Should I Be Concerned?

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Objectives

- Define physical abuse
- Understand different injury types and the mechanisms that cause them
- Differentiate between accidental and abusive injuries
- Understand the medical evaluation of physical abuse

Child Abuse Pediatrics

- Subspecialty of general pediatrics
- Expert trained & experienced in assessing, diagnosing & treating child maltreatment
- Training
  - 3 years of a pediatric residency
  - 3 years of child abuse pediatric fellowship

Child Abuse Pediatrics

- Medical evaluation of any child with concern for child maltreatment
- Work with social services & police departments
- Prepare medical-legal documents for court
- Testify in civil & criminal court cases

When Does a Child Need A Medical Evaluation

- **Any injury** in a child 0-6 months of age

When Does a Child Need A Medical Evaluation

- Any patterned bruises, lacerations or burns
  - ≤ 5 years of age
  - Non-verbal/speech delay
  - Injuries are widespread
  - Injuries causing pain
  - Child discloses or has been witnessed to be hit in the face, hit with an object, whipped, punched, slapped, kicked, or beaten

When Does a Child Need A Medical Evaluation

- Child appears malnourished or starved or demonstrates deprivational behaviors (e.g. eats out of trash can or begs for food)
- Siblings or housemates of children with serious injury or neglect
  - Highest priority: infants under age 2
  - Next highest: preschool children (age 5 or under)

When Does a Child Need A Medical Evaluation

- Severe or extensive injuries at any age, including head trauma, burns, fractures, chest, abdominal injuries
- Child appears to be intoxicated, drugged, or otherwise not normally responsive

What is the Medical Evaluation?

- Complete history
- Head to toe examination
- Photodocumentation

What is the Medical Evaluation?

- Lab and imaging
  - Screening tests for bleeding disorders
  - Screening tests for bone disorders
  - Complete skeletal survey for all children ≤ 24 months
  - Head CT
  - Eye examination
  - Brain MRI

Why get Medical Evaluation

- Identify injuries that need immediate medical intervention
- Determine if injuries are due to accident, medical condition or abuse

Medical Diagnosis

- Unable to determine
- At risk for child maltreatment
- Low/no concern for abuse/neglect
- Non-specific for abuse/neglect
- Concerning for abuse/neglect
- Substantial evidence of abuse/neglect

Physical Abuse

- Any non-accidental or inflicted physical injury
  - Cutaneous injuries
  - Fractures
  - Abusive head trauma
  - Abdominal trauma
- Regardless of intention to cause harm

Cutaneous Injuries

- Most common presentation of physical abuse
- Bruises, abrasions, lacerations, bites, burns
- >50% of abuse victims have skin injuries

Mechanisms of Bruises, Abrasions & Lacerations

- Blunt impact
- Penetration
- Friction
- Heat
- Shear
- Obstruction
- Increased pressure
- Crush

Bruise

- Bleeding beneath intact skin due to trauma

Abrasion

- Friction removes superficial layers of skin
  - Scratches are linear abrasions

Laceration

- Shearing force that causes deeper skin tearing

Petechia

- Pinpoint sized bleeding underneath intact skin

Evaluation of Injuries

- What is the mechanism?
- History ⃠→ mechanism
- History ⃠→ development of child

Location of Injury

- Certain locations on the body are VERY concerning for inflicted injury
- Certain locations on the body are NOT concerning for inflicted injury

Locations NOT Concerning for Abuse

- Forehead
- Nose
- Chin
- Elbows
- Forearms
- Hips
- Knees
- Shins

Any Bruise in an Immobile Infant

Locations VERY Concerning for Abuse

- Chest
- Back
- Abdomen
- Genitals
- Buttocks
- Ears
- Neck
- Intraoral
- Angle of the jaw
- Cheeks
- Eyelids
- Subconjunctival hemorrhages

Patterned Injury

- Suggestive of an object
- May not be able to determine what object is used
- Can make generalizations about the object
  - Flat
  - Textured
  - Flexible

Myth

Infants bruise easily

Fact

- Bruises in infants are rare
- No evidence shows that infant’s skin bruises more easily than an older child’s or adult’s

Myth

Different colored bruises are different ages

Fact

- Bruises caused by the same event may be different colors & may change color at different rates
- Research shows that color is not a reliable way to date a bruise

Factors Affecting Development & Appearance of Bruises

- Object or surface impacted
- Force of impact
- Properties of body region
- Color of skin
- Prior injury
- Distance of hemorrhage below surface of the skin
- Age and health of child

Mechanisms of Burns

- Thermal
  - Scald
    - Immersion
    - Splash
    - Flowing liquid
    - Splatter
- Contact
- Flame
- Radiation
- Chemical
- Electrical

Reference Temperatures

101	Comfortable Infant Bathing
104-8	Hot tub
109-113	Painful for adult
120	2nd degree burn in 10 minutes
127	2nd degree burn in 1 minute
130	2nd deg in 10 s (child) or 30 s (adult)
140	2nd deg in 1 s (child) or 3 s (adult)
156	3rd deg burn in 1 sec child

Severity Factors

- Time of exposure
- Temperature of substance
- Thickness of skin
- Type of exposure

Abusive vs. Accidental Burns

- Scalding by hot liquid is the most common agent for both accidental and inflicted burns in childhood

Abusive vs. Accidental Burns

- Abusive burns are most commonly due to immersion in hot tap water
  - Symmetric with sharp demarcations
  - Usually without splash marks
- Accidental burns
  - Usually smaller, less severe, without a pattern, with an irregular depth

What is the Pattern?

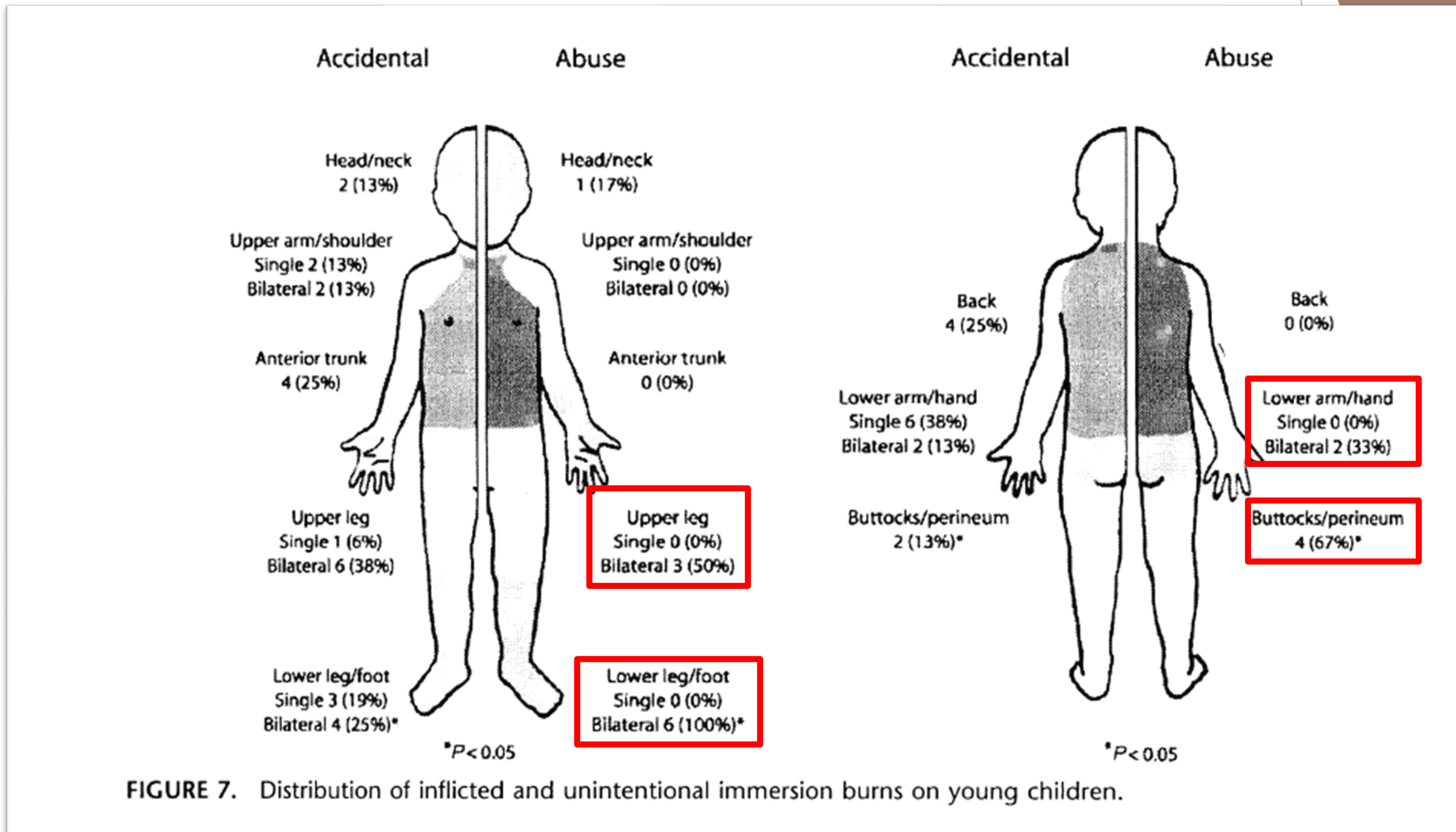
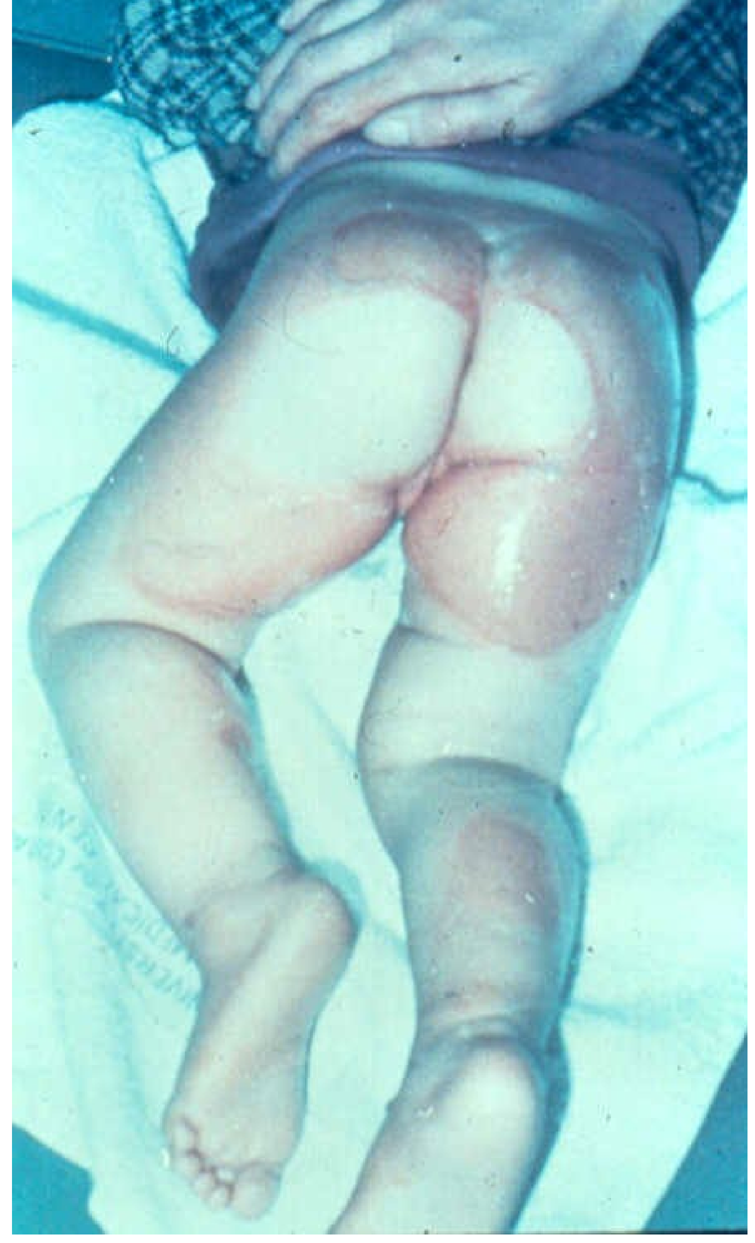


FIGURE 7. Distribution of inflicted and unintentional immersion burns on young children.



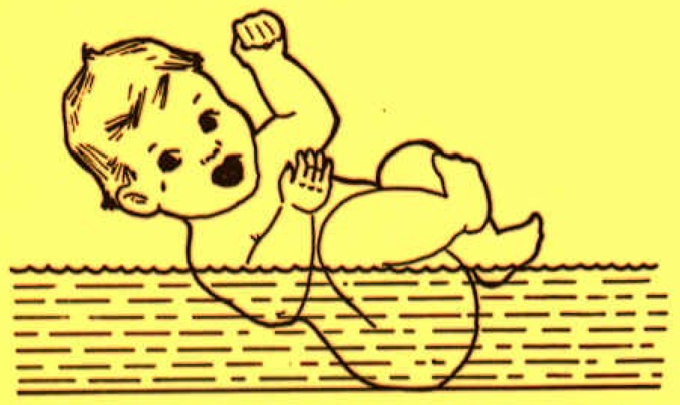


FIG. 2. View of patient from right side. Note flexed extremities which protected skin surfaces in apposition. Note left heel dipped into water because of left knee flexion.

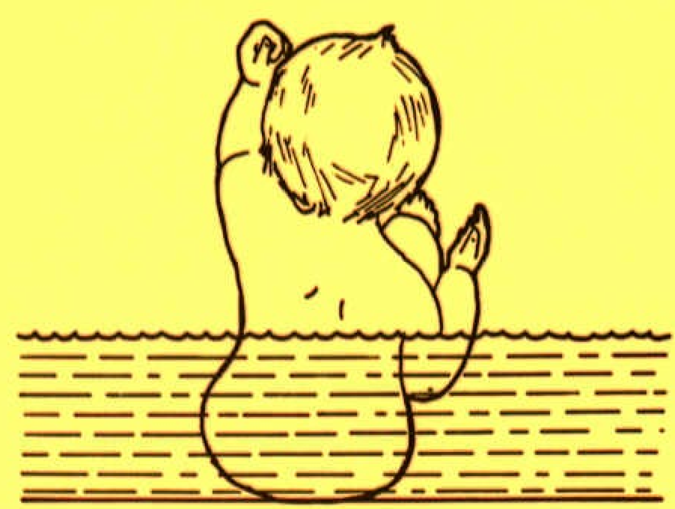


FIG. 3. View of patient in cephalocaudal orientation in the position of immobilization at the time of injury.

Immersion Burns

- On exam
  - Stocking or glove pattern
  - Uniform depth
  - Demarcated outline
  - No splash marks
- Other injuries
- Inconsistent history

Accidental Burns

- Consistent history
  - Caregiver
  - Child
- On exam
  - Gradation - most severe initial point of impact
  - Splash marks
  - Not clearly delineated

Failure to Thrive (FTT) ?

Nomenclature

- Failure to thrive
- Growth faltering
- Weight faltering
- Poor weight gain

Failure to Thrive/Survive/Grow

- Food
- Love
- Stimulation

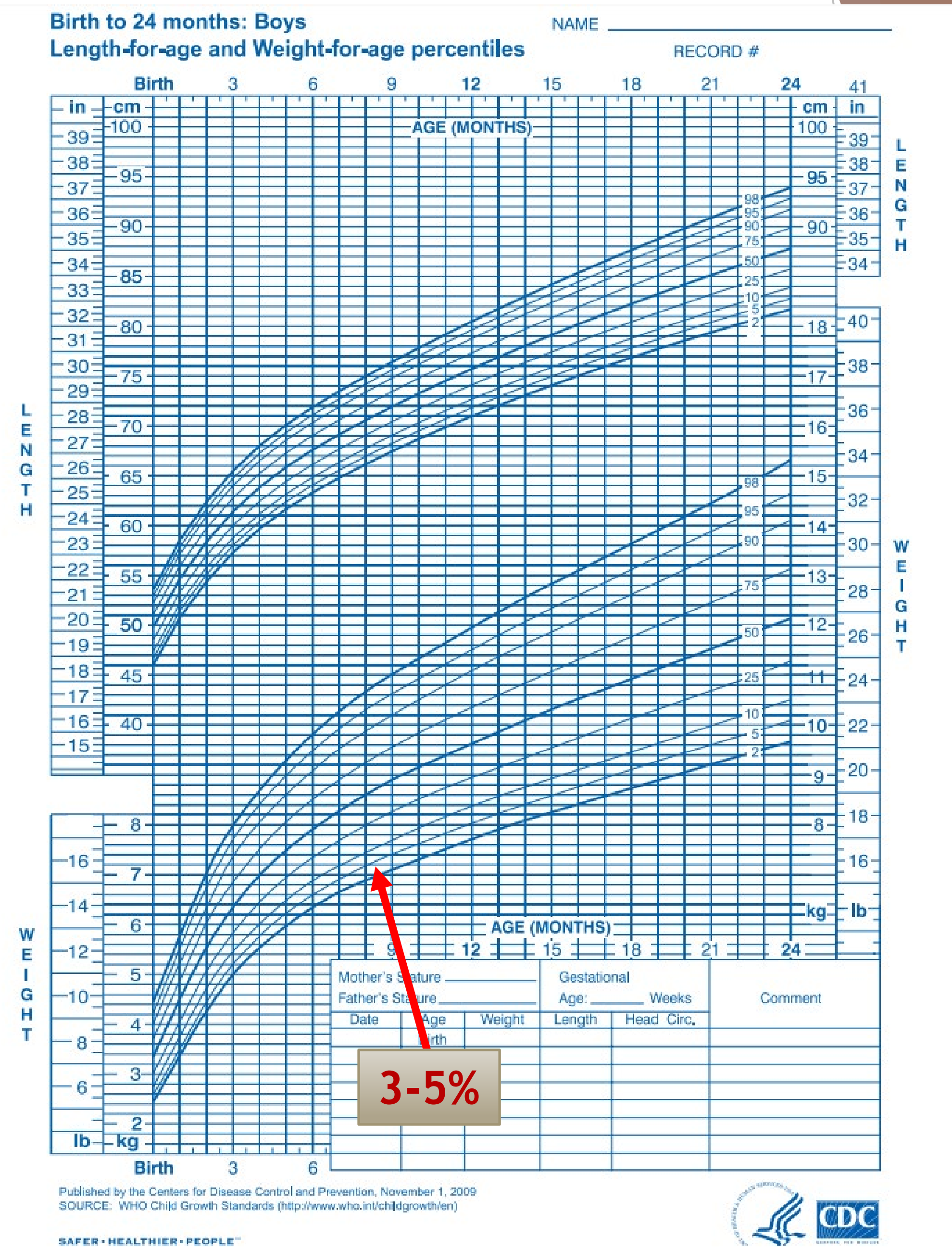
Stimulation

- The child’s environment plays a role in development
- The environment can either assist or disrupt brain development

* No consensus exists concerning the definition of FTT
* Inadequate nutrition to maintain physical growth and development
* Weight is significantly lower than norms for age and gender

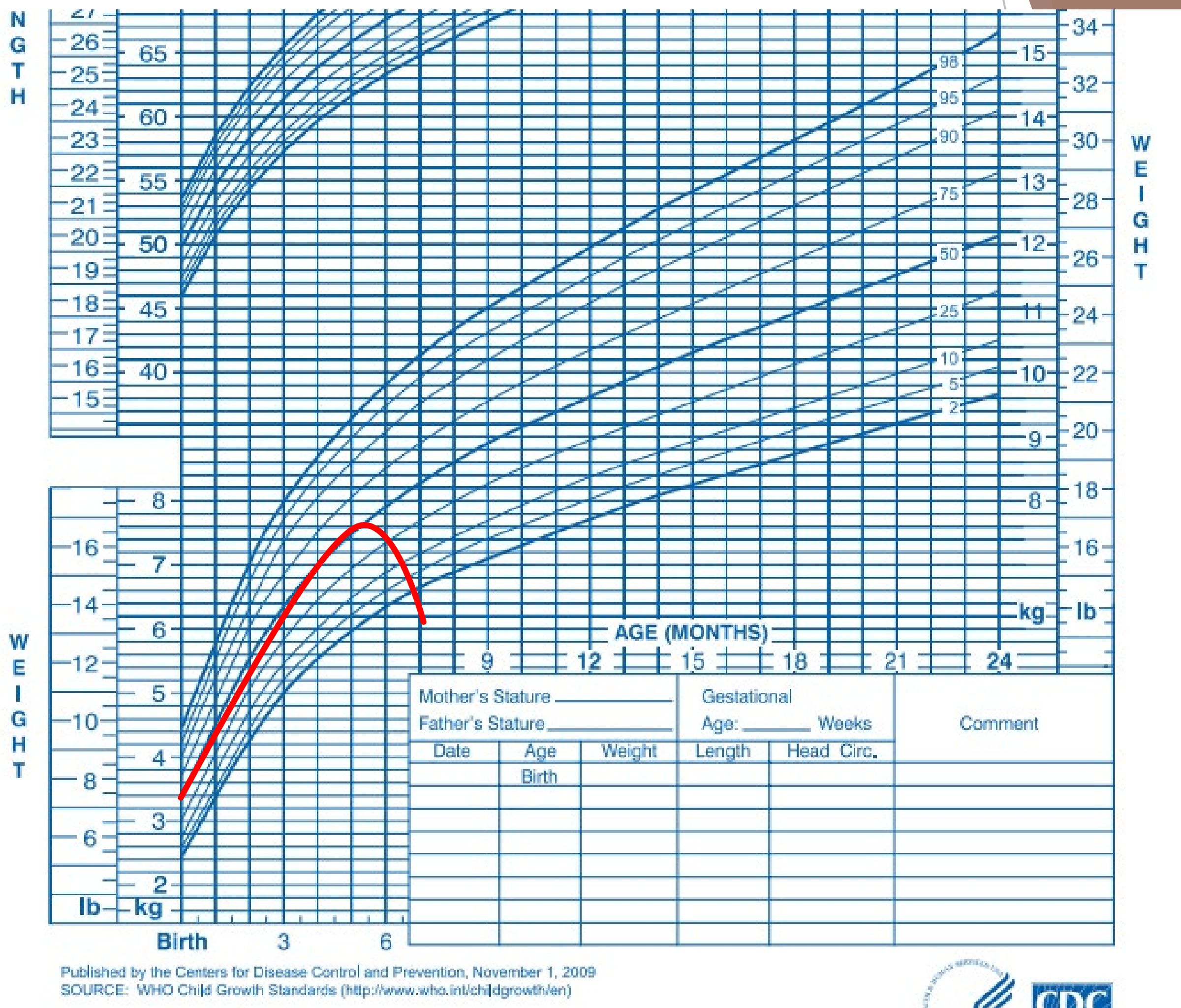
- Weight or weight-for-height below the 3rd to 5th % for age and gender

GROWTH CHARTS



- Weight or weight-for-height below the 3rd to 5th % for age and gender
- Weight curve that crosses 2 major percentiles using a standard growth chart

GROWTH CHARTS



- From conception until the third year of life the brain grows at a rate that is unmatched at any other time
- During the first two years of life, the brain is wired

Outcomes

The effects of under-nutrition can be damaging regardless of if they are permanent

- Loss of motivation to explore
- Diminished physical activity
- Delay in acquiring motor skills
- Delay in acquiring cognitive skills
- Reduced resistance to infection

Outcomes

Early failure to thrive

- Vulnerability to short stature
- Poor arithmetic performance
- Poor work habits

Home visiting attenuated some of the negative effects

Black, Dubowitz, Krishnakumar, Starr 2010

Outcomes

- Cognitive development
  - Lower family income
  - Lower maternal education
  - Earlier onset of FTT
- Motor development (oral)
- Immunity
- Socio-emotional-Behavior/Attachment

Etiology

- Inadequate calorie intake
- Inadequate calorie absorption
- Increased calorie expenditure

Inadequate Caloric Intake

- **Organic**
  - Neurologic
  - Craniofacial anomalies
  - Shortness of breath (congenital heart disease)
  - Gastrointestinal (reflux)
- **Non-organic**
  - Food unavailable
  - Inappropriate feeding technique
  - Withholding food

Inadequate Caloric Absorption

- **Organic**
  - Celiac disease
  - Cystic fibrosis
  - Enzyme deficiencies
  - Food allergies*
  - Hepatitis
  - Parasitic infection
- **Non-organic**
  - Inappropriate food for age

Increased Caloric Expenditure

- **Organic**
  - Chronic Infection (HIV)
  - Congenital heart disease
  - Malignancy
  - Renal Tubular Acidosis
  - Hyperthyroidism
- **Non-organic**
  - Chaotic household leading to decreased sleep
  - Excessive crying

What we see…

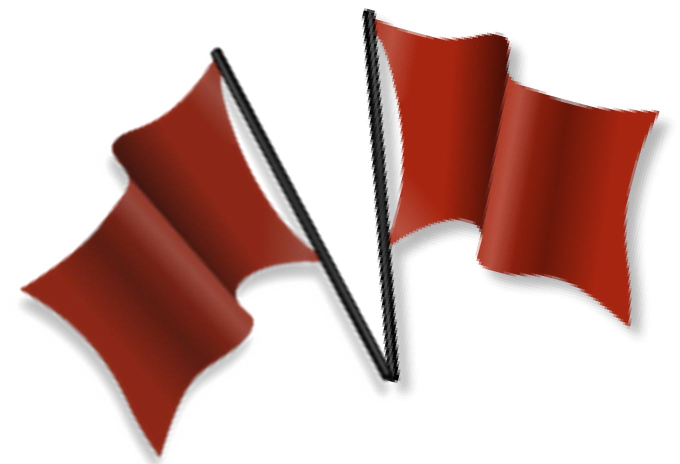
Signs

- No eye contact during feeding

- Bottle propping
- Observation of feeding lacks mutual pleasurable relationship

Red Flags

- Expressionless face
- Lack of appropriate social responsiveness
- Avoidance of eye contact
- Absence of normal vocal responses
- Does not cuddle when held



- Cannot report feeding schedule
- Unwashed skin
- Diaper rash
- Skin infection
- Dirty clothing
- Back of head flat, with bald patch

- Irregular feeding patterns
- Prolonged meal times
- Unsupervised meals
- Grazing
- Excessive milk or juice

- Intentional withholding of food from the child
- Failure to adhere to medical regimens
- Strong beliefs in health and/or nutrition regimens that jeopardize a child’s well-being
- Family that is resistant to recommended interventions despite multidisciplinary team approach

Infant Hunger and Satiety Cues

Approximate Age	Hunger Cues	Satiety Cues
Birth to 5 months	• Wakes and tosses • Sucks on fist • Cries and fusses	• Seals lips together • Turns head away • Decreases or stops sucking • Spits out the nipple or falls asleep when full
4 months through 6 months	• Cries or fusses • Smiles, gazes at caregiver, or coos during feeding to indicate wanting more	• Decreases rate of sucking or stops sucking when full • Spits out the nipple • Turns head away
5 months through 9 months	• Reaches for spoon or food	• Eating slows down
8 months through 11 months	• Reaches for food • Points to food • Gets excited when food is presented	•Eating slows •Pushes food away
10 months through 12 months	•Expresses desire for specific food with words or sounds	•Shakes head “no”

WIC 2007

Failure to Thrive

- **COMPLEX**
- Multidisciplinary approach
  - Pediatrician
  - Nutritionist/feeding specialist
  - Psychiatrist
  - Developmental specialists- Early Intervention
  - CPS

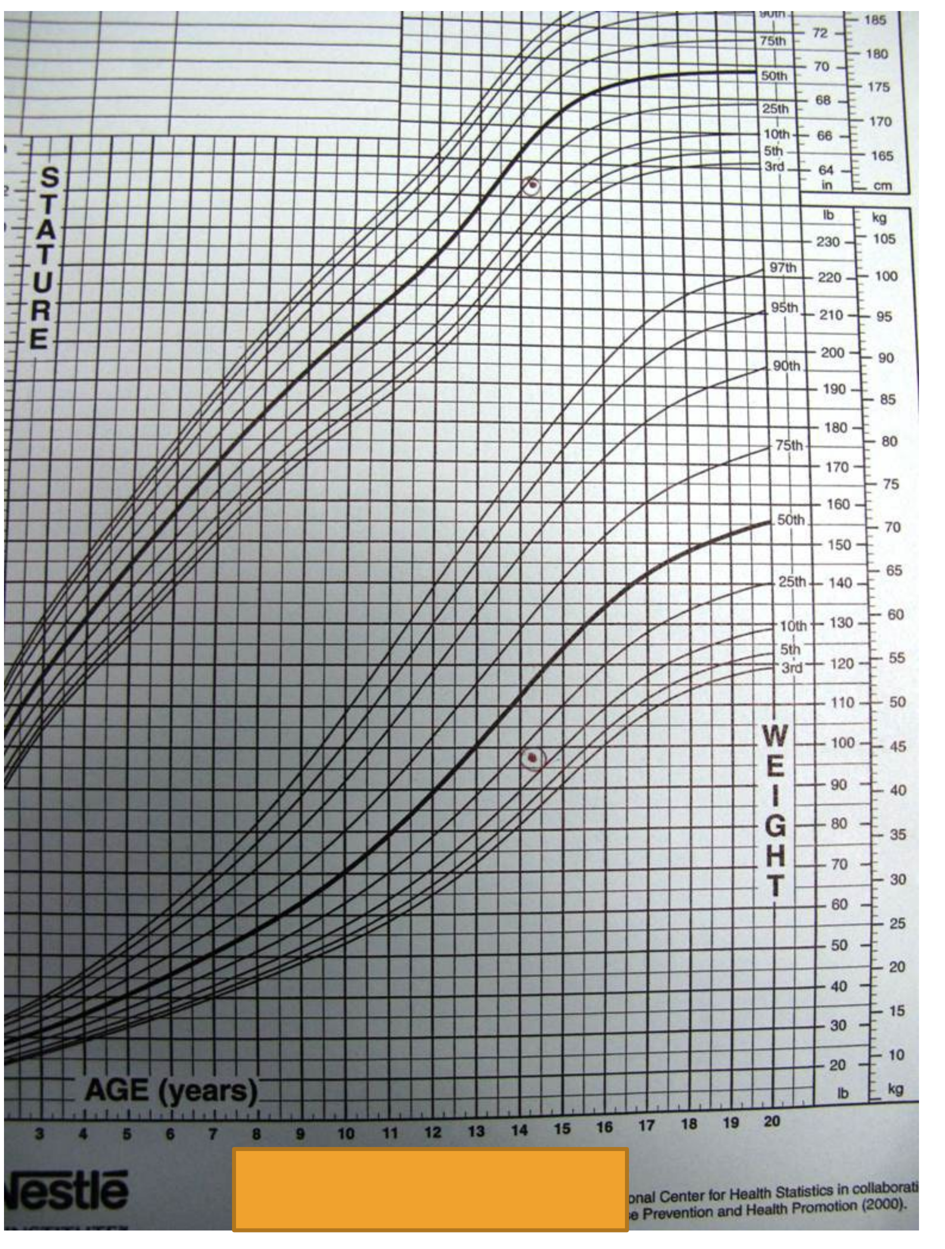
How do we diagnose FTT ?

- History
  - Pregnancy
  - Birth,
  - Diet,
  - Feeding,
  - Neonatal,
  - Past Medical,
  - Social,
  - Surgical,
  - Hospitalizations,
  - Review of Systems

Laboratory tests

- Yield of positive laboratory data approximately 1%
- Guide testing by history and PE

Diagnosis



Review of past medical records---including growth charts

Diagnosis

- Observe the caretaker feeding the infant/ child
- Observe play or interaction while not feeding
- Ideal in the home environment

Non-feeding Observation

- Caregiver
  - Shows joy toward child
  - Over-stimulates
  - Under-stimulates
  - Handling of child
- Infant/ Child
  - Responds with smiles to caregiver’s smiles
  - Cries, stiffens, arches when touched or held
  - Sleepy, passive, difficult to engage

Feeding Observation

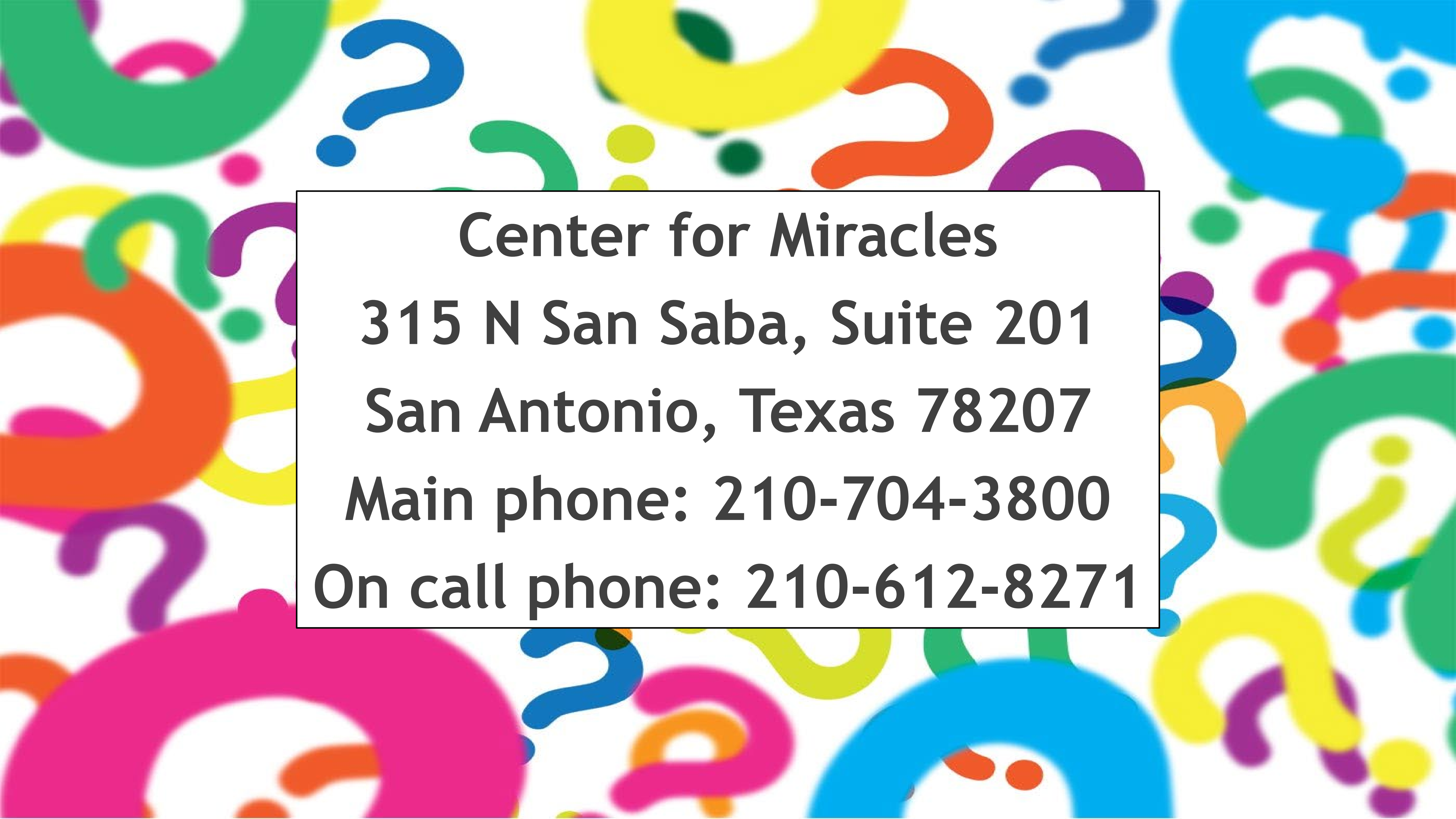
- Caregiver
  - Eye contact
  - Talks to baby
  - Bottle position
  - Bothered by messiness, cleans excessively
  - Interrupts feeding inappropriately, causes distress
- Infant/ Child
  - Poor suck/ tires easily
  - Gags, spits up, vomits
  - Appears distressed
  - Eye contact
  - Relaxed, molded to caregiver
  - Pushes food away, throws food

Diagnosis

- Oromotor (suck, swallow, coordination) observation & intervention should involve an occupational or speech therapist

Hospitalization

- Severe malnutrition
- Significant dehydration
- Significant medical problems
- Child safety
- Concern for re-feeding syndrome
- Need involvement of multiple specialties and/or diagnostic testing
- Failed outpatient management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