Medical complications of eating disorders in children and adolescents

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Objectives

1. Understand the main eating disorders in children and adolescents
2. To identify adolescents with eating disorders
3. Be familiar with the general assessment
4. To review the unique medical complications
5. To highlight the new treatments
Why are eating disorders in children and adolescents so important?

- Eating disorders in the pediatric population
  - being identified in younger adolescents (<12 years)
  - clinical presentation is unique
  - the incidence of eating disorders twice that of type II diabetes
  - has significant medical and psychiatric consequences
  - has the highest mortality rate of any psychiatric disorder
  - are 10 X more likely to die than their healthy peers
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Eating Disorders – DSM IV

- Anorexia Nervosa
- Bulimia Nervosa
- Eating Disorder Not Otherwise Specified
Anorexia Nervosa (AN)

- Refuse to maintain body weight
- Intense fear of gaining weight or becoming fat
- Disturbance in the way in which one’s body weight and shape are experienced
- Postmenarchal females, amenorrhea, the absence of at least three consecutive menstrual cycles

- Prevalence 0.5-2.2%
- Bimodal age of onset 14 and 18 years
- Sex ratio F:M = 10:1 (older)
- Sex ratio F:M = 6:1 (younger)
- Mortality 10%
- 3rd most common chronic illness in adolescents girls after obesity and asthma
Bulimia Nervosa (BN)

- Recurrent episodes of binge eating
- Recurrent inappropriate compensatory behaviors
- The binge and inappropriate compensatory behaviors both occur, on average, at least twice a week for 3 months
- Age of onset – adolescence
- Sex ratio F:M ratio 20:1
- Prevalence 2.5% between 13 and 18 years old
- Death risk 9x that expected
Eating disorder not otherwise specified (EDNOS)

- Eating disorder not otherwise specified includes disorders of eating that do not meet the criteria for AN and BN.
- Binge-eating disorder
- Most common ED in children and adolescents
- Prevalence 3-5% of population
- Sex ratio F>M
- Standardized Mortality Ratio is 1.81-2.47
- Just as serious as AN or BN
Diagnostic Challenges

• Young children are affected
• Young boys and adolescent males are affected
• All ethnicities and socio-economic groups affected
• Children should not maintain/lose a small amount of weight
• Children and young adolescents do not experience their body in same way adults do
• Children and young adolescents may not have reached menarche
DSM-5 Development

• Current Diagnoses Updated
  • Anorexia Nervosa ✔
  • Bulimia Nervosa ✔
  • EDNOS
  • Binge Eating Disorder ✔

• Diagnoses be reclassified from Disorder Usually First Diagnosed in Infancy, Childhood, or Adolescence to Eating Disorders:
  • Pica
  • Rumination Disorder
  • Avoidant/Restrictive Food Intake Disorder ✔
Avoidant/Restrictive Food Intake Disorder

- Eating or feeding disturbance as manifested by persistent failure to meet appropriate nutritional and/or energy needs leading to one or more of the following:
  - significant weight loss (or failure to gain weight or faltering growth in children);
  - significant nutritional deficiency;
  - dependence on enteral feeding;
  - marked interference with psychosocial functioning.

- There is no evidence that lack of available food, an associated culturally sanctioned practice, a general medical condition, or a medication side to account alone for the disorder.

- The eating disturbance does not occur exclusively during the course of Anorexia Nervosa or Bulimia Nervosa.

- If the eating disturbance occurs in the context of another mental disorder (e.g., Mental Retardation or a Pervasive Developmental Disorder), it is sufficiently severe to warrant independent clinical attention.
ARFID
(Katzman, Fisher, Rosen, Ornstein, Mammel, Rome, Callahan, Malizio, Kearney, Walsh, 2012)

• Retrospective case-control study
• 7 pediatric eating disorders programs in North America in 2010
• compared all cases 8-18 years of age who met ARFID criteria to random sample of controls with anorexia nervosa (AN) and bulimia nervosa (BN).
• 98/719 (13.6%) met the diagnostic criteria for ARFID.
Children and adolescents with ARFID were

- younger than those with AN (n=98) or BN (n=66), (12.9 vs. 15.6 vs. 16.5 years; p<0.001)
- had a longer duration of illness (30.5 vs. 14.5 vs. 23.5 months; p<0.001)
- % median EBW that was intermediate between those with AN and BN (86.5 vs. 81.0 and 107.5; p<0.001)
- Patients with ARFID are different from AN, BN, and EDNOS
Effects of starvation in children and adolescents

- Leads to serious physical and psychological complications
- Every organ system in the body is affected
Unique effects of starvation on children and adolescents with AN

Unique medical complications

- Linear Growth Impairment
- Pubertal delay/interruption
- Low bone mineral density
- Structural brain changes
- Cognitive deficits
Impact of AN on Growth

- Children and adolescents with AN may present
  - Growth failure or short stature
- Dramatic alteration in the GH-IGF axis
  - High GH and low IGF-1 levels
  - Failure of GH to stimulate IGF-1 production
  - State of growth-hormone resistance
- Indices of growth-hormone normalize with weight recovery
- Studies inconsistent with respect to full growth potential
  - Complete catch-up growth (Swenne, 2005; Prabhakaran, 2008)
  - Some gain in height, but not complete catch-up (Modan-Moses, 2003)
Interruption of Puberty

• Eating disorders have variable impact on puberty
• Prepubertal onset
  • Absence of pubertal development and failure of growth
• Premenarchal onset
  • Causes arrest of pubertal development, which is most severe if weight loss occurs during the early stages of puberty
  • Menarche may be delayed beyond the normal age
• Postpubertal
  • Amenorrhea/irregular menstrual function
AN and Amenorrhea

- Secondary to hypothalamic hypogonadism
  - Low LH, FSH, estradiol
  - Immature LH secretory pattern
LH levels throughout puberty
LH Secretory Pattern in AN

Anorexia nervosa and Secondary Amenorrhea

Boyar et al . NEJM, 1974
Menstrual function and 2° amenorrhea

- Pelvic ultrasound and ovarian and uterine size and morphology
- Regress to a pre-pubertal stage
- Ovaries and uterus are immature in AN
- Ovaries and uterus mature with weight recovery
Ovarian and Uterine Morphology
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Low bone mineral density

- A serious, frequent, and early consequence of AN
- May impose life-long limitations
- Associated with considerable morbidity

Normal bone  Osteoporosis
Background: Adolescence and AN

*Critical window in time to optimize BMD*

![Graph showing peak bone mass during adolescence](image)

- **Bone mineral content**
- **Age**
- **Adolescence**

Peak bone mass
Mechanisms of Low BMD in AN

- Growth hormone resistance
- Low estradiol
- High cortisol
- Low body mass
- Low calcium intake
- Vitamin D deficiency
Adolescent-onset AN and BMD

- > 90% of adolescents with AN have reduced BMD at one or more skeletal site (Grinspoon, 2000)
- Adolescents with AN do not increase their bone mass (Sokya, 2002)
- Low BMD acquired during adolescence may impose life-long increased fracture risk (Lucas, 1999; Johnell, 2005)
Body Weight and BMD in AN

- Weight restoration
  - Body weight is the most important determinant of BMD in AN
  - Especially lean mass
  - Weight gain is associated with increase BMD
- Calcium intake of 1500 mg/d
- Vitamin D 1000 IU/d
- Moderate weight-bearing exercise
  - Weight-restored adolescents
  - In those achieving weight restoration and medically stable
  - Monitor closely and recommend with caution
- HRT in the form of pill DOES NOT prevent or treat low BMD in AN
SECRETS OF THE TEEN BRAIN

Research is revolutionizing our view of the adolescent mind—and explaining its mystifying ways
Brain structure and cognitive function

- Adolescence (Giedd et al, 1999)
  - period of brain and cognitive maturation
  - increases in total white and occipital gray matter volumes between 4-20 years
  - temporal gray-matter volumes increases reaching a maximum at age 16.7 years and then decline
  - starvation in AN may compromise development
Brain structure

- **Acute AN** (*Katzman et al., 1996*)
  - $\uparrow$ Cerebrospinal fluid (CSF) volumes
  - $\downarrow$ Gray and white matter volumes

- **Weight-recovered AN**
  - Gray matter deficits and CSF elevation persisted (*Lambe et al., 1997; Katzman et al., 1996*)
  - Normal volumes (*Swayze et al., 2003; Wagner et al., 2006*)
Cognitive functioning in adolescents with AN

- Deficits have been reported in almost all neuropsychological domains
  - Learning and memory
  - Attention
  - Visuospatial skills
  - Executive functioning
  - Abstraction and use of strategy
Assessment

Could these young people have an eating disorder?
- You’ve seen Sarah, whose foster mother noted that Sarah has missed her menstrual period the past 2 months
- Nathan, who hasn’t been eating as much since an episode of gastroenteritis 2 mo. ago
- David, who has been losing weight since becoming a vegetarian 4 mo. ago
- Shira, who’s finally losing some of that extra weight she’s been carrying around for so many years ~ 25 kg
- Rene, who is 9 years old, has not gained any weight in the last year and “hates” the way her body looks
- And Samantha, whose height is the same as it was a year ago
Is it normal or is it an eating disorder?

- Vegetarianism, food fads
- Transient illness, vomiting, weight loss
- Intentional weight loss in an overweight adolescent
- No significant weight gain on annual physical
- Skipped meals, loss of appetite
- Loss of menses in an athletic adolescent
Assessment

• Clinicians are in a unique position to
  • Detect the onset of incipient eating disorders
  • Stop the progression at the earliest stages
  • History + screen during routine annual health care
  • Physical examination
  • Be aware of diagnostic limitations and changes in DSM-5
Assessment

• Current dietary practices
  • Amounts, food groups, fluids, restrictions
  • Calorie counting, fat gram counting?
  • Scary foods or taboo foods (foods you avoid)?
  • Vegetarian?
  • Any binge eating? Frequency, amounts, triggers
  • Purging / vomiting? frequency, how, how long after meals?
  • Use of diuretics, laxatives, diet pills, ipecac, CAM?

• Weight and Shape Issues
  • Trying to lose weight
  • Fear of fat
  • Does not view oneself as thin, even when underweight
Assessment

- Exercise
  - How much, often, level of intensity? How stressed are you if you miss exercising?

- Menstrual history
  - Last menstrual periods? regular? OCPs? Sexual history?

- Family history
  - Obesity, eating disorders, mental illness?
Assessment

- Increased social isolation
- Excuses not to eat with family
  - “I already ate”
  - “I had dinner when I can home from school”
  - “Not feeling well tonight”
- Irritability
- Wearing bulky clothes
- Interest in food preparation for others
- Going to the bathroom after eating
- Impaired concentration
Examination

- Provide regular monitoring of weight and height
  - Plot weight, height, and BMI on growth curves
  - $\text{BMI} = \frac{\text{weight in kg}}{\text{height in m}^2}$
- Sexual maturity rating = Tanner staging
- Monitor vital signs
  - Orthostatic BP and HR changes, oral temperature
2 to 20 Years: Girls—Stature-for-Age, Weight-for-Age and BMI-for-Age Percentiles

http://www.cdc.gov/nchs/about/major/nhanes/growthcharts/clinical_charts.htm
Examination: Signs/Symptoms of restricting

- Weight loss/failure to make appropriate gains in weight and height
- Hypothermia
- Bradycardia
- Orthostatic pulse and blood pressure
- Dull, thinning scalp hair
- Lanugo hair
- Emaciated
- Flat affect
- Cold extremities, acrocyanosis
- Primary or secondary amenorrhea
Examination: Signs/Symptoms of binging and purging

- Large fluctuations in weight
- No apparent physical signs
- Arrhythmias
- Palatal scratches
- Menstrual irregularities
- Swelling of the parotid glands
- Frequent and unusual dental problems
- Calluses on dorsum of hand – Russell’s sign
Laboratory Assessment

- CBC, electrolytes, LFTs, TSH
- Urinalysis
- BHCG
- FSH, LH, prolactin, estradiol
- ESR
- EKG
- DEXA in those amenorrheic >6 months – 1 year
Should children and adolescents with eating disorders be a treatment priority?

- Eating disorders are one of the most fatal mental health disorders
- The earlier the treatment the better the outcome
- Treatment in adolescence is often successful
- Treatment tends to work in at least 70% of the cases
Treatment

• Kids with eating disorders rarely want treatment
• Often they do not think they have a problem with eating or that they need help
• Often lack insight or understanding of severity or consequences of illness
• Families are the customers
Treatment Goals

- Weight restoration
- Treatment of acute medical complications
- Prevention of long-term medical complications
- Normalization of eating patterns
- Support and engage family in treatment
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Key elements to treatment

- Interdisciplinary team
- Appropriate treatment setting
  - Inpatient
  - Day Treatment
  - Outpatient
  - Residential Treatment
- Expertise in child/adolescent eating disorders
- Aggressive treatment
- Enlist parents/guardians
Recent Advances in Treatment

- No “optimal” treatments for eating disorders in adolescents
- Family-based treatment (Maudsley)
  - treatment of choice for adolescents with AN & BN
  - outpatient treatment
Efficacy of family-based treatment for adolescents with eating disorders: A systematic review and meta-analysis (Couturier et al, 2012)

- FBT vs. individual treatment among adolescents with ED
- Three studies met criteria: allocation concealment, intent-to-treat analysis, assessor blinding, behavioral family therapy compared with an individual therapy, and adolescent age group.
- Outcome = “remission”
- FBT was not significantly different from individual treatment ($z = 1.62, \ p = 0.11$) at the end of treatment.
- FBT was superior to individual treatment ($z = 2.94, \ p < 0.003$) 6 to 12 months after treatment.
Course of the illness

• Mean time to recovery in AN: 7-8 years
  • Recovery occurs at two points
    • First 2 years
    • 6-12 years duration of illness
• Treatment in adolescence results in about 70% full recovery rate in AN
Take Home Points

• Diagnose early
• Starvation in ED causes unique medical complications that may not be reversible
• Newer treatment strategies focus on family-based treatment
• Majority adolescents recover
Toda raba!
Thank you very much!
Fundamental Assumptions of FBT

- Agnostic view of cause of illness (Parents are not to blame)
- Initial focus on symptoms (Pragmatic)
- Parents are responsible for weight restoration (Empowerment)
- Non-authoritarian therapeutic stance (Joining)
- Separation of adolescent and illness (Respect for adolescent)
Fundamental Assumption of FBT

- Heath care professionals are the experts on the eating disorder
- Parents are the experts on their adolescent
Structure of FBT

- Three phases – each highly focused
  - Phase 1- re-feeding/weight restoration-parents encouraged to take charge of helping their adolescent eat
  - Phase 2- assisting parents in helping adolescent take charge of eating on her/his own
  - Phase 3- establishing healthy adolescent identity and development
FBT for Adolescent Eating Disorders

- FBT more effective than individual treatment
- Outpatient treatment
- Short-term as effective as long-term treatment
  - 10 sessions over 6 months vs. 20 sessions over 12 months
- 65%-90% of patients are fully recovered, 5 years post treatment