Guidelines for Evaluating and Treating Children and Adolescents with Eating Disorders

UNC Division of General Pediatrics and Adolescent Medicine

Created 2004 by Eliana Perrin, MD, MPH, Associate Professor
Updated in part 2012 by Kristen Rogers, MD, Pediatrics Resident
Background and Introduction

These guidelines have been written to assist UNC and community physicians and personnel in caring for the medical needs of children and adolescents with eating disorders.

These guidelines discuss the approach to both the outpatient and inpatient evaluation and treatment of these patients.

We hope these guidelines will be helpful!

To Pediatricians:

There are three potential scenarios during which you may become involved:

- Evaluating a patient in the ER or outpatient clinic for potential admission.
- Coordinating a patient’s care in the outpatient or inpatient setting.
- Transfer of a patient in the psychiatry-based eating disorders unit (EDU) to a medical pediatrics floor in the event of worsening medical status. The patient will need to be formally discharged from psychiatry and readmitted to pediatrics in this situation. The parents will need to be notified and consent obtained.

To Psychiatrists:

These guidelines can be helpful for determining which medical situations may warrant an inpatient pediatrics consult.

- Please page the Pediatric Admitting Officer (PAO) at 216-8160 for all inpatient pediatric consults. Consults are available 24/7.
- During weekday daytime hours the Pediatric Chief Residents may be of some assistance and can be reached via phone at 966-3172.
- For consults regarding abnormal EKGs without other medical problems, please page the Pediatric Cardiology Attending on call via WebXchange for an expedited EKG interpretation.

When calls come in about patients with eating disorders in the outpatient setting:

- If the patient qualifies for admission to the psychiatry-based eating disorders unit (EDU) but not for admission to the Pediatrics Unit: call Dr. La Via and discuss patient with her (see page 4 for Dr. La Via’s contact information).
- If unsure of the patient’s disposition: call the UNC Pediatric Continuity Clinic (966-6669) and make a same day appointment with whichever resident is available.
- If the patient shows up in Emergency Room the physicians there should follow guidelines and do a complete history and physical exam as well as draw appropriate labs. Disposition is same as above.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Background Information</td>
<td>4-6</td>
</tr>
<tr>
<td>• Location of Inpatient Unit; Names of Contact People</td>
<td>4</td>
</tr>
<tr>
<td>• Diagnostic Criteria</td>
<td>5-6</td>
</tr>
<tr>
<td>• Epidemiology, Mortality Estimate</td>
<td>7</td>
</tr>
<tr>
<td>II. Outpatient Evaluation and Treatment</td>
<td>7-13</td>
</tr>
<tr>
<td>• History/Associated Features</td>
<td>7-8</td>
</tr>
<tr>
<td>• Physical Exam</td>
<td>9</td>
</tr>
<tr>
<td>• Laboratory Tests</td>
<td>10</td>
</tr>
<tr>
<td>• Differential Diagnosis</td>
<td>10</td>
</tr>
<tr>
<td>• Initial Evaluation</td>
<td>11</td>
</tr>
<tr>
<td>• Routine Medical Monitoring</td>
<td>12-13</td>
</tr>
<tr>
<td>III. Inpatient Guidelines</td>
<td>14-19</td>
</tr>
<tr>
<td>• Admission Criteria</td>
<td>14</td>
</tr>
<tr>
<td>• Suggested Admission Orders</td>
<td>15-16</td>
</tr>
<tr>
<td>• Consulting, Admitting, Transferring to Pediatrics</td>
<td>17</td>
</tr>
<tr>
<td>• Nutritional Rehabilitation</td>
<td>18</td>
</tr>
<tr>
<td>Appendices:</td>
<td>A-C</td>
</tr>
<tr>
<td>Commonly used Equations</td>
<td>A</td>
</tr>
<tr>
<td>Medical Complications of Eating Disorders</td>
<td>B</td>
</tr>
<tr>
<td>Labs (expected results with eating disorders)</td>
<td>C</td>
</tr>
</tbody>
</table>
Chapter I: Background Information

The UNC Eating Disorders Program (EDU) has an inpatient facility located on 5th floor of the North Carolina Neurosciences Hospital. It has 10 beds dedicated solely to the treatment of children and adolescents with eating disorders. More information is available on their website http://www.psychiatry.unc.edu/eatingdisorders. Below is a listing of some of the UNC Eating Disorders Program staff.

<table>
<thead>
<tr>
<th>Staff Member</th>
<th>Role</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-take Coordinator</td>
<td>Admission/questions</td>
<td>(phone) 966-7012</td>
</tr>
<tr>
<td>Cynthia Bulik, PhD</td>
<td>Director</td>
<td>(phone) 843-1689</td>
</tr>
<tr>
<td>Maria La Via, MD</td>
<td>Inpatient Attending</td>
<td>(phone) 966-9609</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(pager) 216-3517</td>
</tr>
<tr>
<td>Jennifer Richards, MD, MBA</td>
<td>Inpatient Psychiatrist</td>
<td>(phone) 966-8485</td>
</tr>
<tr>
<td>Maureen Dymek-Valentine, PhD</td>
<td>Chief Psychologist</td>
<td>(phone) 966-5161</td>
</tr>
<tr>
<td>Laurie Conteh, MS, RD, LDN</td>
<td>Dietician</td>
<td>(phone) 966-8857</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(pager) 123-2026</td>
</tr>
<tr>
<td>Connie Culbreth, LCSW</td>
<td>Social Worker</td>
<td>(phone) 966-0181</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(pager) 123-1702</td>
</tr>
</tbody>
</table>

Medical Consults/Transfers to Pediatrics for Patients in the EDU:

<table>
<thead>
<tr>
<th>Staff Member</th>
<th>Role</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peds Admittion Officer (PAO)</td>
<td>New consults/transfers</td>
<td>(pager) 216-8160</td>
</tr>
<tr>
<td>Peds Chief Residents</td>
<td>Additional assistance</td>
<td>(phone) 966-3172</td>
</tr>
</tbody>
</table>
1. Diagnostic Criteria from the DSM-IV-TR (1):
Anorexia Nervosa (AN)

- Refusal to maintain body weight at or above a minimally normal weight for age and height (i.e., less than 85% Expected Body Weight – see Appendix A). This can be from weight loss or from failure to gain adequate weight during a period of growth.
- Intense fear of gaining weight or becoming fat, even though underweight.
- Disturbance in the way in which one’s body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight
- The presence of amenorrhea in postmenarcheal females (i.e., the absence of three or more consecutive menstrual periods). A post-menarcheal female is also considered to have amenorrhea if her menstrual periods only occur following hormone administration, (i.e., estrogen and progesterone).

Types
Restricting Type: During the episode of AN, the patient engages in severe caloric restriction (e.g., dieting, fasting, and excessive exercise). However the patient does not engage in binge-eating/purging behaviors (e.g., self-induced vomiting or the misuse of laxatives, diuretics, or enemas).

Binge-Eating/Purging Type: During the current episode of AN, the patient engages in both severe caloric restriction and binge-eating/purging behaviors.

Bulimia Nervosa (BN)

- Rather than restriction, the patient engages in recurrent episodes of binge-eating. An episode of binge-eating is characterized by both of the following:
  1. Eating, in a discrete period of time (e.g. within any 2 hour period), an amount of food that is definitely larger than most people would eat during a similar period of time or under similar circumstances.
  2. A sense of lack of control over eating during the episode (e.g. a feeling that one cannot stop eating or control what or how much one is eating).
- Recurrent, inappropriate compensatory behaviors in order to prevent weight gain (e.g., self-induced vomiting; misuse of laxatives, diuretics, enemas, or other medications; fasting; or excessive exercise).
- The binge-eating and inappropriate compensatory behaviors both occur, on average, at least twice a week for three months.
- Self-evaluation is unduly influenced by body shape and weight.
- The disturbance does not occur exclusively during episodes of AN.

Types:
Purging Type: During the current episode of BN, the patient has regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas.
Non-Purging Type: During the current episode of BN, the patient has used other inappropriate compensatory behaviors, such as fasting or excessive exercise, but has not regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas.

Note: These patients tend to be of normal weight or even overweight with intact menses.
1. Diagnostic Criteria from the DSM-IV-TR (continued) (1):

**Eating Disorder Not Otherwise Specified**
- All criteria for AN are met except that the patient has normal menses.
- All criteria for AN are met except that despite significant weight loss, the patient’s weight remains in the normal range (i.e., greater than 85% Expected Body Weight).
- All criteria for BN are met except that binge-eating and inappropriate compensatory behaviors occur less frequently than twice per week or for less than three months.
- The patient is of normal body weight (i.e., greater than 85% Expected Body Weight) but regularly engages in inappropriate compensatory behavior after eating small or normal amounts of food (e.g., self-induced vomiting after eating two cookies).

2. Epidemiology of Eating Disorders in the United States
   Eating disorders affect not only Caucasian female adolescents and adults, but also males, children, and minority populations. Males now account for 5-10% of all patients with eating disorders. An analysis by the Agency for Healthcare Research and Quality revealed that between 1999 and 2006, hospitalization rates for eating disorders increased the most (by 119%) for children less than 12 years of age. There is also an increasing number of patients with disordered eating who do not meet diagnostic criteria for AN or BN and are diagnosed with Eating Disorder Not Otherwise Specified. These patients often suffer the same physical and psychological sequelae as those diagnosed with AN or BN. Of all adolescent girls in the US, 0.5% are estimated to meet diagnostic criteria for AN and 1-2% are estimated to meet diagnostic criteria for BN. In contrast, the prevalence of Eating Disorder NOS is between 0.8% and 14%, depending on the definition used (2).

3. Mortality and Morbidity of Eating Disorders
- The mortality rate among patients of all ages with anorexia nervosa is 4.0%. For bulimia nervosa it is 3.9%, and for eating disorder not otherwise specified it is 5.2% (3). These deaths are attributable to complications of starvation or to suicide. Death from suicide is 50 times more likely in patients with AN than in the general population. Between 25% and 35% of patients with BN endorse at least one suicide attempt (2).
- Medical complications of eating disorders are frequent and lead to significant morbidity (see Appendix B).
- A review of 119 study series containing 5,590 patients with anorexia nervosa revealed that among the survivors, less than half recovered fully, one-third improved, and one-fifth remained chronically ill (4). Poorer outcomes have been associated with older age at onset, longer duration of illness, lower minimum weight, and lower percent body fat after weight restoration (5) (6).
Chapter Two: Outpatient Evaluation

The differential diagnosis of weight loss in children and adolescents is broad. Serious medical conditions involving weight loss can be misdiagnosed as eating disorders. For example, persistent CNS or GI symptoms may suggest other underlying etiologies.

A. Taking the History: Remember to ask open-ended questions. The following list is adapted from Table 2 of the November 2010 AAP Policy Statement on Identification and Management of Eating Disorders in Children and Adolescents (2)

Weight:
- Most patient has ever weighed? Height and age at that time?
- Least patient has weighed in the past year? Height at that time? When was that?
- What weight does the patient think would be the healthiest for him/herself?
- What weight does the patient desire to be at?

Exercise:
- How often? How long? Type of exercise?
- How anxious or stressed does the patient feel if s/he misses exercising?

Eating habits:
- How many meals and snacks per day? Obtain a 24 hour dietary history. Portion sizes?
- Restricted foods? Why? Picky eater? Recent vegetarianism or veganism?
- Excessive non-caloric fluid intake?
- Calorie counting? Fat-gram counting? Carbohydrate counting?
- Recipe collecting? Excessive cooking? Monitoring what others eat?
- Binge-eating? Frequency? Triggers?

Elimination habits:
  Timing/ relation to eating?
- Stooling frequency? Constipation? Diarrhea?

Menstrual history:
- Age at menarche?
- Last menstrual period?
- Regularity of cycles?

Substance use:
- Diet pills?
- Caffeine? Stimulants?
- Anabolic steroids?
- Tobacco, drugs, alcohol?
Previous psychiatric history:
- Previous diagnoses?
- History of physical, sexual, or emotional abuse? History of neglect by caregiver?
- Any previous therapy? What for? When? Type and duration? Helpful? Why or why not?

Activities:
- Use of websites or other media that is pro-eating disorders?
- Friends? Isolation?
- Shoplifting? Sexual impulsivity? Impulsive spending?

Review of Systems:
- Fatigue, dizziness, presyncope, syncope?
- Pallor, easy bruising or bleeding?
- Cold intolerance? Cold hands and feet?
- Palpitations, chest pain, shortness of breath, exercise intolerance?
- Hair loss, lanugo, dry skin?
- Anorexia, fullness, bloating, abdominal pain?
- Vomiting, gastroesophageal reflux?
- Change in bowel habits, constipation, diarrhea, blood in stool?
- Weakness, muscle cramps?
- Menstrual irregularities?
- Sadness, hopelessness, isolation, anhedonia, suicidality/attempts, self-injurious behavior, cognitive/memory impairment?
- Anxiety, restlessness, ritualistic or repetitive behavior?

Family History:
- Obesity? Eating disorders?
- Mental illness? Depression? Anxiety? OCD? Substance abuse?

**Common Associated Features of Anorexia Nervosa (Co-Morbidities)**
- Anxiety, depressed mood
- Social withdrawal
- Irritability
- Insomnia
- Decreased interest in sex
- OCD features (i.e. collecting recipes and COOKING, compulsive weighing, rituals)
- Perfectionism
- Feelings of ineffectiveness
- Strong need for control
- Inflexible/rigid thinking
- Overly restrained initiative and emotional expression
B. Outpatient Evaluation: Physical Exam

**Vital Signs:** Orthostasis (see Appendix A), hypotension, bradycardia, and hypothermia may signify serious medical issues. People respond slightly differently to the same level of starvation. Although weight loss and dehydration may both be present, weight loss is the more likely cause of altered vital signs. Vital signs can help to differentiate eating disorders from other medical conditions that result in weight loss (e.g. hyperthyroidism results in acute weight loss and tachycardia, whereas AN results in bradycardia).

- **Weight** – Measure in a gown only after voiding and collecting the urine. Make sure patient is not hiding extra weights. Use same scale each time.
- **Height** – Needed in order to calculate Expected Body Weight and BMI.
- **BMI** – refer to Appendix A
- **Expected Body Weight** – refer to Appendix A

**Physical Exam Checklist:** May be helpful to complete for every outpatient evaluation.

<table>
<thead>
<tr>
<th>Vital Signs</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td></td>
</tr>
<tr>
<td>HR Orthostasis (HR increased by 20 or more beats per minute on standing)</td>
<td></td>
</tr>
<tr>
<td>BP</td>
<td></td>
</tr>
<tr>
<td>BP Orthostasis (BP decreased by 10 or more mmHg on standing)</td>
<td></td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td></td>
</tr>
<tr>
<td>Actual Weight (kg)</td>
<td></td>
</tr>
<tr>
<td>Actual Height (cm)</td>
<td></td>
</tr>
<tr>
<td>Actual BMI</td>
<td></td>
</tr>
<tr>
<td>% Expected Body Weight</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Common Findings for AN and BN</strong></th>
<th>Yes or No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrocyanosis (bluish hue to hands or feet)?</td>
<td></td>
</tr>
<tr>
<td>Sinus bradycardia or other arrhythmia?</td>
<td></td>
</tr>
<tr>
<td>Loss of muscle mass?</td>
<td></td>
</tr>
<tr>
<td>Emaciation? Facial wasting?</td>
<td></td>
</tr>
<tr>
<td>Edema?</td>
<td></td>
</tr>
<tr>
<td>Carotenemia (orange hue of skin, especially palms and soles)?</td>
<td></td>
</tr>
<tr>
<td>Dull/brittle hair or nails?</td>
<td></td>
</tr>
<tr>
<td>Lanugo (fine hair covering cheeks, trunk)?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Additional Findings for AN and BN Purging Type</strong></th>
<th>Yes or No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bruises/scratches on palate and posterior pharynx</td>
<td></td>
</tr>
<tr>
<td>Sub-conjunctival hemorrhage from vomiting</td>
<td></td>
</tr>
<tr>
<td>Salivary/parotid gland enlargement</td>
<td></td>
</tr>
<tr>
<td>Dental enamel erosion (esp. on lingual surface of upper teeth), increased caries</td>
<td></td>
</tr>
<tr>
<td>Callouses on knuckles – “Russell sign”</td>
<td></td>
</tr>
</tbody>
</table>
C. Outpatient Evaluation: Laboratory Tests
Labs may not be necessary if the patient is medically stable, the weight loss is accounted for by assessment, and the dietary restriction is not severe. However, some/all of the following are usually indicated. Note that of all the lab tests, an elevated ESR is most indicative of a diagnosis other than eating disorder.

- Initial: CBC, ESR, TSH/free T4, UA, urine pregnancy test, stool for occult blood
- If GI symptoms are present: LFTs, amylase and lipase, celiac disease screening
- If amenorrhea is present: LH, FSH, prolactin, estradiol
- If purging behaviors or complications of severe malnutrition are present: Chem 10, total protein, albumin, EKG (including QTc – see Appendix A)
- See Appendix C for lab value interpretation

D. Outpatient Evaluation: Differential Diagnosis of Weight Loss (2)
Fear of any weight gain (or extra calories/fat) is a sensitive indicator of an eating disorder

Medical Differential Diagnosis of Weight Loss
- Gastrointestinal – malabsorption, inflammatory bowel disease, celiac disease, peptic ulcer disease, tumors, achalasia (pain on swallowing)
- Infections – acute (e.g., tape worm) or chronic (e.g., HIV, TB)
- Endocrine – hyperthyroidism (use heart rate to help distinguish), diabetes mellitus, addison’s disease, hypopituitarism
- CNS – hypothalamic or other CNS tumor
- Oncologic – any malignancy

Psychiatric Differential Diagnosis for Weight Loss
- Depression
- Conversion disorder
- Schizophrenia – delusions of food contamination
- Psychogenic dysphagia
- Drug use – amphetamines, cocaine
- OCD – patients may take an extraordinary amount of time to eat and lose weight because of germ fears or other OCD concerns
E. Outpatient Evaluation (continued):

Initial Evaluation

- Arrange a psychiatric and nutritional evaluation. Convey this message to the patient:
  - This is an unhealthy weight/behavior. Weight/behavior has to stop, and we have to develop a plan to help you with this. I understand this will be difficult for you, but we will work with a team of people (mental health & nutrition) that will help.
  - It will take time and hard work. There is no quick fix. But you can do this. Seeing a mental health professional and nutritionist is NOT negotiable.
  - The psychiatrist may suggest medication, and I strongly support their recommendations because it may help you get through this.

- Begin treating micronutrient and calcium/vitamin D deficiencies:
  - Start a Multivitamin 1 po daily
  - Start a Calcium/Vitamin D supplement. Should be taken separately from Multivitamin to maximize absorption. May also need to be taken separately from patient’s other medications. The AAP and Society for Adolescent Medicine recommend daily intake of 1500mg Calcium with 800 IU Vitamin D (via food and supplements) for children and adolescents ages 9 to 18 years to achieve peak bone mass.

Routine Medical Monitoring

- Frequency of follow up depends on how patient is doing.
- At every visit obtain an accurate weight & vital signs.
  - Have patient void before weighing. Check the urine specific gravity. If <1.010 this suggests water-loading to increase weight. If >1.020 this suggests dehydration. A pH of 8-9 suggests vomiting.
  - Weigh patient in 1 or 2 gowns only. Use same scale every time. Staff should show neutral response to weight gain/loss.
  - Obtain an orthostatic BP/pulse (see Appendix A).
  - Take temperature orally.
- Screen for new medical symptoms.
- Screen for new arrhythmia risk factors (syncope, palpitations, purging, amphetamines).
- Focused exam: new symptoms, CV, abdomen, extremities for perfusion/edema
  - A distended bladder suggests urinary retention to increase weight
- Check electrolytes each week patient is losing weight or has signs of dehydration
- Confirm patient is seeing mental health/nutrition.
- Respond to weight based on plan developed by team using a behavioral approach.
F. Outpatient Treatment (continued)

**Weight Milestones**
- 75% EBW – Below this weight a patient must be hospitalized
- Exercise Weight – Below this weight casual walking required for daily activities only. Above this weight patients who want to exercise will generally tolerate gradually increasing aerobic activity to a maximum of 30 minutes twice daily.
- Target Weight – Goal weight considered medically "safe". Weight at which hormonal function generally returns to normal, menses resumes, and osteopenic bones begin to repair.

**Chronic Management Issues**
- Approximately 30% of female patients with AN have some degree of osteopenia due to a hypo-estrogenic state. Severity is correlated to the degree of weight loss and duration of amenorrhea. Restoration of weight and resumption of menses are crucial for regaining lost bone mineral density and preventing ongoing losses. Ensure daily intake of 1500 mg calcium and 800 IU Vitamin D (via supplements and food). DEXA is indicated to measure baseline bone mineral density if amenorrhea has been present for six months. DEXA should be repeated every two years that amenorrhea persists. Estrogen replacement can restore menses but has not been shown to reliably improve bone mineral density. Estrogen replacement should never be used in place of nutritional therapy to naturally restore weight and menses. Limit activities that increase risk for fractures if osteopenia is documented (7).
- Advise: Do not drop out of psychotherapy too early!
- Follow q 3-6 months for 1-2 years after achieves target weight.
## F. Outpatient Treatment (continued)

### Levels of Outpatient Treatment (8)

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
<th>Indications</th>
</tr>
</thead>
</table>
| **Outpatient**         | Weekly        | • Motivated and cooperative  
                          • Self-sufficient in terms of weight gain  
                          • Uses self-control to manage exercise/purging  
                          • Family supportive  
                          • Located near home |
| **Intensive outpatient** | 2-3 hr daily  | • Fairly motivated and cooperative  
                          • Needs some structure for weight gain and managing exercise/purging  
                          • Family at least somewhat supportive  
                          • Located near home |
| **Partial hospitalization** | 6 hr daily    | • Intrusive/obsessive thoughts occur 2-3hr daily and interfere with motivation/cooperation  
                          • Needs increased structure for weight gain and managing exercise/purging  
                          • Family at least somewhat supportive  
                          • Located near home |
| **Residential**        | Live in       | • Intrusive/obsessive thoughts occur 4-6hr daily and significantly interfere with motivation/cooperation  
                          • Needs direct supervision during and between meals or else will restrict intake  
                          • Needs significant support from others to manage exercise/purging  
                          • Severe family conflict or lives alone  
                          • Located far from home |
1. Criteria for Admission
The following list is adapted from Table 7 of the November 2010 AAP Policy Statement on Identification and Management of Eating Disorders in Children and Adolescents (2)

- Failure to respond to appropriate outpatient management
- Less than 75% EBW
- BMI of 13 or less
- Absolute refusal to eat
- Temperature less than 96°F or 36°C
- Heart rate less than 50 (daytime) or less than 45 (nighttime)
- Systolic blood pressure less than 90mmHg
- Orthostasis (HR increase by 20 bpm, SBP or DBP decrease by 10 mmHg on standing)
- Arrhythmia, including prolonged QTc (0.45 or greater)
- Syncope
- Significant dehydration (low urinary output, poor perfusion)

Additional admission criteria that may be present in Bulimia Nervosa:
- Serum potassium less than 3.2mmol/L
- Serum chloride less than 88 mmol/L
- Esophageal tears
- Intractable vomiting
- Uninterruptable binge-purge cycle
- Hematemesis
- Laxative detoxification
- Suicide risk (admit to Psychiatry if no other medical complications)
- Pregnant (admit to ObGyn)

The following require Telemetry:
- Syncope within the last week
- Prolonged QTc ≥ 0.45 (discuss EKG with Cardiology)
- Severe orthostasis (HR up ≥ 35 bpm, SBP or DBP down ≥ 20 mmHg)
- Persistent orthostasis (HR up ≥ 20 bpm, SBP or DBP down ≥ 10 mmHg)
- HR ≤ 45 bpm while awake
- Hypokalemia with K < 3.2 mmol/L
- Hypochloremia with CL < 88 mmol/L
- Arrhythmia
- BMI ≤ 13
- Esophageal tears/hematemesis
- Repeated recent ipecac use
- Recent amphetamine use
2. Suggested Admission Orders:
Admit To ________
Attending ________
Diagnosis ________
Condition ________

Activity
- Strict Medical Bed Rest if vital signs (VS) unstable. Bedside commode.
- Advance to Wheelchair Bed Rest if VS unstable only once in the passed 24hr
- Advance to Regular Medical Bed Rest when VS stable for 24hr
- Patient to be involved in Eating Disorder Comprehensive Care Program

Monitors
- Place all patients on continuous cardiorespiratory (CR) monitoring on admission
- If telemetry is needed patient will need to be placed in the CICC or PICU

Vital Signs
- If Q2hr vital signs are needed admit to PICU
- Vital signs can be monitored as frequently as Q4hr on the floor
- Obtain orthostatic vital signs on all patients
  - Q2hr if unstable
  - Q4hr if stable on CR monitor
  - Q8hr if stable off CR monitor
  - Avoid taking if SBP < 90 or DBP < 45 or EKG abnormal
- Obtain oral temperature
  - If temperature < 36.3°C warm with blankets and check temperature Q1hr until normalized
- Medical Instability Criteria (MIC) warrant admission to the CICC or PICU
  - Postural changes: SBP decrease ≥ 10 mm Hg or HR increase ≥ 20 bpm
  - HR < 45 bpm while sleeping or < 50 bpm while awake
  - Irregular pulse
  - SBP < 90 mmHg and/or DBP < 45 mmHg
  - Temperature < 36.3°C (days and evenings) and/or < 36.0°C (nights)
  - Give 1-2 cans Boost/Ensure for HR < 41 bpm or BP < below 90/45. Max 2 cans. Obtain stat EKG.

Intake and Output
- Weigh on admission and q AM
  - After first void, in hospital gown, with dry hair before any PO intake.
  - Use same scale each time.
  - Measure urine specific gravity and pH of first void q AM.
  - Staff should show neutral response.
- Strict I/O
1. **Suggested Admission Orders (continued):**

Call MD
- HR < 35 bpm or > 160 bpm
- SBP < 90 mmHg and/or DBP < 45 mmHg
- Any arrhythmia other than sinus bradycardia
- Temperature < 36.0°C

**Nutrition**
- 1:1 observation sitter 30 minutes prior to, during, and after meals.
- Diet type
- Calorie count

**Consults**
- Nutrition
- Psychology

**Labs and Tests**
- Admission
  - Stat 12-lead EKG
  - Stat CBC, Chem 10, Urine Pregnancy Test, Urine Toxicology Screen.
  - Routine ESR, TSH, free T4, UA, AST, ALT, AlkPh, GGT, Total bili, Direct bili, Albumin, Total protein, Amylase, Lipase, Cholesterol, Triglycerides, Uric acid, LH, FSH, Prolactin, Estradiol, Testosterone (males)
- Daily
  - 12-lead EKG once daily x 5 days, then PRN irregular pulse or HR < 41 bpm. Call Cardiology for any EKG changes
  - Chem 10 daily x 5 days. If normal then Q2 days x 4 days. If remains normal then once weekly.

**Medications**
- Multivitamin 1 tablet PO daily
- Calcium/Vitamin D supplement – to attain total 1500mg Calcium and 800 IU Vitamin D daily (via food, Multivitamin, and Calcium/Vitamin D supplement)
- Zinc Sulfate 110 mg PO Daily
- Thiamine 100mg PO x 1 given 30 minutes prior to first meal after admission

**Miscellaneous**
- Egg crate on bed

**Note:** All patients admitted to Pediatrics should be admitted to PED GENERAL & ADOLESCENT MED (PMA). Preferred location is 6-Children’s near the nursing station. CR monitoring is done there. Patients requiring telemetry will be placed in the CICC but should still be admitted to PMA. Unstable patients should be admitted to PED PICU (PMS).
3. **When to Consult Pediatrics for patients in the EDU:**
   - Prolonged QTc: ≥ 0.45
   - Bradycardia present when awake: HR ≤ 50
   - Orthostatic on ≥ 2 occasions: ↑ HR > 20 or ↓ SBP or DBP > 10
   - Hypothermic on ≥ 3 occasions: T < 36.3°C (day) or 36.0°C (night)
   - Evidence of Refeeding Syndrome with any one of the following
     - Hypokalemia
     - Hypomagesemia
     - Hypophosphatemia
   - For any medical problem that was present on admission or develops during the hospitalization (e.g., asthma, diabetes mellitus, sickle cell disease)
   - For any abnormal laboratory result that may indicate a condition other than an eating disorder
   - BMI ≤ 14

   Note: For abnormal EKGs without other medical problems, page the Pediatric Cardiology attending on call via WebExchange for an expedited EKG interpretation.

4. **When to Admit Directly to Pediatrics or Transfer to Pediatrics:**
   - QTc ≥ 0.47
   - Persistently Bradycardic: Awake HR < 50 on ≥ 3 occasions or awake HR < 40 on one occasion
   - Persistently Orthostatic: ↑ HR > 20 bpm or ↓ SBP or DBP > 20 mmHg
   - Persistently Hypothermic: T < 36.3°C on ≥ 3 occasions during the day despite re-warming
   - Evidence of Refeeding Syndrome
     - 2 or 3 the following present: hypokalemia, hypomagesemia, or hypophosphatemia.
     - OR potassium less than 3.2, magnesium less than 1.5 or phosphorus less than 2.4
   - Syncope within one week of admission
   - Ipecac use within one week of admission
   - BMI ≤ 13

5. **When to Transfer to PICU (From EDU or Pediatrics):**
   - QTc ≥ 0.5
   - Cardiac arrhythmia other than sinus bradycardia
   - Persistently low heart rate (< 40) not responsive to warming or liquid nutrition
6. Nutrition Rehabilitation (9)

Restoration of weight and nutritional status is the foundation for the successful treatment of eating disorders. However rapid restoration of weight can lead to Refeeding Syndrome, a potentially fatal condition (see page 19). Thus it is extremely important to consult Nutrition on admission and to follow a standard nutritional therapy protocol, such as the one suggested below:

**Amount of Calories Patients Need on Day of Admission/Hospital Day #1:**
- If patient has abnormal electrolytes or was previously consuming < 750 kcal/day:
  - Correct electrolyte abnormalities prior to starting nutritional therapy.
  - Calculate the kcal/day the patient was consuming prior to admission.
  - Add no more than 500 kcal to this for the initial diet.
  - Monitor electrolytes Q 12-24 hr for the first two weeks of hospitalization.
- If patient has normal electrolytes and was consuming at least 750 kcal/day, there are three options:
  - Start the diet at 1200 kcal/day
  - Start the diet at kcal/day equivalent to the calculated Basal Energy Expenditure (see Appendix A).
  - Start the diet at 25 kcal/kg/day

**Amount of Calories Patients Need for Hospital Day #2 and Onward:**
- Goal daily weight gain is no more than 0.1 to 0.2 kg/day
- The following weight/kcal scale is recommended:
  - If weight gain ≥ 0.2 kg then kcal/day remains the same.
  - If weight gain < 0.2 kg but ≥ 0.1 kg then increase kcal/day by 100 kcal or ½ can Boost.
  - If weight gain < 0.1 kg or patient has lost weight then increase kcal/day by 200 kcal or 1 can Boost.

**Feeding Modality:**
- Oral feedings are preferred
- Nasogastric feedings may be required if unwilling or unable to take PO
- Parenteral feedings may be required in certain circumstances:
  - Multiple previous unsuccessful attempts at dietary treatment
  - Life-threatening weight loss of more than 40% EBW
  - Worsening of psychological or physical state

**Macronutrient Requirements:**
- Protein: 1.5 grams/kg/day
- Fat: 30-50 grams per day
- Carbohydrate: Varies depending on daily caloric needs, but rarely should exceed 70-80 kcal/kg/day
  - For parenteral feedings carbohydrate intake should not exceed 7 mg/kg/min
7. Refeeding Syndrome (9, 10)

Refeeding Syndrome is a set of complications that can occur during the initial stage of nutritional rehabilitation in malnourished patients. It is caused by fluid and electrolyte shifts and can be fatal. The risk is highest during the first two weeks of nutritional rehabilitation and progressively declines thereafter.

Risk factors:
- Body weight < 70% EBW
- Rapid weight loss
- Low phosphate, potassium, and/or magnesium at the start of nutritional therapy
- Little or no nutritional intake for the preceding 5-10 days

Characteristics:
- Hypophosphatemia – hallmark of the syndrome and predominant cause
- Hypokalemia
- Hypomagnesemia
- Vitamin and trace mineral deficiencies
- Volume overload
- Edema

Pathogenesis:
Total body phosphate stores and intravascular volume status are depleted during starvation. Nutritional rehabilitation further decreases phosphate stores and increases fluid retention via three mechanisms:
- Insulin secretion causes cellular uptake of phosphate
- Cells produce metabolic byproducts (e.g., ATP) using phosphate
- Insulin increases renal sodium re-absorption and leads to fluid retention

Complications:
Deficiency of phosphorylated metabolic byproducts and volume overload lead to an array of complications affecting nearly every organ system.

Cardiovascular
- Impaired contractility, decreased stroke volume, heart failure, arrhythmia, sudden cardiac death, hypertension, hypotension.
- Note: Bradycardia is expected with AN. A HR > 70 during the initial states of refeeding may be indicative of Refeeding Syndrome and warrants investigation.

Pulmonary
- Impaired diaphragmatic contractility
- Watch for dyspnea
Muscular
- Impaired contractility, weakness, myalgias, and tetany.
- Hypophosphatemia can cause rhabdomyolysis, indicated by elevated CPK.

GI
- AST, ALT, AlkPhos, and bilirubin are usually mildly elevated during the first few weeks of refeeding due to relatively excessive caloric intake and fat deposition. These should normalize over time. Slowing the rate of refeeding and weight gain can help.
- Diarrhea, nausea, and vomiting can occur as a result of intestinal atrophy and exocrine pancreatic impairment.
- Abdominal pain and constipation can occur due to delayed gastric emptying and prolonged colonic transit time. Adequate hydration and an osmotic laxative (e.g., polyethylene glycol) are recommended.

Neurologic
- Tremors, paresthesias, delirium, seizures.
- Malnourished patients are usually thiamine deficient and refeeding increases utilization of thiamine, which can lead to Wernicke’s encephalopathy (i.e., encephalopathy, oculomotor dysfunction, gait ataxia). Give 100 mg thiamine at least 30 minutes prior to starting nutritional therapy.
- Central pontine myelinolysis can occur with rapid fluctuation in sodium.

Prevention:
- Correct electrolyte abnormalities prior to starting nutritional therapy
- Consult Nutrition on admission to help plan and coordinate nutritional therapy
- Use a standard nutritional therapy protocol
- Monitor vital signs and weight daily
- Examine patient daily, particularly CV, pulmonary, and edema status
- Monitor daily electrolytes and LFTs for first 2 weeks, then space if remain normal

Management:
- Slow the rate of nutritional support
- Correct the electrolyte abnormalities
- Treat the CV and pulmonary complications

A Note on Potassium Replacement:
- Oral potassium is safest and should be used if possible. Follow weight/age adjusted doses.
- Use IV potassium if patient refuses PO, has EKG changes, or potassium is critically low. 40meq/L is safe at usual IV fluid rates. NEVER give as a bolus.
Appendix A: Equations

1. Expected Body Weight (EBW) (11)
   - A calculation used to determine the extent of underweight (or overweight) by comparing the patient’s current BMI to the 50th percentile BMI for age, height, and gender. It is analogous to “Ideal Body Weight.”
   - Uses
     - Diagnostic criterion for AN (< 85% EBW)
     - Indicator of medical stability
     - To determine the need for hospitalization
     - To set appropriate target weights
     - To track progress of treatment and assess recovery
   - There are several methods to calculate EBW, but the BMI Method has been found to be most reliable for children and adolescents at all ages, heights, and weights. The BMI Method requires use of a growth chart based on height- and weight-for-age and gender (e.g., CDC growth charts).

   FORMULA: \( \% \text{ EBW} = 100 \times \frac{\text{Current BMI}}{\text{50th percentile BMI for age, height, gender}} \)

     - For example, a 15 year old boy with a weight of 45kg and height of 170cm has a BMI of 15.57. The 50th percentile BMI for age, height, and gender is 19.9. Therefore this patient is 78% EBW.

2. Body Mass Index (BMI)
   FORMULA: \( \text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (meters)}^2} \)

3. Corrected QT Interval (QTc)
   - This is the length of the QT interval on EKG corrected for the patient’s heart rate
   - Check length of QTc daily for bradycardia (HR < 50), syncope, BMI ≤ 13
   - A QTc ≥ 0.44 is a warning sign that the heart could be predisposed to Toursade de Pointes, a potentially fatal dysrhythmia.

   FORMULA: \( \text{QTc} = \frac{\text{QT interval (secs)}}{\sqrt{\text{RR interval (secs)}}} \)

4. Basal Energy Expenditure (BEE) based on the Harris-Benedict Equations
   - This is the body’s daily energy expenditure at rest based on gender, age, height, and weight. Stress, illness, injury, and physical activity all increase the BEE and are not taken into account in these equations.

   FORMULA: Male = 66.5 + (13.75 x wt in kg) + (5.003 x ht in cm) - (6.775 x age in yr)
   FORMULA: Female = 655.1 + (9.563 x wt in kg) + (1.850 x ht in cm) - (4.670 x age in yr)

5. Orthostatic Vital Signs
   - Have patient lay supine for 5 minutes
   - Check BP and HR while lying supine
   - Have patient stand for 2 minutes
   - Check BP and HR while standing
   - Orthostasis is present if HR increases ≥ 20 bpm and/or SBP or DBP decreases ≥ 10 mmHg
Appendix B: Medical Complications of Eating Disorders (2)

Regulatory
- Hypothermia

Fluids and Electrolytes
- Dehydration
- Hypokalemia, hypomagnesemia, or hyponatremia

Cardiovascular
- Irreversible cardiomyopathy or myositis from Ipecac toxicity
- Prolonged QTc or other EKG abnormalities
- Arrhythmias
- Mitral valve prolapse
- Pericardial effusions
- Hypercholesterolemia

Gastrointestinal
- Delayed gastric emptying
- Impaired GI tract motility
- Bloating
- Postprandial fullness
- Abnormal liver function test results

Endocrine
- Hypoglycemia
- Sick euthyroid syndrome
- Growth retardation

Genitourinary
- Menstrual irregularities or amenorrhea
- Sterile pyuria

Musculoskeletal
- Osteopenia or osteoporosis

Psychological
- Mood changes
- Obsessive/compulsive symptoms
- Suicide

Neurologic
- Cortical atrophy
- Cognitive deficits

Hematologic
- Anemia, leucopenia, or thrombocytopenia

Vomiting-related
- Hypochloremic metabolic alkalosis
- Esophagitis
- Gastroesophageal reflux
- Dental erosions
- Mallory-Weiss tears
- Esophageal or gastric rupture
- Aspiration pneumonia

Laxative-related
- Hyperchloremic metabolic acidosis
- Hyperuricemia
- Hypocalcemia
- Fluid retention (may gain up to 10 lb in 24 hr with laxative discontinuation)
### Appendix C: Potential Laboratory Test Results with Interpretation (12)

<table>
<thead>
<tr>
<th>Test</th>
<th>Potential results with interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBC</td>
<td>Leukopenia, anemia, or thrombocytopenia.</td>
</tr>
<tr>
<td>ESR</td>
<td>Normal (&lt; 20). If high this is likely not an eating disorder.</td>
</tr>
<tr>
<td>Glucose</td>
<td>Low (poor nutrition). High (insulin omission).</td>
</tr>
<tr>
<td>Urine Pregnancy Test</td>
<td>Low weight females can ovulate and therefore become pregnant.</td>
</tr>
<tr>
<td>BUN</td>
<td>High (dehydration). Low (decreased muscle).</td>
</tr>
<tr>
<td>Creatinine</td>
<td>High (dehydration or renal dysfunction). Low (decreased muscle).</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>Slightly elevated (liver dysfunction). Low (low RBC mass).</td>
</tr>
<tr>
<td>AST, ALT</td>
<td>High (liver dysfunction).</td>
</tr>
<tr>
<td>Amylase, Lipase</td>
<td>High amylase (vomiting or pancreatitis). High lipase (pancreatitis).</td>
</tr>
<tr>
<td>Na, Cl, K, Mag, Phos</td>
<td>Low Na (water loading or laxatives)</td>
</tr>
<tr>
<td></td>
<td>Low K (vomiting, laxatives diuretics, or Refeeding Syndrome)</td>
</tr>
<tr>
<td></td>
<td>Low Cl suggests vomiting</td>
</tr>
<tr>
<td></td>
<td>High Cl suggests laxatives</td>
</tr>
<tr>
<td></td>
<td>Low Phos (poor nutrition or Refeeding Syndrome)</td>
</tr>
<tr>
<td></td>
<td>Low Mag (poor nutrition, laxatives, or Refeeding Syndrome)</td>
</tr>
<tr>
<td>Ca</td>
<td>Slightly low (poor nutrition at the expense of bone)</td>
</tr>
<tr>
<td>Bicarbonate</td>
<td>High (vomiting). Low (laxatives).</td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>Elevated (early malnutrition). Low (advanced malnutrition).</td>
</tr>
<tr>
<td>Urine ketones</td>
<td>High (hypoglycemia or dehydration).</td>
</tr>
<tr>
<td>Urine pH</td>
<td>High (vomiting).</td>
</tr>
<tr>
<td>Urine SG</td>
<td>High (dehydration). Low (water-loading).</td>
</tr>
<tr>
<td>TSH, free T4</td>
<td>Normal or low TSH (Sick Euthyroid Syndrome)</td>
</tr>
<tr>
<td></td>
<td>Slightly low Free T4 (Sick Euthyroid Syndrome)</td>
</tr>
<tr>
<td>ADH</td>
<td>Low or normal</td>
</tr>
<tr>
<td>Carotene</td>
<td>Can be high</td>
</tr>
<tr>
<td>Head CT</td>
<td>Can suggest cerebral atrophy!</td>
</tr>
<tr>
<td>EKG</td>
<td>Sinus bradycardia, other arrhythmia, low voltage changes, prolonged QTc interval, T-wave inversions, ST-segment depression.</td>
</tr>
<tr>
<td>U/S pelvis</td>
<td>Small ovaries</td>
</tr>
<tr>
<td>Bone mineral density study</td>
<td>Can show osteopenia</td>
</tr>
<tr>
<td>GI series</td>
<td>Can show delayed gastric emptying</td>
</tr>
<tr>
<td>FSH, LH, Estradiol, Testosterone, Prolactin, GnRH</td>
<td>Normal or low</td>
</tr>
<tr>
<td>GH, Somatomedins</td>
<td>Normal or low</td>
</tr>
<tr>
<td>Dopamine, NE</td>
<td>Normal or low</td>
</tr>
</tbody>
</table>
Works Cited


