

Failure to Thrive (FTT)

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Definition & Epidemiology

- Failure to thrive (FTT) is a clinical sign, not a disease
 - Sign that child's size or rate of growth is below expected
- Commonly used definitions:
 - Weight or height < 2nd %tile for gestation-corrected age and sex (on more than one occasion)
 - Weight crosses 2 major %tiles downward ("falling off curve")
 - Depressed weight-for-length (weight age less than length age, weight-for-length <10th %tile)
 - Weight <80 % of ideal weight-for-age
 - Rate of growth lower than expected
- Quick weight reference ("2 hand method"):
 - 1yo = 10kg
 - 3yo = 15kg
 - 5yo = 20kg
 - 7yo = 25kg
 - 9yo = 30kg

Pathophysiology & Etiology

- Insufficient **INTAKE** (most common cause)
 - Improper formula preparation
 - Poverty/Food insecurity
 - Mechanical feeding difficulty (cleft lip, palate)
 - Neglect or abuse

- Increased **LOSS/Inadequate ABSORPTION**
 - Anemia
 - Biliary atresia
 - Celiac disease or IBD
 - Chronic GI conditions
 - Cystic fibrosis
 - Inborn errors of metabolism
 - Milk protein allergy

- Increased **METABOLISM**
 - Chronic infection
 - Congenital heart disease
 - Chronic lung disease
 - Hyperthyroid
 - Inflammatory conditions (asthma, IBD)
 - Malignancy
 - Renal failure

- *Etiology is often multi-factorial*
- *Organic vs. nonorganic is now an outmoded view of FTT*

Clinical Presentation

- In emergency setting, FTT likely to be seen during evaluation for another medical problem
- Broad presentation and differential and workup should be directed by history
- Weight typically decreases first, followed by length, and ultimately head circumference
- Newborns should regain initial 10% weight loss by 10-14 days
- Kwashiorkor and Marasmus typically do not occur in first world countries

ED Evaluation

- Thorough history and physical
 - May be sufficient to initiate treatment
- Key history points
 - Birth history
 - Birth weight, gestational age, delivery/postnatal course
 - IUGR associated with insulin resistance -> Decreased growth potential
 - Maternal history
 - Confirm newborn screen results
 - Assess patient activity, development and parent interaction
 - Other concerning associated history
 - Easy fatiguability -> Congenital heart disease
 - Diarrhea -> Gastrointestinal disorder with subsequent malabsorption
 - Urinary incontinence -> Renal disease
 - Seizures -> CNS disease preventing adequate intake
- Diagnostic testing (typical ED Screening Labs):
 - CBC - anemia
 - CMP - nutritional deficiency: Na, K, albumin, Ca (Rickets, acidemia, RTA)
 - UA+UCx - UTI, ketonuria, glucosuria, reducing substances
 - Consider CXR - cardiomegaly/CHD
 - Consider Blood gas, Ammonia - IEM (esp if hepatomegaly, lethargy)
 - Consider TSH/ft4/T3, Celiac panel, TB testing

Indications for admission

- **Any one measurement that is still on growth chart is not indication for admission, but must assure proper follow up!
 - Often can be discharged from ED if PMD is already following FTT...but if newly detected and/or doubt ability of caretaker to follow up or access to PMD, then patient should be admitted
- Extreme parental impairment or anxiety
- Extremely poor parent-child interaction
- Need for precise documentation of nutritional intake
- Outpatient treatment failure
- Psychosocial factors that put the child's safety at risk
- Serious underlying illness or medical problem
- Severe malnutrition or dehydration and concern for development of refeeding syndrome

Treatment & Prognosis

- Dependent on etiology
- Goal: establish optimal growth velocity (2-3x average rate per age)
 - Confirmation of true weight gain requires measurements over weeks
 - Continue close outpatient follow-up and management
 - To resolve FTT, need 4-9 months of appropriate growth
- Important to work closely with multidisciplinary team
 - Nurses, OT, PT, SLP, nutrition, social work, psychiatrists, psychologists
- Consider nutritional supplementation, formula concentration, behavioral interventions (for family and for child)
- Consider long term NG tube or gastrostomy tube feedings
- Prolonged malnutrition may result in reduced growth potential and long-term problems with cognitive development
- Catch-up growth is expected, and results in improved cognitive functioning and affect
 - Note that overcorrection may increase risk of developing metabolic syndrome

eTable A. Normal Median Weight Gain in Children

Age (months)	Median weight gain (grams per day)
0 to 3	26 to 31
3 to 6	17 to 18
6 to 9	12 to 13
9 to 12	9
12 and older	7 to 9

Information from Malks-Jumba L. Failure to thrive. The University of British Columbia. Learn pediatrics. February 2011. <http://learn.pediatrics.ubc.ca/body-systems/gastrointestinal/failure-to-thrive/>. Accessed April 20, 2016.

Illustrative Cases

- 8wko, F, ex FT, presenting with FTT after referral from outpatient pediatrician. Has had poor PO intake since birth despite changes in formula, 1lb weight loss over last week, and suspected dehydration.
 - Initial labs s/f WBC 46, Prealbumin 9 mg/dL, and CXR showing enlarged cardiac shadow, small pleural effusion, and a vague lucency extending from the left upper abdomen to the left midchest
 - Further workup showed multiple gastric and esophageal duplication cysts
- 6mo, F, presenting with 8wks of diarrhea, intermittent vomiting, and weight loss with 3 previous ED visits for similar symptoms
 - Plain abdominal film shows dilated bowel loops and abd US shows intussusception in R paracolic region to the splenic flexure
 - Postop was doing well, but on POD4, began showing repeat SBO signs, and repeat abd US showed intussusception in LLQ
- 2yo, F, ex FT, presents with small size, with height and weight <5th %tile and speaks with 4-5 single words
 - Born to a 30yo G5P4 who smoked during pregnancy and with 2wks of prenatal care
 - Review of birth records shows low birth weight suggesting IUGR
 - Mother says that she is developmentally normal, but only speaks 4-5 single words
 - Mother reports frequent insufficient food at home
 - Resources were mobilized to ensure adequate food, financial, and emotional support

PIR Questions

6. You are evaluating a 2-year-old child who has been referred to you for poor weight gain. Before seeing the patient, you examine his growth chart, which reveals weight below the 5th percentile (50th percentile for 12 months), height at the 25th percentile, and head circumference at the 50th percentile. Solely considering the growth chart parameters, which of the following is the *most* likely reason for his poor weight gain?
- A. Cystic fibrosis.
 - B. Growth hormone deficiency.
 - C. Inadequate caloric intake.
 - D. Metabolic disorder.
 - E. Underlying genetic disorder.
7. You are seeing an 18-month-old boy who has Down syndrome for a health supervision visit. His mother is concerned that he is not gaining weight well. She reports that he is a picky eater and often spits up after feedings. He has no history of cardiac or intestinal conditions but has been diagnosed with otitis media three times. Of the following, which is the *most* important to do first?
- A. Initiate ranitidine therapy for reflux.
 - B. Obtain his neonatal records.
 - C. Plot his weight, height, and head circumference on a Down syndrome growth chart.
 - D. Refer him to a dietitian for nutritional counseling.
 - E. Refer him to an otolaryngologist for insertion of tympanostomy tubes.
8. You diagnose FTT in a 15-month-old boy at his first visit to the clinic. His development is normal and he has no history of vomiting, diarrhea, or chronic infections. He has had no primary care physician before now. His growth parameters are: weight at the 10th percentile, height less than the 5th percentile (50th percentile for 10 months), and head circumference at the 25th percentile. There are no abnormal findings on physical examination. Which of the following is *most* likely to reveal a diagnosis in this child?
- A. Complete blood count with differential count.
 - B. Complete metabolic panel.
 - C. Growth hormone testing.
 - D. Immunologic testing.
 - E. Sweat test.

PIR Questions

9. A 2-year-old girl in your clinic has FTT, with her weight and height less than the 5th percentile for age. Her physical examination findings are normal. Which of the following additional historical or examination findings would *most* likely lead you to recommend hospitalization at this time?
- A. Failure to gain weight on several visits despite dietary intervention.
 - B. Head circumference also below the 5th percentile.
 - C. History of gastroesophageal reflux.
 - D. Moderate speech delay.
 - E. Recent divorce of parents.
10. You are giving a lecture to a group of medical students about the management of FTT, and one of them asks whether hospitalization is always indicated. Of the following, the *most* likely benefit of hospitalizing children who have FTT is that:
- A. Laboratory evaluation can be performed more efficiently, leading to a diagnosis more quickly.
 - B. Nurses can educate parents on the proper use of a nasogastric feeding tube.
 - C. Parents finally understand that the child's FTT is a serious problem.
 - D. Therapists and consultants can efficiently and repeatedly evaluate the child's eating behaviors.
 - E. Weight gain in the hospital proves that there is nonorganic FTT.

Answers

- 6) C
- 7) C
- 8) C
- 9) A
- 10) B

Further Reading

- *Jaffe, A.* (2011). **Failure to thrive: current clinical concepts.** Pediatrics in review / American Academy of Pediatrics 32(3), 100-7; quiz 108.
<https://dx.doi.org/10.1542/pir.32-3-100>
- *Homan, G.* (2016). **Failure to Thrive: A Practical Guide** American Family Physician 94(4), 295-299.