no need to use a blender with the infant foods. The mixture should be very thick! Whatever is not used should be discarded within 24 hours.

Use stage 2 baby food jars (3.5-4 oz each). The above is an example; **You can switch out the fruits and vegetables daily, making sure you provide variety of colors on same day (ex: orange and green) in order to ensure variety of nutrients. Choose fruits and vegetables from both vitamin C (applesauce, pears, green beans, peas, spinach) and vitamin A (squash, carrots, sweet potato, peaches, apricots) categories daily as well as high in potassium (banana, prunes). Can also switch out infant meats daily as well. **Will also need an added vitamin D and calcium liquid supplement or can crush a tablet and add to mixture. Make sure it has added calcium (at least 200-300 mg and at least 400 IU of vitamin D.)**

Follow by 5mL of water to cleanse the tube. Do not provide more water directly following feeds as this will add to volume and dilute the concentrated mixture. We will give additional water that is needed at least 1-2 hours after bolus feeds. **Needs additional _____ mL of water per day. Could be done as 5- _____ mL boluses at least 1-2 hours before or after each pureed bolus.**
Alternatively total volume of extra water needed can be provided as overnight continuous drip.

Will need f/u with labs in 3 months.

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Monitoring and Evaluation

- Requires multiple follow-ups with dietitian
- Monitor growth and tolerance
- 3 month nutrition labs for adequacy of diet
 - Zinc, iron vitamin D, electrolytes
- Can increase volume if tolerated, or make changes to diet composition



Cost Comparison

Table 1 Cost of food-based enteral formulas in comparison with standard pediatric enteral formula

Formula	Pack size	Pack price, \$	Price per unit, \$	Price per 100 calories, \$
Homemade, conventional ^a	NA	NA	2.48 per daily recipe ^b (700 kcal)	0.36
Homemade, organic ^a	NA	NA	4.29 per daily recipe ^b (700 kcal)	0.61
Standard pediatric enteral formula: Pediasure (Abbott Nutrition ⁸)	24 cans	49.00	2.04 per can (240 kcal)	0.85
Compleat Pediatric (Nestle Nutrition ⁹)	24 tetrapacks	74.99	3.12 per tetra (250 kcal)	1.25
Real Food Blends ¹⁰	12 pouches	49.95	4.16 per pouch (330 kcal)	1.26
Liquid Hope (Functional Formularies ¹¹)	6 pouches	47.94	7.99 per pouch (450 kcal)	1.78

Ingredient costs from peapod.com and vitacost.com.

Walia C, Hoorn MV, Edlbeck A, Feuling MB. The Registered Dietitian Nutritionist's Guide to Homemade Tube Feeding. *Journal of the Academy of Nutrition and Dietetics* 2016.

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Helpful Hints

- Can make ahead and freeze
- Use water from cooked vegetables as liquid source
- Fruits and vegetables should contain skin for added fiber
- Whole foods blend better when warm
- Need backup option in case of travel, loss of power, hospitalization



<http://www.mealtimenotions.com/>



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