

## Nourishment concerns

Failure to thrive  
Diarrhea  
Constipation  
Obesity

## Failure to thrive

- Definition
  - rate of weight gain  $<2$  SD during an interval of 2 mo or longer if  $<6$  mo of age or during an interval of 3 mo or longer if  $>6$  mo of age
  - weight for length for age is  $<5\%$ ile
- Need to accept that these criteria are not ideal for either specificity or sensitivity

## Failure to thrive

- Infants  $< 3$  yo who are judged to gain inadequately in wt or wt & length
- term applies to growth failure that results from inadequate energy intake without underlying disease or abnormality

## Failure to Thrive Risk Factors

- Decrease in weight velocity
- Downward crossing of at least two growth channels on a standard growth chart- commonly concurrent with decrease in length and OFC velocity
- Estimated ideal body weight for height age 90% or lower
- Any one or combination of factors describes a child at risk for FTT & should be evaluated

## Failure to Thrive Risk Factors

- Non-organic risk factors
  - sickly, difficult child
  - isolated, overwhelmed mother
  - emotionally distant or unavailable father
  - disordered feeding situation resulting in inadequate energy intake or retention
  - impoverished or problematic nonfeeding interaction
  - social environment or loss, stress, or poverty

## Failure to Thrive Risk Factors

- Organic risk factors
  - congenital anomalies
  - postnatal medical illnesses
  - major illness
  - organ system failure

## Possible causes of poor growth

- Genetic
- Poor nourishment
- Poor parent-child interaction
- Poor feeding skills/oral motor problems

## Nutrition 'risk' parameters in children

- Medical
- Physical/motor
- Environmental
- Food intake

## Medical 'risk' issues

- Syndrome and disease entities which:
  - increase or modify nutrient/energy needs
  - interaction of medications and nutrients
  - constipation
  - diarrhea

## Motor 'risk' issues

- Oral motor dysfunction when eating
- making the transition from tube to oral feeds
- lack of self-feeding
- athetosis, increased energy requirements
- accepts only a limited range of textures

## Environmental 'risk' issues

Parents are-

- anxious/concerned about what & how the child eats
- set up a daily buffet of snacks
- not bonded with child
- overly fastidious about self-feeding
- infantalize the child
- have unrealistic expectations about self-feeding
- don't know what the child eats
- try to force feed
- don't recognize cues of hunger or satiation
- reinforce not eating

## Food intake 'risk' issues

- large appetite -eats too much
- picky, finicky appetite -eats very little
- dependence on a single or a few foods
  - juice, noodles, some fruit
  - kool-aid, French fries
  - apples, chicken
- consumption of large volume of liquid
  - 64 oz apple juice
- excessive intake of sweet foods or crunchy, salty foods

### Assessing depressed appetite- truly depressed vs transient phenomena of toddlers

- What is total nutrient intake?
- Is rate of growth typical despite apparent lack of appetite?
- Is child reinforced for not eating rather than eating?
- How do parents react when child refuses to eat?
- Is positive reinforcement for eating used appropriately?
- Is child tired at meals?
- Is the child offered too many snacks?
- Is the child overwhelmed by the demands on eating?
- Is the child overwhelmed by the foods?

### Failure-to-thrive in Seattle

- Total admits: 1100
  - Admits w FTT: 50
- Total NB admits: 336
  - NB admits w FTT: 5
- Total non-NB admits: 764
  - Non-NB w FTT: 45
- Classification:
  - 1. Inadequate pro/energy intake
  - 2. Maternal-infant problems above nourishment
  - 3. Organic causes of various etiology

### Incidence by Type

|        | NB FTT | NNB FTT | Total | % TOTAL |
|--------|--------|---------|-------|---------|
| Type 1 | 2      | 13      | 15    | 30      |
| Type 2 | 2      | 14      | 16    | 32      |
| Type 3 | 1      | 18      | 19    | 38      |
| Total  | 5      | 45      | 50    | 100     |

### Differentiation of organic from non-organic FTT

- 3 groups of infants, 6-16 mo
  - N=8, non-organic FTT
  - N=10, organic FTT
  - N=7, normally grown, hosp. For medical reasons
- Method:
  - 1-7 point scale of approach withdrawal to monitor brief social interactions
- Results
  - Non-organic FTT children prefer distant social interactions and inanimate objects
  - Organic FTT children & medically ill contrast groups consistently responded to close personal interactions

### FTT: SES, intake & mother-child interaction

- Criteria:
  - >2500 gm
  - >36 wks gest
  - no birth complications
  - No organic cause for growth retardation
  - maternal ht >5'1"
- N=30 children, 12-59 mo old
- Study group: <3rd%ile for ht
- Contrast group: 25%ile for ht

### FTT: SES, intake & mother-child interaction

- Contrast families had better living conditions
- Contrast had subtle nutrient advantage
- Mother-child interaction using HOME
- HOME results

### FTT: SES, intake & mother-child interaction

|                          | <u>Study</u> | <u>Contrast</u> |
|--------------------------|--------------|-----------------|
| Overall                  | 70%          | 94%             |
| Development & vocal stim | 74%          | 100%            |
| Emotional climate        | 55%          | 87%             |

### Biochemical tests in FTT evaluation

- Complete blood count (CBC)
- Urinalysis (UA)
- Urine culture
- Blood urea nitrogen, creatinine
- Free erythrocyte protoporphyrin (FEP)
- Stool pH, reducing substances, occult blood, ova, and parasites
- Albumin, prealbumin, transferrin
- Alkaline phosphate
- Sweat chloride

### Management of FTT

### Common causes of acute diarrhea

- Infection
  - bacterial - salmonella, etc
  - Parasitic- giardia
  - viral-rotavirus is causative agent for >50% of hospitalizations of infants with diarrhea
  - medication reaction - antibiotics
- Food intolerance or overfeeding
- Nonspecific diarrhea of infancy-childhood equivalent of irritable bowel syndrome
- Poisoning -iron, insecticides

### Common causes of chronic diarrhea

- CHO intolerance (lactase deficiency)
- food/formula intolerance or improper formula preparation
- nonspecific diarrhea of infancy
- parasitic infections
- celiac disease
- cystic fibrosis
- immune deficiencies
- inflammatory bowel disease
- short gut syndrome
- constipation with encopresis
- pseudomembranous colitis related to antibiotic use

### Chronic non-specific diarrhea: excessive fluid intake

- N=105 toddlers
- N=85, no evidence of malabsorption
- criteria: diarrhea for >3 weeks, normal growth, no enteric pathogens
- Non-protein fluid intake = 196 ±32 ml/kg/day
- e.g. 2 yo child at 12 kg = 2250+ ml fluid/day

## Chronic non-specific diarrhea: excessive fluid intake

- Treatment: limit juice to 90ml/kg/day with no other change in diet
- e.g. 2 yo child at 12 kg = 1000+ ml fluid/day
- FU at 2 wks & 8 wks
  - ↓ stool frequency from ~10/day to ~3/day
  - ↑ consistency of stools
- Hypothesis: intake of fluid exceeded absorption capacity of intestine

## Chronic diarrhea if childhood and use of elimination diets

Differential for chronic recurrent diarrhea

|                                       | N   | %   |
|---------------------------------------|-----|-----|
| Chronic non specific diarrhea         | 63  | 58  |
| Post-infective diarrhea               | 24  | 22  |
| Milk allergy                          | 7   | 6   |
| Primary sucrose isomaltase deficiency | 5   | 5   |
| Celiac disease                        | 9   | 8   |
| Total                                 | 108 | 100 |

## Chronic diarrhea if childhood and use of elimination diets

- N=4, age 3-18 mo
- suspected milk protein sensitivity
- used milk substitute which became primary nutritional source
- Developed protein-energy malnutrition in 6 weeks to 18 mo
  - hypoproteinemia
  - edema
  - hepatic abnormalities

## Chronic diarrhea if childhood and use of elimination diets

### Energy source & distribution of milk substitute

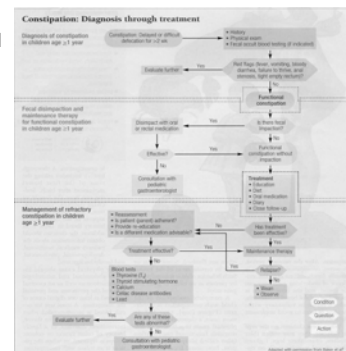
| Nutrient  | Source      | % of total energy |
|-----------|-------------|-------------------|
| Fat       |             |                   |
| Polyunsat | Soybean oil | 22%               |
| Other     | ---         | 47%               |
| CHO       | Corn syrup  | 30%               |
| Protein   | Soy protein | 1%                |

## Chronic diarrhea if childhood and use of elimination diets

Clinical details of 15 children who developed failure to thrive following treatment with elimination diets for long periods

|  |  |
|--|--|
| Age at referral                                | Mean 17 mo [range 8-30 mo]                     |
| Male:female                                    | 2:1  |
| Duration of dietary restriction                | 8 mo [range 8-12 mo]                           |
| First born                                     | 8/15   |
| Final dx                                       |  |
| Chronic non specific diarrhea                  | 13   |
| Milk allergy                                   | 1  |
| Post-infective                                 | 1  |
| Ave age of referral                            | 23 mo [6 mo to 8 yo]<br>only 4 pts were > 4 yo |
| <i>Dietary manipulations tried</i>             |  |
| Milk-free diet                                 | N= 98  |
| Milk, egg, wheat-free diet                     | N= 30  |
| Gluten-free diet                               | N= 60  |
| <i>Follow-up: 90% improved on regular diet</i> |  |

## Diagnosis and management of constipation



For long-term growth and wellness of  
young children:

**Reasonable**

- intake of nutrients- protein, energy,  
calcium, iron, fiber
- quantity of food
- quality of food
- social environment
- interpersonal interaction
- consider how children 'see' food