

DISCLOSURES:

Speakers Bureau

Nutricia North America
Mead Johnson

Medical Advisory Board
The FPIES Foundation
Nutrition4Kids.com
Mission Mighty Me

None pose any conflict of interest for this presentation

LEARNING OBJECTIVES:

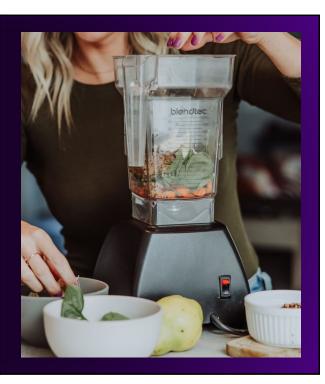
By the end of this presentation, participants will be able to:

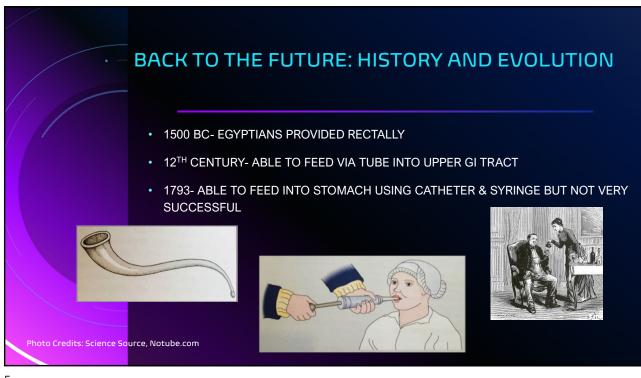
- 1. Describe the history and evolution of blenderized tube feeding as a nutritional therapy.
- 2. Identify clinical & personal reasons for choosing blenderized tube feedings over commercial formula products.
- 3. Discuss appropriate methods for the safe preparation and administration of blenderized enteral nutrition.
- 4. Outline the steps involved in creating a nutritionally balanced homemade blenderized tube feeding formula

3

WHAT ARE BTF'S?

- PUREED BY G-TUBE (PBGT), BLENDERIZED FORMULA, HOMEMADE BLENDED FORMULA AND HOMEBREW
- "BLEND OF FOOD AND LIQUIDS PROVIDED THROUGH A FEEDING TUBE"
- CAN BE SOLE SOURCE OR SUPPLEMENTARY TO PO INTAKE







WHY THE RESURGENCE? CLINICAL REASONS

1. IMPROVED FEEDING TOLERANCE-

- Review in multiple databases by Schmitz et al found BTF reduced nausea, vomiting, diarrhea, gagging, reflux, constipation, abdominal pain and improved volume tolerance.
- Pentiuk et al, 2011 + Edwards et al, 2016: 73% of kids had >50% reduction in retching and gagging on BTF
- Batsis et al, 2020: 95% of kids had reduction in gagging, retching, vomiting and other symptoms of dysphagia or aspiration
- Schmidt et al, 2019: reduction in diarrhea of critically ill adult patients on BTF
- Reasons for improvement: higher viscosity leading to slower gastric emptying, higher fiber content of BTF + more physiological motility due to chyme stimulating regular hormonal response

2. IMPROVED GROWTH-

- Studies show improved weight z scores and height z scores on BTF's with CLOSE RD follow up
- Oley Foundation survey found that 90% of children and 85% of adults reported no weight loss compared to 59% of children and 52% of adults reporting no weight loss on commercial formulas.

7

WHY THE RESURGENCE? CLINICAL REASONS

3. INCREASED INTEREST IN PO FEEDING

- 2011 Pentiak et al study found that 57% of the children in their study had increased PO intake
- Reasons for increased interest- decreased GI symptoms + increased variety of flavors they burp up

4. DECREASED HOSPITALIZATIONS and REDUCTION IN HEALTHCARE COSTS

- Hron et al, 2019: 53% less admissions including 67% fewer respiratory illness admits + 43% less ED visits
- Schmitz et al review: reduced infectious disease complications, greater weight gain and decreased number AND length of hospital admits

5. DIVERSITY IN MICROBIOME

Whole food diets with less processed ingredients that include variety lead to diverse microbiomes-> better health outcomes

WHY THE RESURGENCE? PERSONAL REASONS

- SOCIAL REASONS- participation in meal times, food prep
- FREEDOM TO CHOOSE FOODS TO INCLUDE/AVOID IN BLENDS
- PARENTS WANT TO NURTURE VS "JUST OPENING CAN OF FORMULA"
- MORE SENSE OF CONTROL IN LESS THAN IDEAL SITUATION
- FINANCIAL- LESS EXPENSIVE IF FORMULA NOT COVERED BY INSURANCE

"I can adjust it, if she's getting constipated, the next blend I could increase the fiber or use more juice or switch to flax oil. I've got control."

"I want all of my children to eat at the table together, and everyone to eat the same meal as a family"

"I changed to blended feeding when it dawned on me one day that my son had not had a vegetable or a fruit in 5 years."

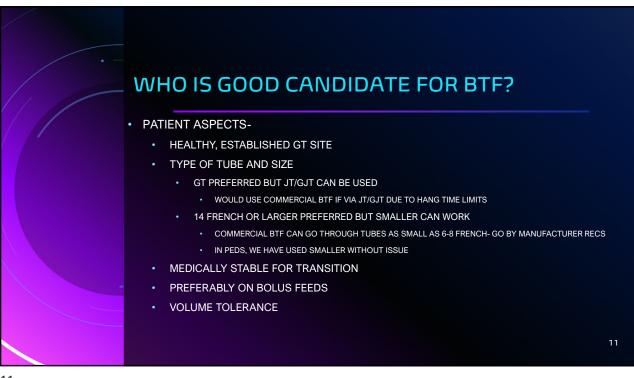
"My child is the most vulnerable of us all yet I am feeding the most processed item to him, and the same thing every day for years!"

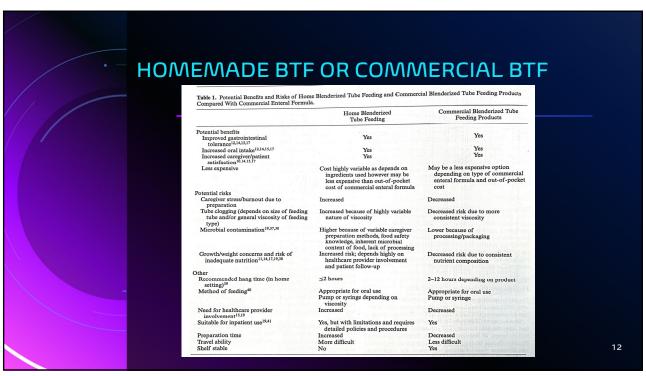
9

WHO IS GOOD CANDIDATE FOR BTF?

- "BEFORE INITIATING BTF, CONSIDER THE PATIENT'S ENTIRE CLINICAL PICTURE, INCLUDING PATIENT-RELATED FACTORS (PSYCHOSOCIAL, SOCIOECONOMIC, AND CLINICAL), EAD, NUTRITION NEEDS AND DIETARY REQUIREMENTS, DIETARY PREFERENCES, ACCESS TO RESOURCES AND FOOD, TOLERANCE, FOOD SAFETY ISSUES, AND COSTS"- ASPEN PRACTICE RECOMMENDATIONS
- FAMILY DYNAMICS-
 - HOME ENVIRONMENT- ACCESS TO BLENDER, REFRIGERATION, SANITARY CONDITIONS
 - FAMILY SUPPORT
 - COST
 - HISTORY OF COMPLIANCE OR NONCOMPLIANCE
- MEDICAL SUPPORT-
 - ACCESS TO RD FAMILIAR WITH BTF'S

10





COMMERCIAL BTF OPTIONS

- FUNCTIONAL FORMULARIES- PLANT BASED, CAL/ML VARIES, 12 OZ POUCHES
 - PEDIATRIC- NOURISH, NOURISH PEPTIDE, NOURISH PEPTIDE BERRY MEDLEY
 - ADULT- LIQUID HOPE, LIQUID HOPE PEPTIDE, LIQUID HOPE PEPTIDE BERRY MEDLEY
 - SPECIALTY- KETO, LIQUID HOPE HIGH PROTEIN KETO SUSTAIN
- KATE FARMS- PEA PROTEIN, 1 CAL/ML, 8 OZ POUCHES
 - PEDIATRIC BLENDED MEALS- 3 DIFFERENT FLAVORS
- NESTLE COMPLEAT BLENDS- PLANT BASED & CHICKEN BASED OPTIONS, 10 OZ POUCHES
 - PEDIATRIC- 1.2 CAL/ML
 - ADULT- 1.3 CAL/ML

13

13

COMMERCIAL BTF OPTIONS

- REAL FOOD BLENDS- 6 MEAL + 1 SNACK + 2 CAL DENSE, HIGH PROTEIN OPTIONS
 - DO NOT CONTAIN ADDED VITAMINS OR SODIUM SO YOU MUST ADD IN IF SOLE SOURCE
- WHOLE STORY MEALS- REAL FOOD POWDERED MEALS, PLANT OR CHICKEN BASED
 - 100 CALS PER SCOOP- CAN CONCENTRATE
 - ORIGINAL- NO ADDED VITAMIN, SODIUM
 - PLUS- NOW COMPLETE
 - PEDIATRIC, ADULT AND RENAL OPTIONS



SAFE PREPARATION & ADMINISTRATION

- FOOD SAFETY & STORAGE
 - FOLLOW FOOD SAFETY GUIDELINES FOR PREP, STORAGE AND SANITIZING EQUIPMENT
 - CAN BLEND EACH MEAL SEPARATELY- FEED IMMEDIATELY
 - CAN PREPARE 1 DAY'S WORTH KEEP UNUSED PORTION IN AIRTIGHT CONTAINER IN REFRIGERATOROR AND USE WITHIN 3-4 DAYS
 - CAN PREPARE LARGE BATCHES & FREEZE-
 - FREEZER TEMP SHOULD BE <0 DEGREES FAHRENHEIGHT
 - IDEAL TO USE WITHIN 3 MONTHS
 - FOLLOW MANUFACTURER RECS FOR COMMERCIAL BTF'S REGARDING STORAGE

15

15



SAFE PREPARATION & ADMINISTRATION

• EQUIPMENT NEEDED-

- PROFESSIONAL BLENDER MAY BE NECESSARY IF BLENDING ALL FOODS
 - BLENDTEC, VITAMIX, VIKING
 - IF FREEZING, MAY NEED TO REBLEND AFTER THAWING FOR SMALLER PARTICLE SIZES TO GO
 THROUGH TUBE WITHOUT ISSUE
- JUG OR WAND BLENDER CAN BE USED IF USING STORE BOUGHT PUREES
 - BLENDING TIME MAY VARY- PER ASPEN RECS, 3-6 MINUTES IS GENERAL REC TIME BUT WOULD NEED TO INCREASE BLENDING TIME IF USING LESS POWERFUL BLENDER OR BASED ON FOODS INCLUDED IN RECIPE
- ENOUGH REFRIGERATOR SPACE TO STORE AND/OR FREEZER STORAGE SPACE IF PLANNING TO BLEND IN ADVANCE
- AIRTIGHT STORAGE CONTAINERS SUCH AS MASON JARS, BREAST MILK STORAGE BAGS FOR EASY THAW
- ICE CUBE TRAYS, SOUP SAVER TRAYS IF BLENDING INDIVIDUAL COMPONENTS IN ADVANCE TO FREEZE + FREEZER STORAGE BAGS TO KEEP CUBES IN

16



Handy Jakes

SAFE PREPARATION & ADMINISTRATION

- EQUIPMENT NEEDED-
 - 60 ML SYRINGES WITH PLUNGER- SMALL BORE CONNECTOR O-RING = EASIER TO PUSH
 - LARGE-BORE GRAVITY BAGS AND REUSABLE BAGS
 - BOLEE BAGS WITH BOLINK LARGE CAP- 375 MLS BAG WITH CAP FOR STORAGE; CAN REUSE UP TO 15X (UDELIVERMEDICAL.COM)
 - BOLINK SMALL CAP ATTACHMENT- FIT ON KF BLENDS AND SOME OTHER BABY FOOD POUCHES AND CONNECT TO FEEDING TUBE OR EXTENSION SET (UDELIVERMEDICAL.COM)
 - STRAIGHT LEVEL EXTENSION SET- ALLOW BETTER FLOW SO LESS CLOGGING

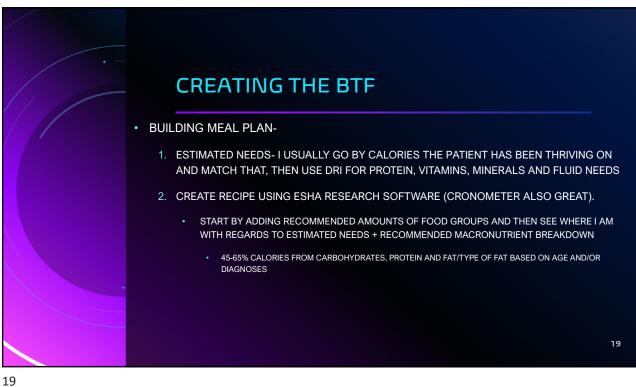
17

17

SAFE PREPARATION & ADMINISTRATION

- DELIVERY METHODS
 - BOLUS VIA SYRINGE OVER 20-30 MINUTES PREFERRED
 - SHOULD NOT BE OUT OF REFRIGERATOR FOR LONGER THAN 2H AT ROOM TEMP, AND LESS THAN 1H IF OVER 90 DEGREES
 - GRAVITY AND PUMP CAN BE USED WITH CONSIDERATIONS ALREADY DISCUSSED
 - HOMEMADE BTF- <2H HANG TIME
 - COMMERCIAL BTF- FOLLOW MANUFACTURER RECS
 - BE AWARE THAT PUMP IS NOT USUALLY ACCURATE WITH BTF- TELL FAMILIES THAT FULL AMOUNT SHOULD BE USED EACH FEED! ADJUST RATE ACCORDINGLY.
- NO OPTIMAL CONSISTENCY RECOMMENDATION- LARGE VARIABILITY BETWEEN HOMEMADE AND EVEN BATCHES OF COMMERCIAL BTF
 - WE AIM FOR STAGE 2 BABY FOOD CONSISTENCY
 - WOULD USE IDDSI TEST IF THERE IS A REC FOR SPECIFIC PATIENT, PUMP OR PRODUCT
 - CAN USE WATER, JUICE, MILK, FORMULA TO THIN AS NEEDED

18



CREATING THE BTF

- MILK GROUP:
 - COW'S MILK, MILK ALTERNATIVE IF FOOD ALLERGY OR FAMILY PREFERNCE, POWDERED MILK TO LOWER VOLUME
 - YOGURT/YOGURT ALTERNATIVES FOR PROBIOTICS
 - FORMULA AS BASE IF NEEDING MORE CONCENTRATED RECIPE AND FAMILY OK WITH
- FRUITS/VEGETABLES: FROZEN, CANNED, FRESH, INFANT PUREES
 - JUICE TO THIN
 - LEAFY GREENS

20

CREATING THE BTF

- GRAINS/STARCHES: BREAD, OATS, RICE, FLOURS
 - INFANT CEREALS FOR INCREASED VITAMINS/MINERALS
- PROTEINS: PLANT BASED VS ANIMAL BASED, BEANS, NUT BUTTERS, NUTS/SEEDS, INFANT MEAT PUREES, EGGS
- FAT: LIQUID OILS, MCT OIL
 - MUST BE LIQUID AT ROOM TEMP OR CLOGGING AN ISSUE
 - NUT BUTTERS, AVOCADO
 - FLAX OIL- GREAT TO HELP WITH CONSTIPATION
- SIMPLE SUGARS: SUGAR, AGAVE, MAPLE SYRUP, HONEY, JUICE, BLACKSTRAP MOLASSES

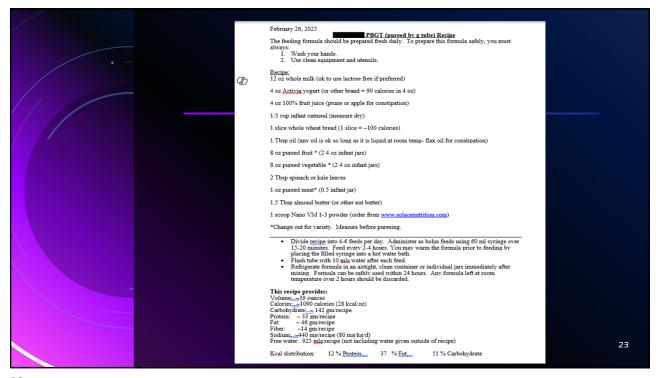
21

21

CREATING THE BTF

- 3. COMPARE RECIPE TO ESTIMATED NEEDS AND TWEAK.
- 4. ADD VITAMIN, SALT IF NEEDED.
 - NANOVM (SOLACE NUTRITION), PHLEXY VITS (NUTRICIA), SPECTRUM- POWDERED OPTIONS
 - LIQUID OPTIONS AND CRUSHABLE OPTIONS WORK AS WELL
 - CALCIUM/PHOS/VITAMIN D- POWDERS, LIQUIDS, CRUSHABLE OPTIONS
 - SALT
 - GO BY ASPEN DAILY SODIUM REQUIREMENTS
 - TABLE SALT, IODIZED SALT, LITE SALT
- 5. LOOK AT FREE WATER FROM RECIPE AND CALCULATE ADDITIONAL WATER NEEDED OUTSIDE OF RECIPE.
 - RECOMMEND FLUSHES, WATER TO THIN BASED ON THIS.

22





ASPEN PRACTICE RECOMMENDATIONS

- NUTRITIONAL ANALYSIS IS RECOMMENDED WITH REGULAR ADJUSTMENTS PRN
- CAN USE SAME RECIPE DAILY OR VARY IT SO LONG AS IT MEETS PATIENTS NEEDS
- MODULARS CAN BE USED TO MEET NEEDS (BUT ARE NOT ALWAYS NECESSARY)
- FLUID NEEDS SHOULD BE MET AND FLUID FROM RECIPE SHOULD BE TAKEN INTO ACCOUNT. USE CAUTION WHEN ADDING TO RECIPE- CAN DILUTE NUTRIENT CONTENT, AFFECT HANG TIME AND ADVERSELY AFFECT VISCOSITY WHICH COULD AFFECT TOLERANCE/MEDICAL REASON FOR USING BTF
- HOSPITAL CONSIDERATIONS INCLUDED IN RECS.
- FOLLOW UP WITH RD OR NUTRITION SUPPORT SPECIALIST KNOWLEDGEABLE IN BTF IS ESSENTIAL. IT IS RECOMMENDED TO FU EVERY 1-2 MONTHS INITIALLY AND CAN MOVE TO EVERY 4-6 MONTHS BASED ON PATIENT STABILITY.
- LAB PARAMETERS SHOULD BE MONITORED BASED ON NUTRITION ASSESSMENT AND INDIVIDUAL SIGNS OR SYMPTOMS OF DEFICIENCIES.

25

KEY TAKEAWAYS

- BTF ARE SAFE AND EFFECTIVE
- RD'S SHOULD BE WILLING TO LEARN AND ASSIST FAMILIES WITH BTF.
 - "I FELT ANGRY (AFTER WORKING WITH 2 RDN'S). I FELT THAT WORKING WITH A DIETITIAN
 WAS NOT WORTH MY TIME. A PARENT IS TRYING TO DO THEIR VERY BEST; THERE IS
 RESEARCH SUPPORTING BLENDED FEEDS; AND MANY PEOPLE DO THEM ON THEIR OWN.
 JUST LOOK AT SOCIAL MEDIA" Bennett et al
- THERE ARE A VARIETY OF CONSIDERATIONS WHEN DECIDING IF PATIENT IS GOOD CANDIDATE AS WELL AS WHETHER HOMEMADE BTF OR COMMERCIALLY MADE BTF ARE BETTER OPTION.
- PATIENTS ON BTF SHOULD BE CLOSELY MONITORED BY RD FAMILIAR WITH BTF WHO
 HAS THE ABILITY TO ANALYZE RECIPES.

26

EVALUATION

Which of the following is *not* a commonly cited reason families choose blenderized tube feeding over commercial formulas?

- A. Improved tolerance (less reflux or vomiting)
- B. Desire to provide real food ingredients
- C. Elimination of all feeding tubes
- D. Increased caregiver control and involvement in nutrition

Which patient would be the best candidate for a blenderized tube feeding regimen?

- A. A patient with frequent hospitalizations and no caregiver support at home
- B. A medically stable patient with a gastrostomy tube, motivated caregivers, and adequate blender access
- C. A newly post-op patient with high-volume jejunal feeds and feeding intolerance
- D. A patient receiving continuous jejunal feeds who requires a sterile diet due to neutropenia

When preparing a homemade blenderized tube feeding, which of the following is essential to ensure both safety and nutritional adequacy?

- A. Limiting variety to only 3 ingredients
- B. Avoiding the use of commercial blenders
- C. Collaborating with a registered dietitian to assess macro- and micronutrient needs
- D. Preparing large batches to store at room temperature

27

27

REFERENCES

- ASPEN Enteral Nutrition Committee. Blenderized tube feedings: practice recommendations from the American Society for Parenteral and Enteral Nutrition. Nutr Clin Pract. 2023;38(6):1190-1219.
- Bahramian B, Talebi S, Rezaie M, Sarabi-Jamab M, Razavi SMA. Designing blenderized tube feeding diets for children and investigating their physicochemical and microbial properties and dietary inflammatory index. Nutr Clin Pract. 2023;38(3):360-375.
- Batsis ID, Davis L, Pritchett L, et al. Efficacy and tolerance of blended diets in children receiving gastrostomy feeds. *Nutr Clin Pract.* 2020; 35 (2): 282-288.
- Bennett K, Hjelmgren B, Piazza J. Blenderized tube feeding: health outcomes and review of homemade and commercially prepared products. Nutr Clin Pract. 2020;35(3):417-431.
- Bobo E. Reemergence of blenderized tube feedings. Nutr Clin Pract. 2016;31(6):730-735.
- Boullata JI, Carrera AL, Harvey L, et al. The registered dietitian nutritionist's guide to homemade tube feeding. *J Acad Nutr Diet.* 2017;117(1):11-16. doi:10.1016/j.jand.2016.09.019.
- Hron B, Fishman E, Lurie M, et al. Health outcomes and quality of life indices of children receiving blenderized feeds via enteral tube. J Pediatr. 2019; 211: 139-145.
- Schmidt SB, Lulig W, Winter R, Vasold AS, Knoll AE, Rollnik JD. The effect of a natural food based tube feeding in minimizing diarrhea in critically ill neurological patients. Clin Nutr. 2019; 38 (1); 332-340.
- Schmitz EPC, da Silva EC, Lins-Filho OL, Antunes MMC, Brandt KG. Blenderized tube feeding for children: an integrative review.
 Rev Paul Pediatr. 2022;40:e2020387.
 - Weeks C. Home blen derized tube feeding: a practical guide for clinical practice. Clin Transl Gastroenterol. 2019;10(2):e00020.

