Feeding Matters:
FTT, Growth Charts, and How to get beyond that toddler weight plateau
I have no financial disclosures, and will discuss no medications
Growth and Weight gain: the public perceptions

• Bigger is always better
• Future weight gain and growth are related to birthweight and length
• We are a nation of food sufficiency, hence every child has equal opportunity
Growth and weight gain: the realities

• Bigger is not always better: the rise in obesity rates
• Birth parameters not predictive of future growth and weight gain
• Multiple determinants of children’s intake: food availability, family dynamics, cultural patterns, behavioral (autonomy factors in intake), diagnosed or undiagnosed medical issues
43,000 households in Houston, Texas, have no car and are more than a half mile from a supermarket.
Did you know?

- Texas has one of the highest rates of child food insecurity in the country
- Every day 53,000 people in Houston are hungry
- Each week the Houston Food Bank feeds 137,000 people, 47% of which are children
- 43% of hungry families must choose between food and medicine
Pediatricians rely on growth charts as means to determine whether growth and weight gain are ‘normal’

• We rely on these charts daily, but what do they really mean?

• Is there an ideal percentile for a child?
Growth charts consist of a series of percentile curves that illustrate the distribution of selected body measurements in children. Pediatric growth charts have been used by pediatricians, nurses, and parents to track the growth of infants, children, and adolescents in the United States since 1977.

CDC recommends that health care providers:

- Use the WHO growth standards to monitor growth for infants and children ages 0 to 2 years of age in the U.S.
- Use the CDC growth charts for children age 2 years and older in the U.S.

Growth charts are not intended to be used as a sole diagnostic instrument. Instead, growth charts are tools that contribute to forming an overall clinical impression for the child being measured.
Correct Measurements Essential!

Consistent weighing method, same scale if necessary (to detect small changes)

Length on measuring device until child able to stand independently
Length-for-age percentiles:
Girls, birth to 36 months
Failure to Thrive

• First described in childhood in 1897 as ‘ceased to thrive’; first noted as a diagnosis in 1933
  • Problems of poverty/insufficient food/social deprivation
  • Generally applied to children less than school age
  • Now has evolved to organic vs nonorganic classification of faltering weight when compared to peers

• No consensus on definition; no universally accepted anthropometric measurements; several approaches:
  • Weight Crossing 2 major percentiles
  • Weight < 3% or 5%
  • <80% of IBW for age
  • <3% or 5% weight for length
Poor weight gain
"Failure to thrive"
Failure To Thrive

• Best considered a sign of inadequate nutrition to support weight gain
• Etiology becomes task of examiner
  • Medically based
    • Food intolerance: Emesis, Malabsorption
    • Ongoing illness: cardiac, pulmonary, endocrine, neurological, metabolic, infectious, allergic/immunological and/or GI disorders
  • Psychosocially based
    • Not enough food offered or consumed
    • Social complexities of parental psychopathology or substance abuse, inadequate parenting skills
A Diagnostic Approach

- Identify FTT
- Obtain detailed history
- Perform physical exam
- Consider: further diagnostic testing vs nutritional therapy
Elements of history

- Prenatal history
- Delivery, neonatal events
- Any medical or surgical history
- Emesis and stooling history
- Allergies
- Family history, +adult stature, body build
- Social history, +life stressors
- Nutrition history
The Nutrition History

- Early infancy feeding practices, volumes accepted
- Developmental milestones in feeding
- Food allergies
- Food preferences
- Expression of hunger
- Intake over a typical day
- Mealtime management (schedules, duration, distractions, who is present, how refusal is handled)
Elements of the Physical Exam

• Any dysmorphic features
• Signs of abuse or neglect
• Reciprocity and development for age
• Severity of malnutrition
# Table 3

**Failure to Thrive Defined by Malnutrition Z-Scores**

<table>
<thead>
<tr>
<th>Anthropometric Measurements</th>
<th>Mild Malnutrition</th>
<th>Moderate Malnutrition</th>
<th>Severe Malnutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight-for-height/BMI z-score</td>
<td>-1 to -1.9</td>
<td>-2 to -2.9</td>
<td>≤ -3</td>
</tr>
<tr>
<td>Length/height z-score</td>
<td>-</td>
<td>-</td>
<td>≤ -3</td>
</tr>
<tr>
<td>Mid-upper arm circumference z-score</td>
<td>-1 to -1.9</td>
<td>-2 to -2.9</td>
<td>≤ -3</td>
</tr>
<tr>
<td>Weight gain velocity* (&lt;2 years)</td>
<td>&lt;75% expected</td>
<td>&lt;50% expected</td>
<td>&lt;25% expected</td>
</tr>
<tr>
<td>Weight loss (≥2 years)</td>
<td>5% body weight</td>
<td>7.5% body weight</td>
<td>10% body weight</td>
</tr>
<tr>
<td>Deceleration of weight-for-length z-score</td>
<td>-1 z-score</td>
<td>-2 z-scores</td>
<td>-3 z-scores</td>
</tr>
</tbody>
</table>

Abbreviation: BMI, body mass index.

*Based on World Health Organization data.²⁰

Adapted from a consensus statement from the American Society for Parenteral and Enteral Nutrition.⁷
Effectiveness of Nutrition Therapy

• Achieving ideal weight for length, or normal BMI in child >2yrs of age
• Catch up weight gain
  • 12-18mo of age: >10g/d
  • >18mo-24mo of age: > 8g/d
That early toddler weight plateau

• Developmental contributors:
  • Motor skills translates into increased kcal need
  • Oral motor skills needed to eat solids different from sucking
  • Developmental assertiveness of child can impact willingness to eat

• Household dietary contributors:
  • Transition from breast or bottle on demand to meals, snacks
  • Parental desire to avoid specific foods: gluten containing, dairy, sweetened
  • Use of low kcal dense items, especially low fat items
High Calorie Snacks

- Whole milk yogurt with granola, nuts, and berries
- Banana and whole milk smoothie with peanut butter
- Whole wheat bagel topped with avocado
- Whole milk cottage cheese with mayonnaise and pineapple
- Hummus with olive oil on top served with whole wheat pita chips
- Deviled eggs with mayonnaise and mustard
- Whole wheat full fat Triscuit crackers topped with nut butter, cream cheese, or avocado
- Trail mix with nuts, dried fruit, and coconut
- Oatmeal with whole milk topped with coconut shavings, nuts, and dried fruit
- Guacamole with tortilla chips
- Granola bars with nut butter
- Whole wheat macaroni and cheese with broccoli
- ½ tuna fish sandwich with whole wheat bread, tuna canned in olive oil, and mayonnaise.
- Avocado smoothie (1 ripe avocado, ½ cup vanilla yogurt, ½ cup honey, 1 cup milk, 8 ice cubes
- Toasted whole wheat bread with peanut butter and honey
- Canned fruit in heavy syrup topped with coconut shavings
- Pizza roll ups (whole wheat tortilla topped with marinara sauce, full fat cheese, and spinach, heated in the microwave for 30 seconds, rolled up, and sliced)
- Mediterranean roll ups (whole wheat tortilla topped with hummus, feta cheese, and olives rolled up and sliced.)
- Whole wheat cookies (1 cup oats, 1 cup whole wheat flour, 1 cup wheat germ, ½ cup oil, ½ cup honey, ½ cup milk, ½ cup chocolate chips, 1 teaspoon salt, 1 teaspoon vanilla. Mix together, spoon into 2 inch cookies and back at 400 F for 15 minutes or until set.)
# FOODS FOR INCREASING CALORIES AND PROTEIN

<table>
<thead>
<tr>
<th>FOOD</th>
<th>CALORIES</th>
<th>SUGGESTED USES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Milk Products</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole Milk*</td>
<td>20 in 1 fluid oz</td>
<td>Add to Carnation Breakfast Essentials, hot cocoa, milkshakes, soups, cereals, puddings, and baked goods.</td>
</tr>
<tr>
<td>Evaporated Milk*</td>
<td>25 in 1 Tbsp</td>
<td>Instead of whole milk in baked goods, meat dishes, milkshakes, soups, and cooked cereals.</td>
</tr>
<tr>
<td>Dry, Powdered Milk*</td>
<td>25 in 1 Tbsp</td>
<td>Add to whole milk, milkshakes, desserts, casseroles, sauces/gravies, meat dishes, cereals, macaroni &amp; cheese, potato, soups, salad dressings and yogurt.</td>
</tr>
<tr>
<td>Half &amp; Half</td>
<td>20 in 1 Tbsp</td>
<td>Add to cereals, cocoa, milkshakes, soup, baked foods, sauce and whole milk.</td>
</tr>
<tr>
<td>Sour Cream</td>
<td>25 in 1 Tbsp</td>
<td>Add on vegetables, potatoes, in salads, casseroles, and guacamole.</td>
</tr>
<tr>
<td>Cheese*</td>
<td>120 in 1 oz (1&quot; cube)</td>
<td>As a snack. On bread, toast, crackers, vegetables, pasta, eggs, hot dogs, hamburgers; in salads, dips, sandwiches; mixed in meatloaf, meatballs, soups, potatoes, gravies, scrambled eggs as a sauce.</td>
</tr>
<tr>
<td>Cream Cheese</td>
<td>50 in 1 Tbsp</td>
<td>On toast, sandwiches, bagels, baked goods, dips, and scrambled eggs.</td>
</tr>
<tr>
<td>Cream</td>
<td>60 in 1 Tbsp</td>
<td>On cereal, Jell-O. In puddings, hot chocolate, milk shakes, soups, sauces, and casseroles.</td>
</tr>
<tr>
<td>Ice Cream</td>
<td>17 in 1 Tbsp</td>
<td>In milk shakes; as a topping for dessert.</td>
</tr>
<tr>
<td>Butter or Margarine</td>
<td>100 in 1 Tbsp</td>
<td>On pancakes, waffles, toast, bread, crackers, mashed potatoes, pasta, and veggies. In baked goods, casseroles, and sauces.</td>
</tr>
<tr>
<td>Sweetened Condensed Milk</td>
<td>60 in 1 Tbsp</td>
<td>Add to pies, puddings, and milkshakes. As a topping for ice cream, fruit, and desserts.</td>
</tr>
<tr>
<td><strong>Nuts, Seeds, Legumes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peanut butter**</td>
<td>94 in 1 Tbsp</td>
<td>On toast, bread, crackers, fruits, veggies, tortillas, hot cereal, pancakes, and baked goods. In milkshakes.</td>
</tr>
<tr>
<td>Chopped Nuts**</td>
<td>50 in 1 Tbsp</td>
<td>In puddings, salads, casseroles, baked goods. On cereals, vegetables, fruits, ice cream.</td>
</tr>
<tr>
<td>Wheat Germ</td>
<td>25 in 1 Tbsp</td>
<td>In baked goods, cereals, meatloaf, casseroles; As a topping for fruit. (Add cinnamon and sugar)</td>
</tr>
<tr>
<td>Granola</td>
<td>115 in 1 oz</td>
<td>Topping for yogurt, ice cream, and apple sauce. Add to trail mix as a snack.</td>
</tr>
<tr>
<td>Hummus or bean spread*</td>
<td>17 in 1 Tbsp</td>
<td>As a spread on bread, toast, crackers. As a dip for veggies, mixed with cheese or potatoes.</td>
</tr>
<tr>
<td><strong>Fats, Oils, Sweets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetable oil</td>
<td>110 in 1 Tbsp</td>
<td>In soups, casseroles, vegetables, gravies, cooked cereals, and sauces.</td>
</tr>
<tr>
<td>Butter or Margarine</td>
<td>100 in 1 Tbsp</td>
<td>On pancakes, waffles, toast, bread, crackers, mashed potatoes, pasta, and veggies. In baked goods, casseroles, and sauces.</td>
</tr>
<tr>
<td>Chocolate syrup, sugar, jams, jellies, corn syrup</td>
<td>45-60 in 1 Tbsp</td>
<td>On cereals, fruits, milkshakes, milk, cookies, crackers, toast, waffles, pancakes, as a topping for ice creams and desserts.</td>
</tr>
<tr>
<td>Avocados</td>
<td>40 in 1/8 each</td>
<td>As a topping on salads, casseroles, quesadillas, mashed into guacamole, added to soups, rice.</td>
</tr>
<tr>
<td>Coconut Dried Sweetened</td>
<td>60 in 1 oz</td>
<td>As a topping for ice cream and desserts, or added in baked goods.</td>
</tr>
<tr>
<td><strong>Egg Products</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Egg yolks* or Whole eggs</td>
<td>60 per yolk, 75 per whole egg</td>
<td>Mixed in casseroles, meatloaf, baked goods, cooked meats spreads, soups, rice dishes, cooked and added to sandwiches and salads. Cook eggs before eating.</td>
</tr>
<tr>
<td>Mayonnaise</td>
<td>60 in 1 Tbsp</td>
<td>On sandwiches. In pasta, salads, deviled eggs, and dip.</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby food</td>
<td>100-150 jar</td>
<td>In sandwiches; mixed in meats, soups, dips, casseroles, pasta, grain dishes, meatloaf, toast.</td>
</tr>
<tr>
<td>Gravy</td>
<td>26 in 1 Tbsp</td>
<td>On meats, potatoes, pasta, and vegetables. Mix in casseroles.</td>
</tr>
</tbody>
</table>

* These foods are also good sources of protein.  
** Do not offer these foods to children less than 2 years of age or those with oral-motor delays.
Kcal dense supplements for children

• Followup formulas
  • Have been heavily marketed
  • May be of benefit where no solids ingested
  • Per WHO: not necessary and marketing misleads parents

• Oral supplements
  • Various brands, dairy or soy based
  • All pleasing to toddler palate—ie sweet
  • Can be useful for catch up
  • Available from WIC under specific circumstances
  • Excessive use can result in decreased interest in solid foods
  • Expensive!
The final goal: healthy weight and eating habits

- Scheduled mealtimes of healthy foods, snacks as needed
- No distractions at mealtimes
- No force feeding, child accepts task of eating willingly
- Meal duration <30min
Useful Resources

• Patient Education Resources, TCH webpage, as well as TCH blog posts related to nutrition
• Gikids.org (Children’s Digestive Health information, partners with NASPGHAN)
• Healthychildren.org (AAP)
• WeArePediatricians Facebook page
• Superhealthykids.com—owned by health educator and dietitian—blog updates, recipes, menu ideas