Eating Disorders: In Children and Adolescents

Michelle Jorgensen MD
Case

- 19 year old male admitted referred to the clinic due to concerns about weight loss and overexercise.
- Holter Monitor showed HR 25 with up to 3 second pause
- Running up to 3 hours daily. Unable to comply with exercise limitations
- Lack of insight into medical illness, came to hospital only under threat of commitment.
Case

- 17 year old female, gymnast, track
- Wanted to “get healthy” cut out red meat, then dietary fats, then carbohydrates
- Lost 15 pounds over 3 months.... increased exercise
- Became bradycardic with frequent near syncope.
- Inpatient at BMI 16.5 (25lb total weight loss)
History of Eating Disorder
Eating Disorders

- Pica
- Rumination Disorder
- **Avoidant/Restrictive Food Intake Disorder**
- Anorexia Nervosa
- Bulimia Nervosa
- Binge Eating Disorder
- Other/Unspecified Feeding or Eating Disorder
15 year old male referred from CPS
Comorbid PTSD – Depression - Anxiety
Very little food intake.
  - Telling staff he has eaten
  - Food in the trash can

Daily reports of stomach/gut pain
Intermittent bloody diarrhea
Avoidant/Restrictive Food Intake Disorder

- Eating/Feeding Disturbance with persistent failure to meet nutritional/energy needs.
  - Weight loss or failure to gain
  - Nutritional deficiency
  - Interference with psychosocial functioning
Case

- 13 year old female premorbid OCD
- Acute weight loss summer 2015 down 25 lbs with restriction of intake overexercise
Anorexia Nervosa

- Restriction of energy intake leading to significantly low weight
- Intense fear of weight gain or becoming fat
- Disturbance of perception of own weight and shape, undue influence of weight and shape on self evaluation. Lack of recognition of seriousness of low weight

- Type
  - Restricting type
  - Binge eating /purging
# BMI Chart

<table>
<thead>
<tr>
<th>HEIGHT in/cm</th>
<th>Underweight</th>
<th>Healthy</th>
<th>Overweight</th>
<th>Obese</th>
<th>Extremely obese</th>
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Anorexia Nervosa: Behavioral Signs

- Restrictive eating
- Odd food rituals
- Fear/avoidance of food situations
- Sudden decision to be vegetarian/vegan
- Rigid exercise rituals
- Dressing in layers
- Refusal to allow others to prepare food
Case #2

18 year old female 10 year history diabetes type one
HgA1C running in 7.4 range with insulin pump.
Spring/summer begins binging and vomiting, with-holding insulin to purge.
A1c 19.3, does not disclose insulin abuse
Develops chronic infection
Fall continues binge/purge, withholding insulin-onset peripheral neuropathy
Admission inpatient EDU.
Bulimia Nervosa

- EKG WAVEFORM

- *** Age and gender specific ECG analysis ***
- Normal sinus rhythm
- ST- T wave abnormality, consider anterior ischemia
- Prolonged QT interval or tu fusion, consider myocardial disease, electrolyte imbalance, or drug effects
- Abnormal ECG

- Ventricular Rate: 76 BPM
- Atrial Rate: 76 BPM
- P-R Interval: 124 ms
- QRS Duration: 88 ms
- Q-T Interval: 528 ms
- QTC Calculation(Bezet): 594 ms
- Calculated P Axis: 66 degrees
- Calculated R Axis: 69 degrees
- Calculated T Axis: 85 degrees
Bulimia Nervosa

- Tests: (1) Comp Panel 14 MCSU (COMSU)
- Sodium 135 mmol/L 135-145 MS
- Potassium [LL] 2.1 mmol/L 3.5-5.3 MS
- Chloride [L] 75 mmol/L 99-110 MS
- Bicarbonate [HH] 54 mmol/L 23-32 MS
- Glucose [H] 105 mg/dL 70-100 MS
- Creatinine 1.1 mg/dL 0.6-1.1 MS
- Glomerular Flt. Rate
  - [L] 58 ml/min >60 MS
- BUN 16 mg/dL 6-22 MS
- Total Bili [L] 0.1 mg/dL 0.2-1.2 MS
- Alk Phos 98 U/L 30-125 MS
- AST 24 U/L 0-33 MS
- Calcium 10.1 mg/dL 8.5-10.2 MS
- Total Protein 7.3 gm/dL 5.5-8.2 MS
- Albumin 3.8 gm/dL 3.5-5.0 MS
- ALT 16 U/L 0-36 MS
Bulimia Nervosa

- Recurrent Episodes of Binge Eating
  - Eating in a discrete period an amount of food that is larger than what other would eat in similar circumstances
  - Sense of lack of control over eating

  Recurrent inappropriate compensatory behaviors
  - vomiting, laxatives, diuretics, fasting, excessive exercise

  Occurs once a week for 3 months
  Self evaluation is unduly influenced by weight and shape
Bulimia Nervosa: Behavioral Signs

- Binge eating
- Eating in secret
- Avoidance of social situations with food
- Bathroom visits after meals
- Long showers after meals
- Missing food
- Food wrappers/packing in bedroom
- Diet pills/laxative/diurectics
- Rigid/intense exercise
Binge Eating Disorder

- Binge Eating
- Lack of control
- 3 or more of the following
  - Eating more rapidly
  - Eating until feeling uncomfortably full
  - Eating large amounts when not physically hungry
  - Eating alone because of feeling embarrassed about how much one is eating
  - Feeling disgusted with oneself, depressed, or very guilty afterwards
- Marked distress about binge eating
Prevalence of behaviors in Eating Disorders

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Prevalence</th>
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<tbody>
<tr>
<td>Vomiting</td>
<td>90%</td>
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<tr>
<td>Laxatives</td>
<td>60%</td>
</tr>
<tr>
<td>Diet Pills</td>
<td>50%</td>
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<tr>
<td>Fasting</td>
<td>40%</td>
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<tr>
<td>Rumination</td>
<td>30%</td>
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<tr>
<td>Chew and Spit</td>
<td>20%</td>
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<tr>
<td>Diuretics</td>
<td>15%</td>
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<tr>
<td>Ipecac</td>
<td>8%</td>
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<tr>
<td>Enemas</td>
<td>7%</td>
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<tr>
<td>Saunas</td>
<td>5%</td>
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<tr>
<td>Water Loading</td>
<td>30%</td>
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Epidemiology

- Prevalence in National Comorbidity Study US
  - 0.3 Anorexia Nervosa (no sex difference)
  - 0.9 Bulimia Nervosa (0.5 male/female 1.3)
  - 1.6 BED (0.8 male/2.3 female)
- Mean age of onset 12
- 3 in 100000 < 13 British Pediatric Surveillance Study
- Disordered Eating 14-22% American and German surveillance studies
Risk Factors

- Gender
- Race/Socioeconomic Status
- Family History/Genetics
- Societal Emphasis on Thinness
- Personality characteristics
- Perinatal factors
- Early Eating behaviors
- Dieting
- High risk activities
- Media
Do you make yourself **Sick** because you feel uncomfortably full?

Do you worry you have lost **Control** over how much you eat?

Have you recently lost more than **One stone** (14 lbs) in a 3 month period?

Do you believe yourself to be **Fat** when others say you are too thin?

Would you say that **Food** dominates your life?

*One point for every "yes"; a score of 2 indicates a likely case of anorexia nervosa or bulimia*
References

Initial workup

- Low Weight (BMI 18.5 or less, significant drop on growth curve)
  - Comprehensive Metabolic Profile
  - Magnesium
  - Phosphorus
  - TSH
  - Sedimentation rate
  - Vitamin B 12
  - Complete Blood Count
  - Electrocardiogram
  - Urine Drug Screen
  - Urinalysis with Culture
  - Urine Pregnancy
  - If BMI < 16 add Complement 3 and fasting thiamine level
Outcome-AN

- 50-70% of adolescents will recover
- 20% improve
- 10-20% are chronic (Steinhausen, 2002)
- 5-7 year course common
- 1/3 relapse following initial hospitalization
- 5.6% mortality rate per decade of illness
- Low mortality rate for adolescents
Initial Workup - Purging

- Complete Metabolic Panel
- Complete Blood Count
- Amylase level/ fractionated amylase
- Phosphorus
- Magnesium
- Electrocardiogram
- Urine Drug Screen
- Urine Pregnancy
Outcome-BN

- 35-75% recovery rate
- 1/3 will relapse within 1-2 years of recovery
- Negative prognostic factors
  - Low self esteem
  - Longer duration of illness
  - Higher frequency/severity of binge eating
  - Substance abuse history
  - Obesity history
Sign and Symptoms Bulimia Nervosa

- Russell’s sign
- Enlarged salivary glands
- Dental complications
  - erosions on upper teeth
  - predisposition to cavities
  - temperature sensitivity
  - Fillings above surface of teeth (due to erosion)
Russell’s Sign
Parotiditis
Treatment - sialandenosis

- Stop Purging
- NSAIDS
- Hot Compress
- Tart candies – Altoid sours
- Antibiotics – if evidence of infection
- Pilocarpine 1.25 to 5 mg daily in TID doses
- Parotidectomy
Enamel Erosion
Dental Care -- Vomiting

- Routine Cares (brushing)
- Alkalinize Mouth
- Baking soda
- pH neutral mouthwash
Signs and Symptoms of Anorexia Nervosa

- Acrodermatitis
- Hypercarotenemia
- Acrocyanosis
- Muscles Wasting
- Lanugo
Acrodermatitis
Hypercarotenemia
acrocyanosis
Muscle Wasting
Lanugo
Brain Effects

- Pseudoatrophy – enlargement of cerebral spinal fluid spaces. Partly reversible with refeeding
- Reduced seizure threshold - electrolyte disturbance
- Cerebral hypoperfusion - reduced blood flow
Cardiovascular (Heart) Complications

Structural changes – decreased cardiac mass and mitral valve prolapse
Rhythm Changes – QTc Prolongation
Slow Heart Rate (Bradycardia)
Sudden Cardiac Death
Functional Abnormalities

- Decreased cardiac contractility with lower ejection fraction
- Decreased exercise capacity with blunted blood pressure response
- Orthostatic Hypotension
- Hypotension
# Cardiovascular

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<td>Bradycardia</td>
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<tr>
<td>Tachycardia</td>
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<tr>
<td>Hypotension</td>
<td>+ +</td>
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<tr>
<td>Arrhythmias</td>
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<tr>
<td>Mitral Valve Prolapse</td>
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<tr>
<td>Myopathy</td>
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Treatment Cardiac complications

- EKG
- Telemetry for HR < 40 or QTc > 440
- HR < 30 overnight waken
- Encourage fluid
- Liberal salting
# Neuroendocrine

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<td>LH/FSH</td>
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Bone

- Osteopenia/Osteoporosis
- Growth Retardation
Osteopenia/Osteoporosis

- Seen in over 60% of AN patients and many patients with past history of AN
- Starts within 6 months of weight loss
Osteoporosus Dx

- Dexa Scan lumbar spine and hip when reach goal weight.
Treatment Osteopenia/porosus

- Oral contraceptives
  - No difference in bone mass from controls
  - Small subset of patients have no further loss
  - Not recommended to treat amenorrhea
- Bisphosphonates
  - No significant improvement
  - Increase fetal anomalies in future pregnancies
- Calcium
- Weight bearing Activity
## Gastrointestinal

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<td>Sialoddenosis</td>
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<tr>
<td>Esophageal Rupture</td>
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<tr>
<td>Delayed Gastric Emptying</td>
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Gastric Motility/Fullness

- Erythromycin 250mg to 500mg TID
- Metoclopramide 5 to 10mg TID
- Prochlorperazine 5 to 10 mg TID
- Ondansetron 8mg daily
- Omeprazole 20mg BID
- Simethicone 180mg TID
Bowel Regimen

- Psyllium Fiber twice daily/Power Pudding QID
- Colace 200mg BID
- Miralax 17gm in 8 oz fluid QID (miralax bomb)
- Magnesium Hydroxide 2400 mg daily
- Lactulose 30ml QID
- Fleets Enema
- Course of GoLytely
Power Pudding*
½ cup prune juice
½ cup applesauce
½ cup wheat bran flakes
½ cup whipped topping
½ cup prunes (canned, stewed prunes)
Blend all ingredients, cover, and refrigerate up to one week. Take ¼ cup daily with breakfast.
### Renal

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Hepatic

- Refeeding hepatitis
ELECTROLYTES

- DEHYDRATION
  - dizzy, lightheaded, weak

- HYPOKALEMIA
  - generalized weakness, reduced gut motility, cardiac arrhythmia

- HYPOPHOSPHATEMIA
  - muscle weakness, fatigue, congestive heart failure, respiratory failure

- HYPOMAGNESESEMIA
  - Muscle cramp, weakness, unfocused vision, impaired short term memory, heart arrhythmias

- HYPOGLYCEMIA
  - Seizure, Stupor, Coma
Replacement

- Potassium
- Phosphorus
- Magnesium
- Glucose
Vitamin Regimen

- Calcium citrate 350 to 500mg plus D TID
- Vitamin D 1000 IU (total daily dose 2000mg)
- Omega 3 FA 2000 to 3000mg daily
- MVI with minerals
- Vitamin D complex daily
- Magnesium Oxide 500mg daily
- Zinc sulfate 220mg or zinc gluconate 50mg
- Thiamine 100 mcg daily
- Folic acid 1 mg daily
- Vitamin C 500mg daily
Refeeding Edema

- Elevate feet
- TED hose
- Increase protein content
- Very conservatively use spironolactone
Hematology

- Hemoconcentration
- Hemolytic anemia secondary to hypophosphatemia
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<tr>
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<tr>
<td><strong>Bone marrow hypoplasia</strong></td>
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Permanent Sequellae

- Dental Enamel
- Growth Retardation
- Bone Demineralization
- CNS Changes?
- Other?
Fatalities

**Anorexia Nervosa**

- Suicide
- Multiple organ system failure
- Arrhythmias
- Fluid/Electrolytes
- Refeeding Heart Failure
- Hypophosphatamia
- Hypomagnesemia
- Ipecac
- Renal Failure
Fatalities

Bulimia Nervosa

- Suicide
- Gastric Rupture
- Esophageal rupture
- Fluid / Electrolyte
- Ipecac
- Renal Failure
Athletes and Eating Disorders

- Higher incidence in sports with emphasis on body size, weight, and appearance
  - gymnastics, dance, track and field, wrestling
- Exercise can exacerbate symptoms
- Eating Disorder can interfere with performance
Female Athlete Triad

  
  1. If the cause of low EA is inadvertent undereating, then referral for nutritional education is sufficient. Nutritional education should ideally include a sports dietitian, particularly a Board Certified Specialist in Sports Dietetics (CSSD). An exercise physiologist can also complete an assessment of energy expenditure and EA.

  2. If the cause for low EA is disordered eating (DE), the referral should be to a physician, and for nutritional counseling with a sports dietitian.

  3. If the cause for low EA is intentional weight loss without DE, then referral for nutritional education is sufficient.

  4. If the cause for low EA involves clinical eating disorder (ED), treatment should include evaluation and management with a physician, nutritional counseling with a sports RD and referral to a mental health practitioner for psychological treatment. In this case, the reversal of low EA will not be possible without psychological treatment.
Guidelines for eating disorder in sports

- [International Olympic Committee Female Athlete Triad Guidance](#)
- [NCAA guidance for eating disorders](#)
Eating Disorder Treatment Team

- Family – Parents/Child/Siblings
- Primary Care Provider
- Psychologist/Therapist
- Dietician
- Psychiatrist as needed
- School
- Daycare/Extended family
Nutrition Treatment

- Nutrition Assessment – Child and Family both
- Start where child is at (might be 600 calories a day)
- Increase 300 calories Q 3 days
- 3 meals 3 snacks a day
- Goal \( \frac{1}{2} \) to 1 lb increase per week (outpatient
- Monitor for refeeding syndrome
Therapeutic Treatments

- Family Based Treatment
  No evidence in child and adolescent population
  - Cognitive Behavioral Therapy
  - Individual Psychotherapy
  - Cognitive Remediation Therapy
  - Motivation Enhancement
Psychopharm in AN

- SSRI – NO EVIDENCE it is helpful in AN (in children or in adults)

- SNRI – NO EVIDENCE it is helpful in AN (children or adults)

- Atypical Antipsychotics
  - Olanzepine – case studies – decrease agitation and anxiety
  - Risperidol – case studies plus antidepressant improve anxiety and weight gain
Psychopharm of AN

- Bone Health
- Oral contraceptives – DO NOT IMPROVE bone health
- Bisphosphonates – risk of fetal anomalie in all future pregnancies
- Transdermal estrogen – beginning evidence
Therapy in Bulimia

- CBT plus Fluoxetine
- CBT individual or groups
- Light Therapy
- Self Help/Guided Self Help
Psychopharm in BN

- Fluoxetine 60mg daily - decreases binge eating and purging.
- Single study medications (in adults)
  - Fluvoxamine 182mg daily - decreases urges to binge and purge (high dropout in study)
  - Trazadone 400mg - decreases frequency of binge/purge
  - Topiramate 100mg - decreases number days per month binge/purge. Decreases body dissatisfaction
• 5HT3 antagonist - decrease binge purge behaviors. Decreases amount of time spent in a binge. (in adults)
References

• Lock and LaGrange. Treatment Manual for Anorexia Nervosa - A family Based Approach or Help your Teenager Beat and Eating Disorder
• Cognitive Behavior Therapy for Eating Disorders – Christopher Fairburne

• International Academy of Eating Disorders. www.aedweb.org
• National Association for Eating Disorders (NEDA)
• www.nationaleatingdisorders.org
Eating Disorders: Levels of Treatment

- Outpatient
- Intensive outpatient –
- Partial hospitalization Inpatient hospitalization
- Residential treatment – AEDWEB.org