



Restrictive Eating Disorders

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Institutional Goals

- Enterprise Safety Priority Goals/Metrics for 2023
 - Implementation of Pathway
 - **Reduction in LOS by 5%**
- PHIS ALOS 11.4 days
- 2022 LOS
 - PCH ALOS 18.8 days
 - Multiple stays were 40-110 days
- 2023 LOS
 - 9 days
 - **48% reduction in LOS**
 - Of note, patients had clear discharge plans implemented

The Inpatient Eating Disorder Team

- The team:
 - Stephanie Conrad, Medical Director
 - Stacey Halverson, PhD, Psychology
 - Victoria Alanis, RD, Nutrition
- To discuss if patient needs to be admitted:
 - Vocera text me
 - (anytime)
 - Vocera group (“Eating Disorder Team”) 8a-5p
 - dg_eatingdisorders@phoenixchildrens.com
 - One call center will direct admissions to me during daytime hours

Types of Eating Disorders

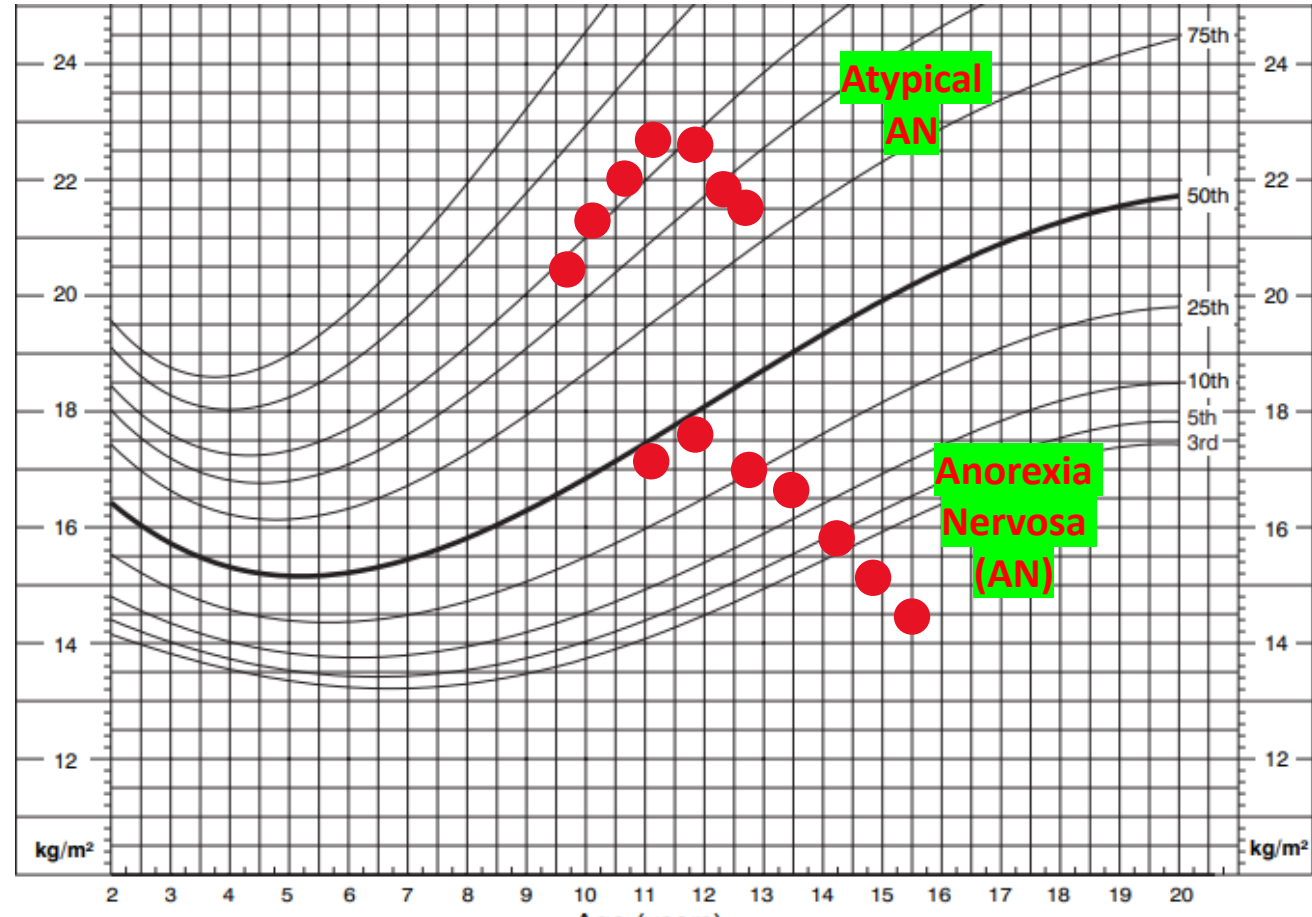
- Anorexia nervosa (AN) - Restricted caloric intake relative to energy requirements, leading to significantly low body weight for age, sex, projected growth, and physical health
 - Atypical anorexia nervosa
- Bulimia nervosa (BN) – Repeated episodes of binge eating and repeated use of compensatory behaviors to prevent weight gain
- Binge-eating disorder (BED) – Recurrent episodes of binge eating
- Avoidant restrictive food intake disorder (ARFID) – Disrupted eating pattern due to lack of interest in eating, avoidance based on sensory aspects of food or concern for an aversive event related to eating
- Other specified feeding or eating disorders (OSFED)

Medical Evaluation and Management of Eating Disorders

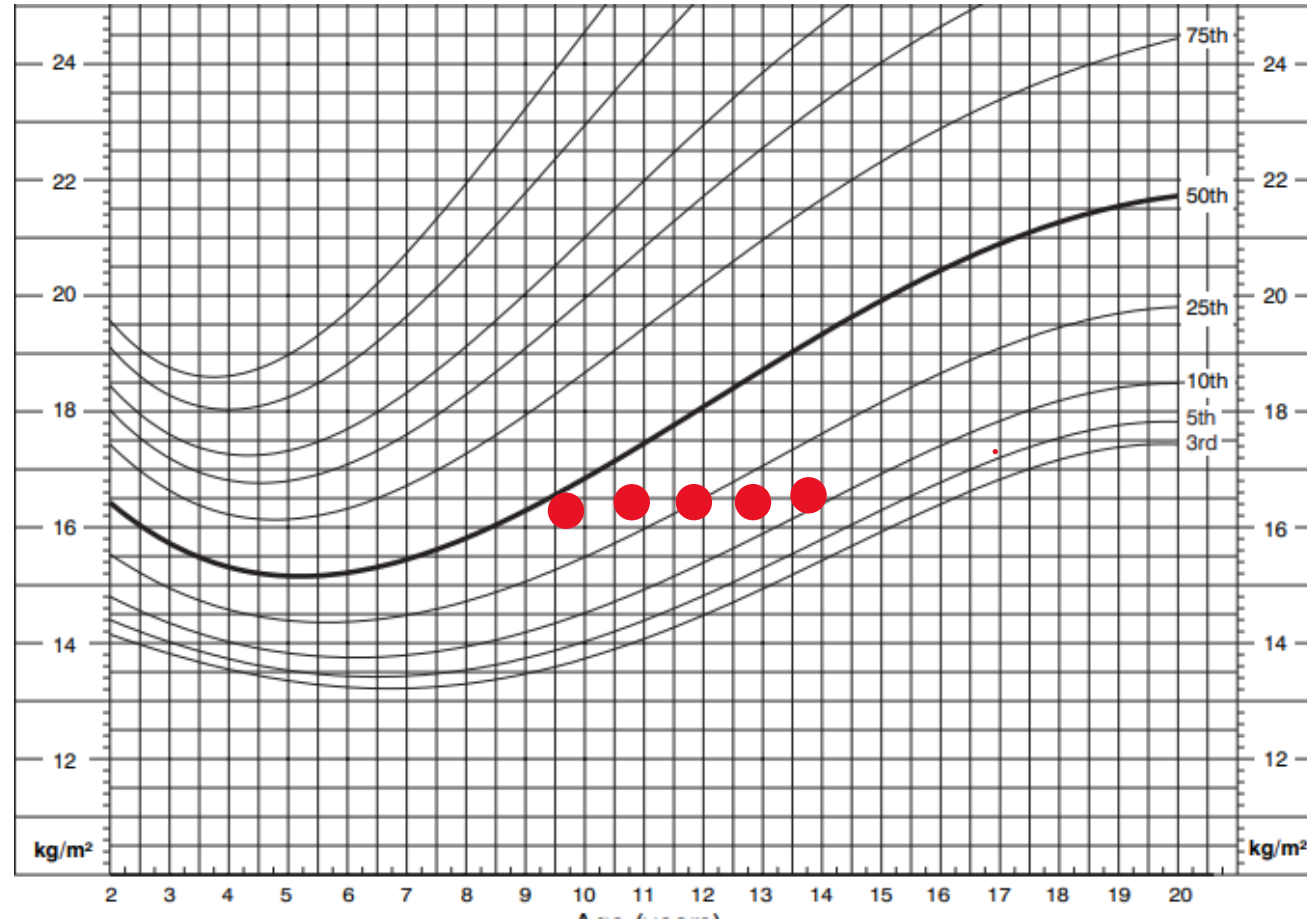
Look at the Growth Chart!

- When to be concerned:
 - Falling off the growth curve
 - Flat BMI curve

Concern: falling off BMI curve



Concern: flat BMI curve



Weight Suppression predicts illness severity

- Weight suppression = $(\text{Highest historical weight} - \text{Weight at presentation}) / \text{Highest historical weight}$
 - Patient 1 (AN): 16 y/o who weighed 125 lbs 1 year ago, 85 lbs at today's visit
 - 32% suppressed
 - Patient 2 (AAN): 16 y/o who weighed 250 lbs 1 year ago, 120 lbs at today's visit
 - 52% suppressed
- Patients with greater weight suppression have shown worse ED psychopathology among other factors [Lavender 2015; Berner 2013]
 - Findings are consistent with evidence that one's body weight (or BMI) at a given point in time may be a less salient correlate of poor ED-related health outcomes when compared to *differences* between one's current weight status and one's past highest weight (i.e., weight suppression)

Medical Evaluation: A Good Eating Disorder ROS

• Neuro:

- Difficulty concentrating, Fatigue,
- Poor sleep, Irritability, Headaches

• CV:

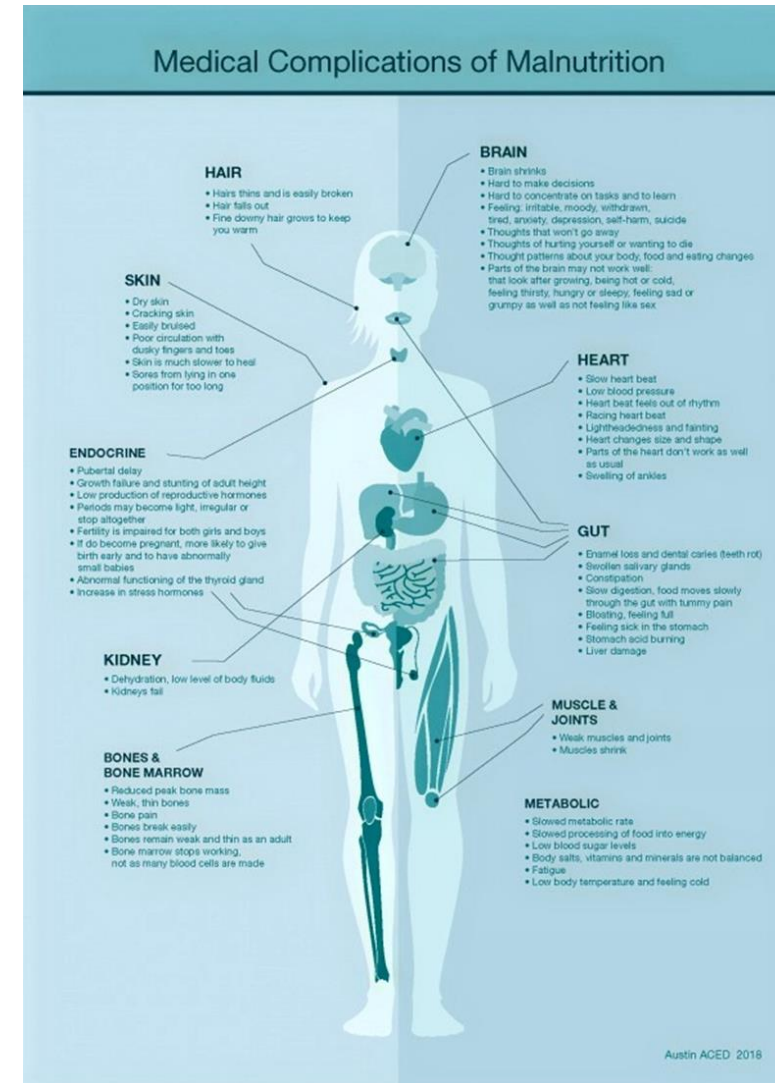
- Chest pain, Palpitations – marker of anxiety
- Bradycardia/Hypotension – resolves quickly with nutrition
- Dizziness (especially upon standing), Syncope

• GI:

- Constipation
- Early satiety
- Reflux if purging

• Endo:

- LMP
- Cold intolerance
- Hair loss



Medical Evaluation: Laboratory Values

- CMP, Magnesium, Phosphorous
 - Electrolyte disturbances
 - Rare on presentation with anorexia nervosa
 - Hypoglycemia
 - Alkalosis with purging
 - AKI
 - Transaminitis (AST/ALT in the 100's, hyperbilirubinemia)
 - Liver autophagy, will take weeks of nutritional rehabilitation to recover
 - No need to trend or obtain a liver ultrasound
- CBC
 - Iron deficiency anemia
 - Bone marrow suppression
 - Leukopenia, neutropenia > anemia or thrombocytopenia
 - Will take weeks of nutritional rehabilitation to recover, no need to trend

Medical Evaluation: Laboratory Values

- Nutrition labs
 - Vitamin D, Zinc
- Thyroid labs – can get on presentation of new diagnosis
 - Euthyroid-sick pattern
 - T3 low, TSH/FT4 normal or low
- Celiac panel - can get on presentation of new diagnosis
 - TTG/IgA

Patient A

- 17 y/o F who presented from PCP's office for severe AN
 - Weight was 125-130 lbs 18 months ago
 - Admission weight 57 lbs
 - Weight suppression: 56%
 - Physical exam findings:
 - Bradycardia, orthostatic hypotension
 - Fatigue, difficulty concentrating, lanugo, hair loss, dry skin, amenorrhea, cold, epigastric pain

01-25-23 22:10

Comp Metabolic Panel

Sodium	140	[134-143 mmol/L]
Potassium	4.0	[3.6-5.2 mmol/L]
Slight hemolysis, result may be falsely increased.		
Chloride	104	[98-108 mmol/L]
CO2	29	[17-31 mmol/L]
Anion Gap	7	[4-16 mmol/L]
Glucose	59 ↓	[70-120 mg/dL]
Blood Urea Nitrogen	10	[5-25 mg/dl]
Creatinine	0.47	[0.1-1.1 mg/dL]
BUN/Creatinine Ratio	21	[10-28 RATIO]
Calcium	10.1	[8.7-10.2 mg/dL]
Protein Total	7.0	[6.4-8.2 gm/dL]
Albumin Serum	4.6	[3.5-5.2 g/dL]
Globulin	2.4	[1.4-4.6 g/dL]
A/G Ratio	1.9	[0.8-2.5 RATIO]
Bilirubin Total	1.2 ↑	[<0.8 mg/dL]
AST/ SGOT	220 ↑	[15-37 U/L]
Slight hemolysis, result may be falsely increased.		
ALT/ SGPT	629 ↑	[30-65 U/L]
Alkaline Phosphatase	89	[50-136 U/L]

PCH Main Clinical Lab, 1919 E. Thomas Rd., Phoenix, AZ 85016 602 933 1280

01-25-23 22:10		CBC and Differential	
→	WBC Count	3.8 ↓	[4.5-13.0 K/uL]
	RBC Count	3.07 ↓	[4.10-5.10 M/uL]
→	Hemoglobin	10.4 ↓	[12.0-16.0 gm/dL]
	Hematocrit	29.4 ↓	[36.0-46.0 %]
	MCV	96	[78-102 fL]
	MCH	33.9	[25.0-35.0 pg]
	MCHC	35.4	[31.0-37.0 %]
	RDW	13.1	[11.0-15.0 %]
	Platelet Count	205	[140-450 K/uL]
	MPV	10.1	[7.5-11.5 fL]
	Differential Type	AUTOMATED	
	Neutrophils	38	[%]
	Lymphocytes	55	[%]
	Monocytes	5	[%]
	Eosinophils	1	[%]
	Basophils	1	[%]
	Nucleated RBCs	0	[0 /100]
→	Absolute Neutrophils	1.4 ↓	[1.8-8.0 K/uL]
	Absolute Lymphocytes	2.1	[1.2-5.8 K/uL]
	Absolute Monocytes	0.2	[0.0-0.8 K/uL]
	Absolute Eosinophils	0.0	[0.0-0.5 K/uL]
	Absolute Basophils	0.0	[0.0-0.1 K/uL]

Patient B

- 16 y/o transgender male with a history of several years of AN, admitted for a recent relapse in October of 2022 (weight 42 kg) with return of menses
 - Admitted in March of 2023 weighing 33 kg
- Endorsed restricting but denied purging or the use of laxatives
 - Labs don't lie

03-01-23 17:00		Comp Metabolic Panel	
→	Sodium	132 ↓	[134-143 mmol/L]
	Potassium	2.6 ↓	[3.6-5.2 mmol/L]
→	Slight hemolysis, result may be falsely increased.		
	Chloride	85 ↓	[98-108 mmol/L]
→	CO2	35 ↑	[17-31 mmol/L]
	Anion Gap	12	[4-16 mmol/L]
	Glucose	80	[70-120 mg/dL]
	Blood Urea Nitrogen	22	[5-25 mg/dl]
→	Creatinine	1.31 ↑	[0.1-1.1 mg/dL]
	BUN/Creatinine Ratio	17	[10-28 RATIO]
	Calcium	9.9	[8.7-10.2 mg/dL]
	Protein Total	7.5	[6.4-8.2 gm/dL]
	Albumin Serum	4.1	[3.5-5.2 g/dL]
	Globulin	3.4	[1.4-4.6 g/dL]
	A/G Ratio	1.2	[0.8-2.5 RATIO]
	Bilirubin Total	0.8 ↑	[<0.8 mg/dL]
	AST/ SGOT	31	[15-37 U/L]
	Slight hemolysis, result may be falsely increased.		
	ALT/ SGPT	68 ↑	[30-65 U/L]
	Alkaline Phosphatase	71	[50-136 U/L]

	03/2023 7:44	03/03/2023 09:49	03/03/2023 00:27	03/02/2023 17:34	03/02/2023 09:59	03/02/2023 00:39	03/01/2023 17:00	
Single Serum Tests								
Sodium	138	140	↓ 133	↓ 133	↓ 131	↓ 129	↓ 132	
Potassium	3.2 * ↓	2.7 * ↓	3.2 * ↓	2.7 * ↓	2.6 * ↓↓	2.4 * ↓	2.6	
Chloride	109	108	↓ 96	↓ 91	↓ 86	↓ 86	↓ 85	
CO2	21	23	↑ 30	↑ 33	↑ 37	↑ 34	↑ 35	
Anion Gap	8	9	7	8	8	9	12	
Glucose	177	86	↑ 138	↑ 167	↑ 223	↑ 126	80	
Blood Urea Nitrogen	6	7	11	16	22	16	22	
Creatinine	0.55	0.62	0.71	0.86	↑ 1.13	1.01	↑ 1.31	
BUN/Creatinine Ratio	11	11	15	19	19	16	17	
Calcium	6.9 ↓	7.8 ↓	8.0	8.8	9.8	9.4	9.9	

Metabolic Alkalosis

- Most common acid/base disturbance seen in with AN-BP and BN
- Both vomiting and diuretics create a contraction alkalosis secondary to loss of NaCl resulting in intravascular depletion
- Laxatives
 - Acutely can → non-gap metabolic acidosis
 - Chronic use → mild metabolic alkalosis with severe hypokalemia
- In severe/chronic purging, restoration of aldosterone takes weeks
 - Avoid boluses → edema and acute weight gain when aldosterone levels are high
- Bicarbonate >38 is very suggestive of self-induced vomiting

Patient C – Atypical AN

- BMI 18.8

Patient History: 13-year-old female with concern for a pericardial effusion.
Indications: Evaluate pericardial effusion.

Summary:

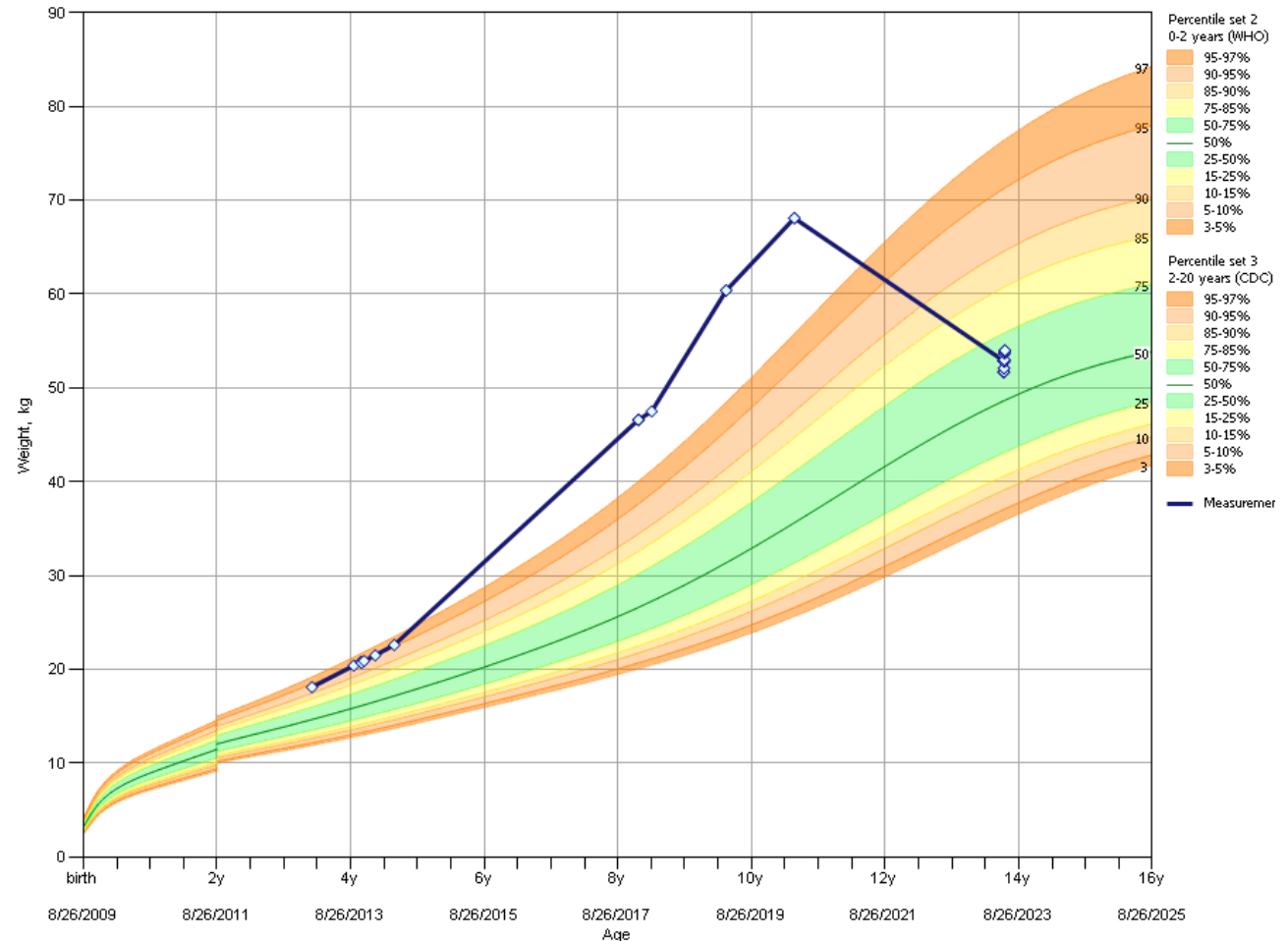
1. Qualitatively normal right ventricular size with normal systolic function.
2. Normal size left ventricle with moderately decreased systolic function.
3. Left ventricular ejection fraction is estimated ~ 35-40%.
4. Small pericardial effusion noted anteriorly.
5. There is no echocardiographic evidence of tamponade.

Comparison To Previous Exam:

Compared to the previous echocardiogram of 06/02/2023, decline in LV systolic function with decrease in pericardial effusion.

ECHO:

- Pericardial effusion
- Decreased LV function



Early Refeeding Edema in AN

- In AN-R during early refeeding get exuberant GLP release and excessive insulin secretion in response to carbohydrates
- Insulin's normal effect on the kidney is to cause salt and water retention/edema
- Mild
 - Goes away naturally within 1-2 weeks
 - Leg elevation
 - Don't use diuretics
 - Can fuel worsening edema via aldosterone

Despite a "normal BMI", this patient with Atypical AN showed significant refeeding syndrome



	06/11/2023 06:38	06/10/2023 05:50	06/10/2023 03:49	06/09/2023 16:15	06/09/2023 04:16	06/09/2023 04:16
istry						
ndocrine						
TSH						
Free T4						
Glycohemoglobin A1C						
Single Serum Tests						
Sodium	↑ 145	↑ 144	↑ 146	↑ 144	↑ 144	
Potassium	* ↓ 3.0	↓ 3.1	↓ 2.6 *	↓ 3.3 *	↓ 3.3 *	
Chloride	↑ 116	↑ 115	↑ 119	↑ 114	↑ 114	↑
CO2	21	23	19	20	22	
Anion Gap	8	6	8	10	8	
Glucose	↓ 65	↓ 67	↓ 54	84	71	
Blood Urea Nitrogen	9	8	7	7	9	
Creatinine	0.39	0.41	0.34	0.34	0.40	
BUN/Creatinine Ratio	23	20	21	21	23	
Calcium	* ↓ 6.8 *	↓ 7.2 *	↓ 6.1 *	↓ 7.3 *	↓ 7.8 *	
Protein Total						
Albumin Serum						
Globulin						
A/G Ratio						
Alkaline Phosphatase						
AST/ SGOT						
ALT/ SGPT						
Zinc, Serum/Plasma						
Bilirubin Total						
Phosphorus	* 2.9 *	3.0 *	↓ 2.6 *	2.8 *	3.2 *	
Magnesium	* ↓ 1.5 *	↓ 1.5 *	↓ 1.3 *	↓ 1.5 *	1.6 *	
Vitamin D, 25-Hydroxy, D2/D3/Total						

Psychopharmacology: Evidence is Minimal

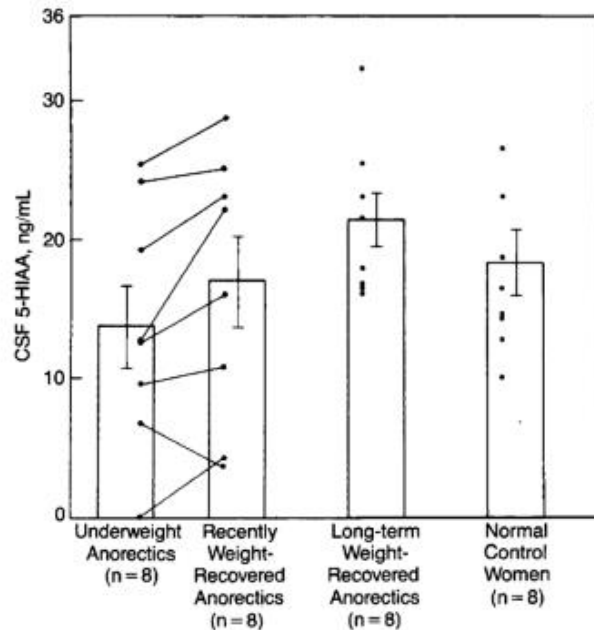


Fig 2.—Mean (\pm SEM) concentrations of 5-hydroxyindoleacetic acid (5-HIAA) in CSF for each group of anorectics and normal controls.

Abnormalities in CNS Monoamine Metabolism in Anorexia Nervosa

Walter H. Kaye, MD; Michael H. Ebert, MD; Michael Raleigh, PhD; C. Raymond Lake, MD

• Patients with anorexia nervosa have disturbances of mood, appetite, and neuroendocrine function. Central nervous system monoamine pathways modulate these systems, and alterations in function of these systems may occur in anorexia nervosa. Because monoamine metabolism can be influenced by nutritional intake, we studied anorectics before and at intervals after correction of weight loss. Underweight anorectics had a 30% decrease in CSF homovanillic acid level and a 20% decrease in CSF 5-hydroxyindoleacetic acid concentra-

Underweight patients with anorexia nervosa appear to have decreased excretion of urinary metabolites of norepinephrine (NE),^{3,19-22} dopamine (DA),^{20,22} and serotonin (5-HT).²² Because some fraction of urinary monoamine metabolites is derived from the CNS, the existing data suggest that underweight anorectics may have disturbances in central monoamine metabolism. Such disturbances in anorexia nervosa have been postulated by a number of investigators.^{16,23-25}

Psychopharmacology: Evidence is Minimal

- Food is the best treatment
- Typically, do not start serotonergic medications until around 85% target goal weight
- Fluoxetine is FDA approved for BN
 - Improves binge/purge frequency even in absence of mood disorder

Admission Criteria

- Severe malnutrition ($\leq 75\%$ Median body mass index for age, sex and height, Weight loss $> 10\%$ of total body weight over less than a 6 month period or z-score < -3.0)
- Dehydration
- Electrolyte disturbance (hypokalemia, hyponatremia, hypophosphatemia)
- Physiological instability
 - Severe bradycardia (heart rate < 50 beats/min daytime; < 45 beats/min at night)
 - Hypotension MAP < 60
 - Hypothermia (body temperature $< 96^\circ$ F, 35.6° C)
 - Orthostatic increase in pulse (> 30 beats/min) or decrease in blood pressure (> 20 mm Hg systolic or > 10 mm Hg diastolic)
- Failure of outpatient treatment and inability to manage significant symptoms as an outpatient
- Acute food refusal 24+ hours in the setting of concerns for disordered eating
- Uncontrolled bingeing/purging
- Acute medical complications of malnutrition

Restrictive eating disorder pathway

- Addresses
 - Significant weight loss and acute po refusal due to
 - Anorexia nervosa
 - Avoidant Restrictive Food Intake Disorder (ARFID)
 - Other Specified Feeding Eating Disorder (OSFED)
 - Medical stabilization
 - Nutritional rehabilitation
 - Length of stay
 - Family support and education
 - Plan of care post-discharge

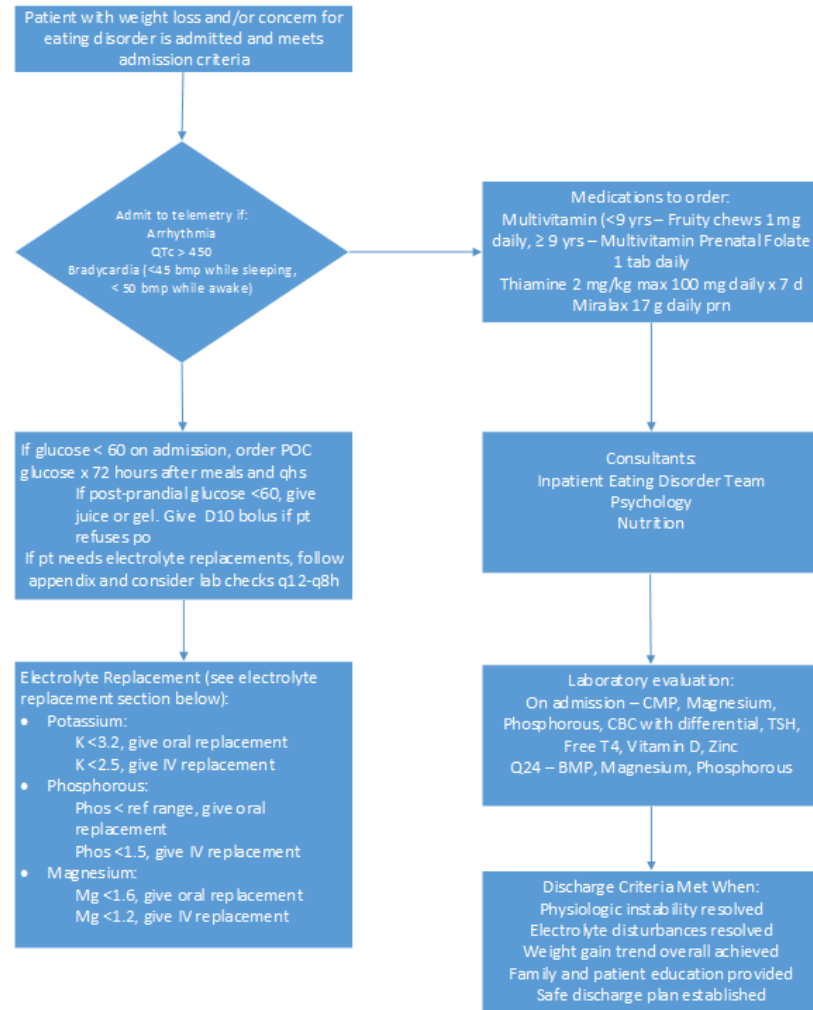
How the Inpatient Eating Disorder Team Functions to Support the Patient, Family, and PCP

- Meet the patient soon after admission (usually in the first 24 hours)
 - I often speak to the family (email, phone, zoom) prior to admission – this helps!
- We have family meetings after admission (48-72 hours)
 - Multiple family meetings when needed, either formal or informal
- We work with family, patient, and SW to make recommendations
 - Hospital course/anticipated length of stay
 - Discharge goals
 - Level of care for eating disorder treatment post-discharge
- Communication with the PCP around discharge

Inpatient Restrictive Eating Protocol

- What the patient and family can expect:
 - Sitter in the room at all times
 - No parent/visitor in the room during meals/snacks
 - No electronics (cell phone, personal computer)
 - Can watch TV
 - After patient has started nutritional rehabilitation, we accommodate for school laptops
 - Meal plan
 - Our dietitian makes the patient's meals based on pre-eating disorder preferences, these meals are delivered to patient.
 - Meal planning is addressed prior to discharge
 - If meal is not eaten, a supplement will be given
 - If patient refuses supplements, the team will need to discuss NG placement
 - More individualized for ARFID patients
- Tips for explaining the protocol (the “whys” of what we do) is on page 26 of the pathway

Inpatient Restrictive Eating Pathway



Resource List of Arizona-based ED Treatment

Adolescent Residential Treatment Centers:

Name	Contact/Location	Population Served	Insurance(s) Accepted
Meadows Ranch	Phone: 866-332-7381 Address: 55635 N Vulture Mine Rd Wickenburg, AZ 85390	Females ages 11-17	Aetna, Beacon Health Options, BCBS, Cigna, UnitedHealthcare/Optum, Humana, MultiPlan, First Health, QualChoice, Tricare
Rosewood Ranch	Phone: 800-845-2211 Address: 36075 S Rincon Rd Wickenburg, AZ 85390	All genders ages 12-17	Aetna, Cigna, Optum, BCBS, Beacon Health Options, First Health Network, Magellan, MultiPlan, Kaiser, UnitedHealthcare, some AHCCCS plans
Rosewood Scottsdale	Phone: 800-845-2211 Address: 14138 E Peak View Rd, Scottsdale, AZ 85262	All genders ages 12-17	Aetna, Cigna, BCBS, Beacon Health Options, First Health Network, Magellan, Multiplan, Kaiser, UnitedHealthcare

Adolescent Partial Hospitalization Programs (PHPs):

Name	Contact/Location	Population Served	Insurance(s) Accepted
Rosewood - Tempe	Phone: 800-845-2211 Address: 950 W Elliot Rd, #201 Tempe, AZ 85284	All genders ages 12-17	Aetna, Cigna, Optum, BCBS, Beacon Health Options, First Health Network, Magellan, MultiPlan, Kaiser, United Healthcare

Adolescent Intensive Outpatient Programs (IOPs):

Name	Contact/Location	Population Served	Insurance(s) Accepted
<i>Embark Behavioral Health (Formerly Doorways Counseling)</i>	<i>Phone: 602-997-2880 Address: 4747 N 7th St, Suite 450 Phoenix, AZ 85014</i>	<i>All genders ages 13-20</i>	<i>Aetna, BCBS, Cigna, United Healthcare</i> *Not currently taking patients
Healthy Futures	Phone: 480-451-8500 Address: 8065 N 85th Way Scottsdale, AZ 85258	All genders ages 12-18	Aetna, ambetter, Beacon Health Options, BCBS, Cigna, Humana, Magellan, United Healthcare, TriWest
Rosewood - Tempe	Phone: 800-845-2211 Address: 950 W Elliot Rd, #201 Tempe, AZ 85284	All genders ages 12-17	Aetna, Cigna, Optum, BCBS, Beacon Health Options, First Health Network, Magellan, MultiPlan, Kaiser, United Healthcare, some AHCCCS plans
Community Connections	Phone: 623-242-8460 Address: 16620 North 40th Street, Suite F-2, Phoenix, AZ 85032	All genders ages 13-17	AHCCCS
Lifetree Counseling	Phone: 602-488-6104 Address: 7075 W Bell Rd Suite 1, Glendale AZ 85308	All genders ages 13-17	Aetna, BCBS

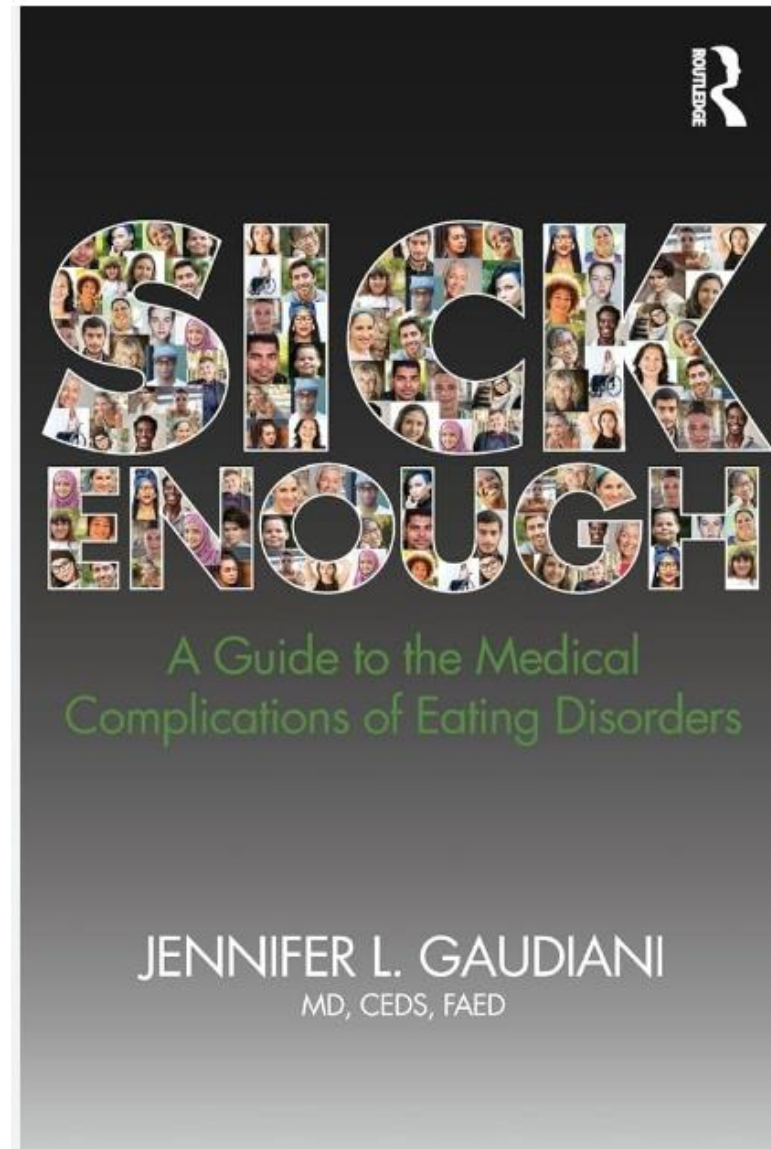
Treating Eating Disorders In the Outpatient Setting

- Important to have a team:
 - PCP, therapist, dietitian (well versed in eating disorders) +/- a psychiatry
- Hypermetabolism following starvation syndrome
 - Weight loss despite eating goal calories
 - Night sweats, tachycardia
- Gastroparesis
 - Early satiety
 - Smaller, more calorically dense meals and snacks are recommended
 - 3 meals/3 snacks
 - Higher carbohydrate
- Constipation
 - Don't be afraid to give miralax!

Screening

- DXA
 - Adult female – DXA should be performed within a year after losing her period
 - No loss of period – should also be checked within a year of restrictive eating patterns
 - Children/Adolescents – less clear
 - If long bone fractures – DXA should be checks
 - Fracture risk is increased by 60% after one year of AN, risks/screening should be discussed with patients and parents
 - Males often get missed in screening
- Gold standard for bone density loss: Weight restoration!
 - This may include menses restoration in females

Recommended
Reading



Resources For Talking to Patients About Weight

Ellyn Satter Institute:

- <https://www.ellynsatterinstitute.org/resources-and-links-professionals/>

