Failure to Thrive in Refugee in a Refugee Child

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Objectives:

• Define failure to thrive
• Discuss in refugee children
  – Causes and risk for FTT children
  – Common nutritional deficiencies
  – Common infectious disease
• Discuss an approach to assessing the failure to thrive child.
• Discuss management of FTT in a refugee child.
Failure to Thrive

• Inadequate weight gain and physical growth compared to standard growth curves
  – weight for age that falls < 5th percentile on multiple measures.
  – crosses two major percentile lines on a growth chart.
  – BMI Wt-for-length < 2nd % ile WHO, 3rd ile CDC,
  – Z-scores

• Growth Charts
  – CDC, based on American formula fed infants
  – WHO growth charts
Overview of causes

• Any chronic illness can cause FTT such as kidney, liver disease,
• Poor nutrition/ inadequate caloric intake
• Inability to utilize calories (malabsorption/disease)
• Increased metabolic demands (infections/illness)
• Genetic, trisomy, thalassemia, SSD
• Constitutional
Time line for Risks/exposure

Genetics (constitutional)  
Abnormal chromosomes  
Malnutrition  
Infections (TB, malaria, HIV parasite)  
Mental trauma  
Environmental toxins (lead)  
Poverty  
Malnutrition  
Infections  
Mental stress  

Pregnancy  
Birth  
Flight  
Refugee camp  
Reintegration  

Trauma  
Infections (HIV, syphilis)
Special risks in Refugee Children

• Vulnerable: dependent on others for the basics of life
  – Food, clothing
  – Shelter, protection from harm

• Cultural issues: selective feeding boys vs girls

• Separation from primary care givers

• Stresses and psychological trauma often go unrecognized, anxiety

• Behavioral risks in children
Risk Factors preflight

• Most come from resource-poor parts of world
  – Often marginalized
  – Decreased access to resources/food
  – Baseline malnutrition
  – high levels endemic disease
Flight

• Fleeing war or persecution
• Observe/experience violent acts: murder, rape or intimidation, self-harm to family, neighbours,
• Separation from parents or caregiver, unaccompanied minors at highest risk
• War exposed refugee children often have anxiety, depression, anger or violence, and dealing with parents mental health issues
• Depression/anxiety may not be obvious, but may express as poor appetite, failure to gain weight
Refugee Camp

• Refugee Housing
  – elements,
  – Overcrowding, high risk of transmission of infections
  – Often violence may continue
  – Uneven distribution of food/other resources

• Sanitation:
  – Toilets (field/pit/toilet)
  – personal hygiene (hand hygiene)
  – Shoes (transmission of infection)
Case 1 cont’d

- Born in jungle as mother trying to escape Burmese Army, unattended birth, husband shot
- Poor breast milk supply
- Feed sugar mixed with river water
- Severe diarrhea, URTIs,
- At 2-3 months almost died. Breast milk increased
- Severe malnutrition continued until arrived at refugee camp at age 2-3 years
Stunting & wasting

• **Wasting**
  – <2 SD for average weight for height (acute)
  – Often acute malnutrition

• **Stunting**
  – <2 SD median height for age (chronic)
  – Long term
  – Asymmetric: (spare head)
  – Symmetric: head/brain affected

• **Reversibility depends on duration and severity**
Relevance of Malnutrition in Refugee Children

– Depends on severity and duration
  • Effects can be reversible to a point, but prolonged severe malnutrition can have permanent effects

– Pregnancy, Intrauterine growth retardation (IUGR)

– Female child, small pelvis can lead to death and complications during childbirth

– Never reach full growth potential

– Final intellectual capacity

– Increased susceptibility to infection
Contributors of Malnutrition

• Multiple/teen pregnancies
  – mother and infant
• Lack of availability/poverty
• Loss: malaria, parasites,
• Acute and chronic infections
• Chronic disease
Water insecurity

- Water source at all stages
  - Sufficient supply drinking
  - Lack of water for hygiene
    - lake/river,
    - well,
    - transported in, tap,
    - filtered/chlorinated water
    - Boiled
  - Vector for many infections
    - Hepatitis A, E,
    - Cholera
    - Enteric pathogens
    - Schistosomiasis,
Common types of Deficiencies

• Calories/ Protein Energy Malnutrition
  – Marasmus
  – Kwashiorkor

• Iron

• Vitamin A

• Vitamin D

• Iodine

• Zinc
Iron deficiency

• Commonest form of microdeficiency
• Moderate 8-10mg/L, severe anemia ≤8mg/L
• Poor maternal iron stores, hemorrhage,
• Poor intake iron
  – Poverty, access, cultural/religious beliefs
  – Vegan diet
• Poor bioavailability of iron,
  – starch diets, high phytate, lack of variety diet
• Decreased absorption-bowel disease, parasites
• Losses: parasites, hookworm, strongyloides, malaria
• Chronic disease, recurrent infections
Vitamin A deficiency (VAD)

- Major public health issue, 130M children
- VAD inutero, breast milk deficient
- Lack of access VA rich foods
  - Animal based: (preformed)
    - Liver, egg yolk, dairy products
  - Plant-based: (B-carotene) to be converted
    - orange colored fruit/veg & Dark green veg
- Diarrhea, parasites decrease absorption
- Infection, increase utilization
  - diarrhea, pneumonia, measles
Vitamin A deficiency (VAD)

• Affects cell-mediated immunity
  – VAD increase risk severe infection, infections increase VAD
  – VAD: measles, diarrhea, pneumonia increased risk of death and blindness
  – Vision: poor night vision, conjunctival & corneal dryness (xerosis) and ulcerations, xerophthalmia-blindness

Source Tropical Medicine & Parasitology, Peters & Gilles 1995
Case 2

- 2 year Karen boy presents with fatigue, Arrived from Thailand 5 months ago,
- History of fever 3 weeks ago
- No family history of any illness
- Dietary history, “picky eater”
- Family hx not known
O/E

- Bp 85/60, HR 110
- Pale conjunctiva, no jaundice,
- H&N normal
- Chest-N
- Abd, no H&M, soft, non-tender
- Gu-normal
- No rashes
• What is in your differential?
• What work up would you do?
Laboratory investigations

- Hb 55
  - Fe levels 0,
- Bili normal, AST/Alt normal
- Hemoglobin electrophoresis – normal
- Malaria smear negative
- G6PD normal
- Lead levels normal
- Vitamin D insufficient,
• Reviewed dietary hx, strawberry Kool-Aid x5 months
• First dietary tray devoured by child (and mother)
Other causes of anemia

- Sickle cell disease,
- Hemoglobinopathies:
  - Thalassemia alpha, beta
  - Hemoglobin E,
- G6PD deficiency
- Lead intoxication
Lead poisoning

- Sudanese child died of lead poisoning 2000
- African refugee children settling in New Hampshire*
  - 39/92 (42%) elevated levels of lead,
  - highest risk in Liberians in refugee camps
  - Malnutrition/anemia increased lead absorption
  - Increased lead after settlement: poor housing
- Lead in Massachusetts 1995-1999**
  - 11.3% elevated lead at arrival
  - 7% newly elevated levels 6 months after arrival
  - Highest in Somalis and Vietnamese
- Environmental lead: paints, jewellery, cooking pots, lead gas. industrial emissions, ammunitions, traditional remedies.
Infectious disease contributing to malnutrition and FTT
Infections

• Any chronic infection can lead to failure to thrive in Refugee child
  – Bacteria
    • Tuberculosis
    • Gastroenteritis
  – Parasites
    • Intestinal parasites
    • schistosoma
    • Blood parasites, malaria*, filariasis
  – Virus
    • Acute/chronic hepatitis
    • HIV
Intestinal parasites

• Almost all children have parasites*
• often not detected in stool O&P-poor sensitivity
• In a child with FTT, if you don’t find it don’t assume that it’s not there…
  – Safer to assume that it is there
• have a high index of suspicion
  – RBC/WBC in stool, eosinophilia, malabsorption
  – Patterns not fit, eosinophilia w/ giardia

*Saiman, Pediatrics, 108(3):608
DeGirolami PC, Kimber J, American journal of clinical pathology Intestinal parasites among Southeast Asian refugees in Massachusetts.
Relevance Intestinal Parasites in Refugee Children

- Poor sanitation
- Prolonged and intense exposure to parasites
- Refugee children already malnourished,
- FTT, wasted, stunted
Undetected/Untreated parasites

• parasites (even if asymptomatic) can lead to:
  – Impaired growth and development
  – Malnutrition, (iron loss, micronutrient)**hookworm
  – Malabsorption (giardia)
  – Serious liver or renal disease (cirrhosis, cancer-schistosomiasis)
  – Disseminated infection/death and hyperinfection (strongyloides)
  – Many continue w parasites years after arrival
  – Can be transmitted to others (food worker, healthcare)
Significant parasites

- **Giardia**,  
  - chronic diarrhea, malabsorption,  
  - Nausea, bloating, decrease appetite

- **Hookworm**  
  - Chronic blood loss (anemia and eosinophilia)

- **Schistosoma**  
  - long standing can cause FTT, liver cirrhosis, ca

- **Stronglyoides**
Persistent Parasites: Lost boys of Sudan

- 44 of 150 (30%) in Atlanta July 2005-Dec 2006 tropical disease clinic
  - CBC, LFT, Stool O&P x 3, hepatitis B, serology schistosoma and strongyloides
  - 10/32 (32%) tested, hep BsAg positive, one death carcinoma
  - Schistosoma 27/42 (64%) positive
  - 10/40 (25%) positive strongyloides
  - 10/38 (26%) positive filaria serology, likely onchocerciasis
  - 12 with persistent intestinal parasites
- Excess morbidity, long term sequelae
- ?strongyloides & schistosoma pre-departure treatment

Case 2

- 2 year girl from Eritrea, arrived a 3 weeks ago
- Itchy rash, on thigh
- Started on steroid cream: not appear to be working
Initial labs

- CBC
  - Hb 109
  - WBC 14
- Eosinophils: 11,000 cells/mcl (normal <400)
- AST/ALT normal
- Urea/Cr
Differential for rash?

- eosinophil not related
  - eczema
  - scabies
  - Bedbugs Filiariasis (onchocercia or others)
- Schistosoma
- Eosinophilic drug rash
- Hypereosinophilic syndrome
- Other autoimmune conditions
- Strongyloides larva seen x 3
Strongyloides stercoralis epidemiology

- World wide distribution, tropical and temperate
- 100-200 million persons
- 14/124 (11%) East African and 97/230 (42%) Asia positive serology for *S. stercoralis*
- Increased
  - poor sanitation,
  - walking barefooted (often not in hx)
  - Can persist for decades previously
Strongyloides

- Asymp. to multi-organ failure.
- Derm;
  - ground itch at site of penetration
  - *cutanea larva currants*-serpiginous urticarial creeping rash
- Gastrointestinal;
  - anorexia, weight loss, nausea, chronic diarrhea, constipation, bloating
  - Important cause of FTT, malabsorption
- Respiratory;
  - Initial wheezing and mild cough
    - commonly confused with Asthma
  - **steroid use can cause dissemination and death**
Hypermigration Syndrome

- amplification of the auto-infective life cycle
- immunosuppressive
  - Transplant, cancer, HIV, DM, etoh, **steroids**
- massive ams. larvae migrate-inflammation
  - Lungs & throughout body
  - Bacteremia, meningitis,
  - gram- sepsis can occur
  - Case fatality rate up to 70-90%
Diagnosis

- High index of suspicion,
- Travel from poor-hygiene, (barefooted?)
- Eosinophilin
  - Usually in chronic disease
  - Not always present in hyperinfection
- Stool 0&P
  - Often low sensitivity if low parasite
    (special media)
- Can be in sputum, urine, tissue, CNS if disseminated
- **Serology;**
Case 3

• 15 year old Eritrean boy presenting with 6 month hx of abdominal pain
• Parents died when he was 5
• Arrived as GAR with sister to live with cousin
• Referred from ER
• Hb 90, WBC 3.0, plts 500
• ?Questions
Physical

- Wasted++
- no jaundice, no generalized lymphadenopathy
- No rashes
- HSM
Tuberculosis

- >1/3 of the world's population have been exposed
  - 50% latent TB in refugees
  - TB rate foreign-born persons in the US was 9.7 times\(^1\)
  - 65% of all cases of TB in Canada in foreign born\(^2\)
  - TB risk of exposure increases w/ age
  - Risk for reactivation high during migration

- Latent TB, may be candidate for prophylaxis
- Annual risk of developing active TB approx 0.1%/year, 5-10% life
- Higher if malnourished, underlying disease, or immunosuppression


\(^2\)PHAC
TB in Children

- Primary TB most often in young children,
  - Often silent, but can present as pneumonia (lower lobes with hilar hyphadenopathy),
  - less likely to be infectious, especially < 8 years of age

- BCG
  - relevance decreases with time
  - gamma-interferon (QuantiFERON-Gold) Interferon-gamma release assays (IGRAs)- Blood test may help differentiate
    - indicate cell mediated response to M. tuberculosis but not BCG

- Malnutrition
  - increases the risk for active TB and false negative TST

- Extra-pulmonary often missed,
  - weight loss, fever, night sweats, generalized lymphadenopathy, malaise or non-specific symptoms,
  - Can affect any organ system
  - Repeat TST when nutrition improves
Malaria

• Many refugees come from malaria endemic parts of the world

• Symptoms can be non-specific and often missed post arrival

• *P. falciparum*, severe disease, hemolysis, especially in young children, reinfection common

• *Other non-falciparum*, relapses can be years after arrival, chronic anemia, weight loss, failure to thrive,
Schistosomiasis

- Infects 300-500 million people,
- Trematode (fluke), contact with fresh water,
- Cerceria rash
  - Cercaria penetrates skin
  - Rash hours to weeks
    - May be pruritic, last 7-10 days
- Acute schistosomiasis (katayama syndrome),
  - Fever, H/A, abd pain, +/- bloody diarrhea
  - Often high eosinophilia, may/may not shed eggs, serology may be positive
- Chronic schistosomiasis, common cause of FTT
- S. Mansoi and most others gi-liver Ca
  - S. hematobium- bladder Ca, renal failure
  - Commonest cause of hematuria in Egypt
Congenital syphilis,

• >1 million births with congenital syphilis/yr
• >50% of infected infants are not symptomatic at birth,
  – signs may be subtle and non-specific
    • prematurity, low birth weight,
    • Hepatomegally +/- splenomegally
    • blistering skin rash
    • resp distress, fever,
    • pseudoparalysis (12% neonates, 36% infants)
  – x-ray chondritis,
• Important often missed cause of FTT
• important to test for and treat early parent or child
Other factors for FTT

• No newborn screening in many parts of world
  – Congenital syndromes
  – Hypothyroidism
  – Metabolic syndromes

• Genetic conditions
  – Thalessemias, Hemoglobinopathies SSD

• Developmental delay

• Constitutional? parents short
Approach to Refugee Child
History

• Ethnicity, where born, travel routes
  – May or may not discuss trauma/losses
• Antenatal
  – Past obstetrical hx, losses
• Labour-attended/unattended, in hospital, clinic, jungle
  – Labour complications
• Neonatal complications
• Food security-
  • full dietary hx for FTT
  – enough?
  – kinds of food,
  – How long breastfed, when started supplemental foods
• Water security
• Type of housing,
History cont’d

• History of contact with lakes, rivers (Africa)
• Animal exposure
• Sick contacts
• Endemic diseases (schisto, oncochercia, malaria)
• Detailed ROS
  – Fevers, weight loss, energy, appetite,
  – mental status (depressed, left parent/sibs behind)
• Social history:
  – people left behind, died?
  – current situation, housing, food insecurity
Physical

- Weight, ht, head circumference <2 years
  - (CDC vs world health growth charts)
- Visual acuity
- Hearing screening
- Dental assessment
- Jaundice, lymphadenopathy, hepatosplenomegally,
- BCG scar, signs of torture, coining
- Rashes: scabies, bed bugs, ringworm, onchocercia,
Laboratory testing

- CBC & differential, (anemia, eosinophilia)
- Iron, ferritin,
- lead
- TSH
- urea, Cr, AST/ALT
- Hep BsAg, Hep BsAb, Hep B core Ab,
  - repeat at 6 months
- +/-Hep C if risk, war zone, injection drug use, risk factors
- HIV, all test > 15 HIV, endemic, risk, vs all
- T. pallidum (syphilis)
Testing cont’d

- Stools O&P x 3
- Stool culture if symptomatic
- Urinalysis, (schisto, uti, renal TB)
- TST (?>6 weeks age), even w BCG,
- CXR: symptoms, wt loss, fever, contact hx, (sputum)
- Special tests based on risks, G6PD, Hb electrophoresis, strongyloides, schistosoma, filariaria serology
- ?malaria smear (hx, enlarged spleen, thrombocytopenia, ?endemic)
USA pre-departure guidelines

- Middle East, South and, Southeast Asian, presumptive therapy with a single dose of albendazole (400 mg, 200 mg for children 12-23 months) and ivermectin,

- Africa, (loa loa), presumptive albendazole, screen or treat for strongyloidises and schistosomiasis
Canadian Evidence based guidelines for Immigrant and refugees

- strongyloides serology, screen refugees from SE Asia and Africa
- Schistosomiasis serology, screen refugees from Africa
- Not address intestinal parasites**
- Canada not giving pre-departure prophylaxis?
- Ivermectin and albendazole are special access, not easy to get
- If not do stools, intestinal parasites can persist
- child with FTT from refugee camp, stools negative no parasite..
- FTT treat emphircally?
Management

- Address underlying causes
- Maximize nutrition
- Empiric rx with anti-parasitic (risk)
- Multi-vitamins with iron
In Conclusion

- Refugee children arrive with multiple physical and emotional and social risks
- Early detection and intervention of this risks will have a tremendous impact on their health and long term quality of life
- To enable children and their families to thrive