Failure to Thrive:
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Dept of OMM
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FTT Objectives

• Define Failure to thrive (FTT)
• Etiology: Be able to discuss the multiple causes of FTT by using the “follow the calorie approach”
• Prognosis: How does FTT impact a child’s growth and development?
  — Has this historically changed in how we look at FTT
  — How does this relate to obesity?
• Clinical manifestations: Know the typical clinical features of a child with FTT.
• Diagnosis: Be able to use growth chart and clinical data to properly categorize the FTT.
• Treatment: Treatment of FTT depends on the etiology
• Growth charts: Use patterns on growth charts to help classify FTT.

Infant Management

• Last part of the talk will discuss management of breastfeeding infants and FTT.
• Probably the most common FTT, albeit brief, that you will see.
“Kids can be small, we don’t need to panic.”

(As long as they are growing, and parents aren’t 6ft 5 in and 250 pounds!)

“Force feeding children, does not cure most forms of organic FTT.” (one notable exception we will discuss)

Growth charts for long and thin babies will scare you to death! –but shouldn’t.
• Beware of breastfeeding nazi’s who recommend tongue clipping and no bottle.

Link between Obesity and FTT

• Nervous doctor --> nervous parent --> not comfortable unless child cleans plate, or finishes bottle--> Child knows when they are done based on parents feeling, NOT their own sense of satiety. Power struggles later make obesity and poor diet more likely.

FTT Defined (There in NO accepted definition)

• “The end result of inadequate usable calories with contributing risk factors from multiple categories.”

• This is best understood by looking at growth charts...think of it as failure to grow compared to peers.

FTT Epidemiology

- Prevalence data is difficult to interpret due to low birth weight infants.
- Developed nations:
  - Preterm birth
  - Family dysfunction
  - Genetic abnormality
- Developing world:
  - Food availability (poverty and local conditions, e.g. weather/famine/war) marasmus/kwashiorkor.


FTT (What do patients look like?)

**Clinical Manifestations**

- Poor growth (see weight charts)
  - Proper chart, proper measurement, on a regular schedule.
- Alopecia
- Reduced subcutaneous fat/muscle mass
- Dermatitis
- Lanugo (more soft thin hair than usual)


FTT prognosis (Why do we care?)

- If in the first year of life—ominous due to brain growth
  - Short stature, behavioral and academic difficulties (economy-ability to provide for family)
- Prognosis variable depends on cause
- Requires continuing developmental surveillance (Early on, Head start, Supplemental Security Income)

FTT Etiology (What causes it?)

- Follow the calorie concept:
  - 1. Failure to offer adequate calories (Caregiver)
  - 2. Failure to take sufficient calories (Child)
  - 3. Failure of child to retain and use sufficient calories. (Organic pathology)
  - 4. Increase metabolic demands. (Organic disease)

**Each one could have a “multifactorial cause”**


FTT Etiology: (Caregiver)

- Caregiver (maternal) psychological
  - Low understanding of infant/child cues
- Low breast milk supply
- Economic problem
- Poor understanding of normal feeding


FTT Etiology (child)

- Poor feeding, sucking and swallowing
- Feeding refusal or aversion
- Poor cue expression
- Poor transition to solid food
- Developmental/Genetic cause?

FTT Etiology (Organic)

- Malabsorptive process
- Excessive Gastroesophageal reflux disease
- Genetic Problem (short stature syndrome)
- Acquired illness
  - Celiac Disease, HIV
- Congenital disease


FTT Etiology (by age)

<table>
<thead>
<tr>
<th>0 to 6 months</th>
<th>6 to 12 months</th>
<th>After infancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Breast-feeding difficulties</td>
<td>- Celiac Disease</td>
<td>- Acquired chronic diseases</td>
</tr>
<tr>
<td>- Improper formula preparation</td>
<td>- Acute failure to thrive</td>
<td>- Highly distractible child</td>
</tr>
<tr>
<td>- Impaired parent-child interaction</td>
<td>- Child neglect</td>
<td>- Incorrective child</td>
</tr>
<tr>
<td>- Congenital syndromes</td>
<td>- Delayed introduction of age-appropriate foods or poor transition to food</td>
<td>- Inappropriate mealtime environment</td>
</tr>
<tr>
<td>- Neonatal infections or teratogenic exposures</td>
<td>- Food allergy</td>
<td>- Inappropriate diet</td>
</tr>
<tr>
<td>- Maternal psychological disorder</td>
<td></td>
<td>- Recurrent infections</td>
</tr>
<tr>
<td>- Congenital heart disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Cystic fibrosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Neurological abnormalities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Child neglect</td>
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<td></td>
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<tr>
<td>- Recurrent infections</td>
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</table>

FTT Etiology (Organic by system)

- Psych/Social: Inadequate diet b/c of poverty, poor parenting skills, parent child interaction (power struggles, coercive feeding, food refusal, rumination, parental cognitive mental health problems, Child abuse or neglect)
- Neurologic (Cerebral Palsy, CNS tumors, NMSK disorders, Neurodegenerative disorders)
- Renal (Recurrent UTI, Renal Tub acidosis, renal failure)
- Endocrine: Diabetes Mellitus, Diabetes Insipidus, Thyroid disease, Growth hormone deficiency, Adrenal insufficiency
- Genetic/Metabolic: Sickle cell, Inborn errors of metabolism, fetal alcohol syndrome, skeletal dysplasia, chromosomal disorders, VATER, CHARGE

FTT Etiology (Organic by system)

- **Gastrointestinal:** pyloric stenosis, gastroesophageal reflux, repair of tracheoesophageal fistula, malrotation, malabsorption syndromes, celiac disease, milk intolerance, lactose, protein, pancreatic insufficiency syndromes (CF), chronic cholestasis, inflammatory bowel disease, chronic congenital diarrhea states, short bowel syndrome, pseudoobstruction, Hirschsprung disease, Food allergy.


FTT Etiology (Organic by system)

- **Cardiac:** Cyanotic heart lesions, vascular rings, Cong Heart Failure.
- **Pulmonary/Respiratory:** Severe Asthma, Cystic fibrosis (CF), chronic respiratory failure, bronchopulmonary dysplasia, adenoid/tonsilar hypertrophy, Obstructive sleep apnea.
- **Miscellaneous:** Collagen vascular disease, Malignancy, primary immunodeficiency, transplantation.
- **Infections:** Perinatal infection (TORCHES) occult/chronic infections, parasitic infestations, Tuberculosis, HIV.


FTT Diagnosis: crucial features of work-up

- **Detailed Histories:**
  - Nutritional
  - Family
  - Prenatal
  - Social make-up of home. (who feeds child and major events happening at the time of growth failure.)
  - Thorough ROS

The most useful tools to use to diagnose?

Growth Chart + Brain = DX

Then and only then use labs to confirm your diagnosis.

Diagnostic approach:
• What tests are available to use?
  – Pt initial story*
  – Doctor centered questions*
  – Physical exam
  – Specialists (who order lots of tests)
  – Labs/radiology/special testing.

* Most important
FTT Etiology Associated Sign/symptoms

<table>
<thead>
<tr>
<th>History and physical examination</th>
<th>Condition to consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spitting, vomiting, food refusal</td>
<td>Gastroesophageal reflux, chronic tonsillitis, food allergies</td>
</tr>
<tr>
<td>Diarrhea, fatty stools</td>
<td>Malabsorption, intestinal parasites, milk protein intolerance</td>
</tr>
<tr>
<td>Snoring, mouth breathing, enlarged tonsils</td>
<td>Adenoid hypertrophy, obstructive sleep apnea</td>
</tr>
<tr>
<td>Recurrent wheezing, pulmonary infections</td>
<td>Asthma, aspiration, food allergy</td>
</tr>
<tr>
<td>Recurrent infections</td>
<td>HIV, congenital immunodeficiency disease</td>
</tr>
<tr>
<td>Travel to or from developing countries</td>
<td>GI parasitic or bacterial infections</td>
</tr>
</tbody>
</table>


FTT (diagnosis) Physical Exam:

<table>
<thead>
<tr>
<th>Category</th>
<th>Item (Clue to diagnosis system)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vital Signs</td>
<td>BP (renal), Temp (infection), Pulse (cardiac), Respiration (Pulm/Metabolic) Growth charts (all of the above)</td>
</tr>
<tr>
<td>General Appearance</td>
<td>Activity and posture (NMSK), affect (Psych)</td>
</tr>
<tr>
<td>Skin</td>
<td>Hygiene (parent) rashes/neurocutaneous markings (genetic syndromes), signs of trauma (abuse)</td>
</tr>
<tr>
<td>Head</td>
<td>Hair whorls, quality of care, alopecia, fontanelle size, frontal bossing, sutures, shape, dysmorphisms, philtrum (genetic)</td>
</tr>
<tr>
<td>Eyes</td>
<td>Ptosis, strabismus, palpebral fissures, conjunctival palpebral, funduscopic exam (Neuro/genetic)</td>
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<td>Ears</td>
<td>External form, rotation, (Genetic) tympanic membranes (chronic infection)</td>
</tr>
<tr>
<td>Mouth, nose, throat</td>
<td>Thinness of lip (FAS), hydration, dental health (parent), glossitis, chelosis, gum bleeding (organic disease)</td>
</tr>
</tbody>
</table>

FTT (diagnosis) Physical Exam:

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<thead>
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<th>Category</th>
<th>Item (Clue to diagnosis/system)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck</td>
<td>Hairline (genetic), masses, lymphadenopathy (cancer)</td>
</tr>
<tr>
<td>Abdomen</td>
<td>Protuberance, hepatosplenomegaly, masses (malnutrition, genetic)</td>
</tr>
<tr>
<td>Genitalia</td>
<td>Malformations, hygiene, trauma (genetic, parenting)</td>
</tr>
<tr>
<td>Rectum</td>
<td>Fissures, trauma, hemorrhoids (GI, constipation/CF)</td>
</tr>
<tr>
<td>Extremities</td>
<td>Edema (cardiac), dysmorphism, rachitic changes (rickets'/nutritional), nails (genetic/nutritional)</td>
</tr>
<tr>
<td>Neurologic</td>
<td>Cranial nerves, reflexes, tone, retention of primitive reflexes, voluntary movement (NMSK/degenerative diseases)</td>
</tr>
</tbody>
</table>


FTT DDx Approach (Growth Chart)

Microcephaly Noted

Low length/height for age noted

Neurologic features minor

Low weight gain per month, followed by decreasing linear growth

Weight/length normal with low linear growth each month

Consider genetic or endocrine causes

Poor growth because of inadequate nutrition, due to neurologic cause

Consider neurological disease from genetic, hypoxic, teratogenic/infectious cause

Consider inadequate nutrition (Psych/GER)

Growth Charts: Your MOST IMPORTANT TOOL

- They are only as good as the measurements taken. If it is wrong repeat it yourself.
- Data is best OVER TIME, single data points in time seldom are helpful
- Make sure you are using the right curve (Current standard is WHO chart for children under 2)
Basic Navigation

- Check sex and age group
- Measurement on the left (metric or US) and age of child on the bottom.
- Percentiles are listed on each line.
- Weight on bottom and Height on top

Basic Navigation

- Head circumference on top
- Weight for height on the bottom (NOT BY AGE) another curve that is important when judging failure to thrive.

Basic Navigation: Older children

- 3 curves Height/Weight/BMI
- Plots are straightforward, age on the x-axis, and height and weight on the y-axis.
Basic Navigation: Older Children

- BMI must be calculated and then the percentile (as we learn in the obesity lecture) is the most important number.
- Notice the BMI trending over time.

FTT and WHO Charts:

IOM Goal 1: “Assess, monitor, and track growth from birth to age 5.”

- 1. WHO Charts
WHO Charts:

- Sept 10, 2010 CDC recommended providers use the WHO charts.
- Breastfed (predominant) infants
- Rapid initial growth with slowdown after 3 months
- **Cutoff for unhealthy weight is now 2nd and 98th percentiles.** (WIC and USDA)
  - Significant ramifications


Special Note:

- If a child is below the 2nd Percentile for weight but is growing at a rate parallel to the curve, this is NOT Failure to Thrive.

Old vs. New
FTT (DIAGNOSIS) GROWTH CHARTS:
Case one:

Case 2

Case 3:
Case 4

FTT (diagnosis) laboratory assessment

• Limited in scope, stemming from history and physical.
• Common Themes:
  – Obtaining state newborn screening results
  – Complete blood count (CBC)
  – Urinalysis
  – Disease specific (after history and physical appropriate laboratory assessment of disease process)


FTT Treatment

• Multidisciplinary
• Focus on appropriate feeding environment
• Hospitalize (more in-depth assessment and work up)
  – Severe malnutrition
  – Failure of outpatient management
  – Refeeding syndrome
  – Iron, zinc and vitamin D. (Catch up growth)
Infant Follow-up

• Baby (healthy) who weighed 8 pounds at birth presents to your office day 3 of life at 7#3 oz. Mom reports BF is going well. Documented 4 stools in 24 hours still greenish.
• Baby returns day 7 and your MA knocks on the door to pull you out to let you know the baby is the same weight. Mom describes a baby who is now stooling 5 times in 24 hours. Large yellow, seedy stools.
• Panic or not?

DO NOT PANIC

• Reach birth weight by what age? 7-10 days.
• How much weight can be lost?

Tips to manage infants

• Curve tipped syringes-finger feeding
• After feed weighs (sometimes is worth the time)
• Be skeptical of first time breast feeders saying things are going well.
• Poops are key! (less than 4/day and there is a problem) Bilirubin Guidelines.
References