(Don't) Just Feed Them Already!

A Review of Nutrition Emergencies

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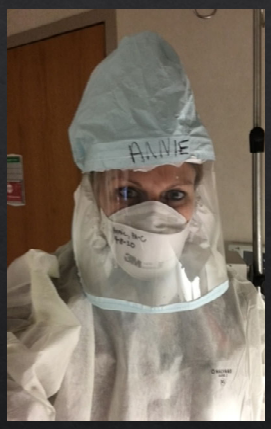
About Me

- Registered dietitian since 2009, worked in intensive care & surgery primarily doing nutrition support
- Emergency medicine PA since 2012
- Love integrating nutrition into EM practice & teaching nutrition



@anniethepac

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Disclosures

- None

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Objectives

- Discuss the epidemiology of anorexia nervosa, Wernicke's encephalopathy, and refeeding syndrome
- Analyze the pathophysiology of starvation
- Recognize the clinical manifestations of anorexia nervosa, refeeding syndrome, and Wernicke's encephalopathy
- Explain diagnosis and appropriate management of anorexia nervosa, refeeding syndrome, and Wernicke's encephalopathy
- Describe appropriate nutritional rehabilitation and maintenance therapies for a starved patient

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Pretest Question #1

Approximately how long will patients with anorexia nervosa require increased calories to maintain their restored weight?

a) Once weight is restored, they have the same caloric requirements as the general population
b) 1 month
c) 3 months
d) 6 months

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Pretest Question #2

Which medication, if given before thiamine, can precipitate or worsen Wernicke encephalopathy?

a) Dextrose
b) 0.9% Normal Saline
c) Lactated Ringers
d) Methylprednisolone

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Pretest Question #3

Though refeeding syndrome can cause multiple electrolyte disturbances, the primary electrolyte responsible for disease manifestations is:

a) Potassium
b) Chloride
c) Phosphorus
d) Sodium

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Topics

- Anorexia nervosa
- Wernicke encephalopathy
- Refeeding syndrome

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AJ is a 19-year-old female

- Presents to the ED c/o bilateral lower extremity edema and dizziness
- BMI is 16.2
- HR is 55, BP is 90/50, and she has orthostatic hypotension
- When the RN hangs IV fluids, AJ asks, "Are there calories in that? I'm watching my weight."

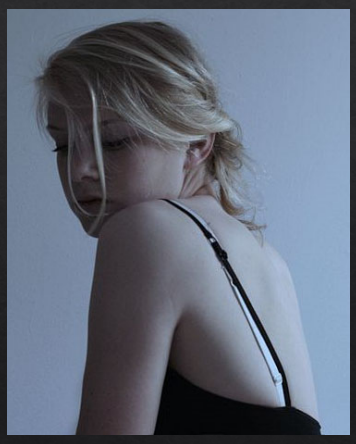

Image: https://commons.wikimedia.org/wiki/File:Worried_Women_2.jpg

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Anorexia Nervosa (AN)

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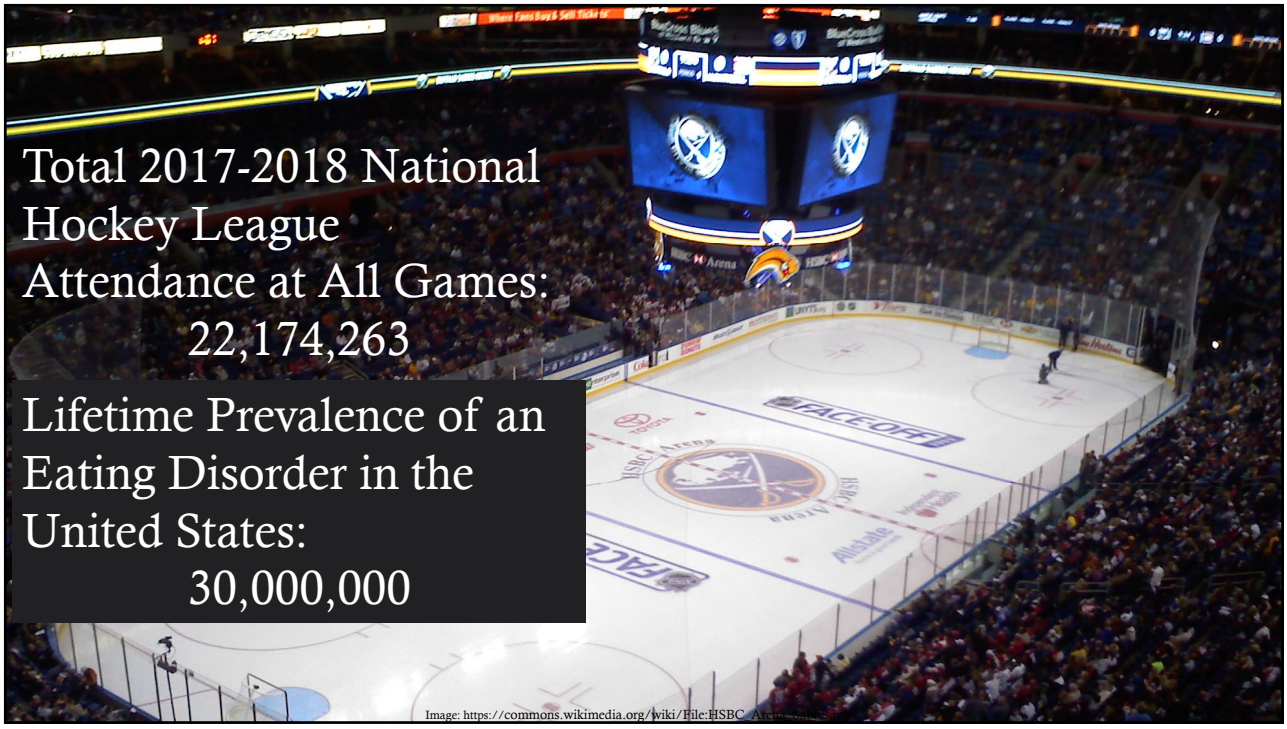

Image: https://commons.wikimedia.org/wiki/File:HSBC_Arena_...

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Eating Disorder Statistics

- Every 62 minutes someone dies from an eating disorder[1]
- Eating disorders have the highest mortality rate of any mental illness[2]
- 13% of women over 50 engage in eating disorder behaviors[3]
- 16% of transgender college students report an eating disorder[4]
- 3.3% of women and 2.6% of men developed an eating disorder while serving in the military[5]
- 1 in 5 anorexia deaths is by suicide[6]
- Nearly half of patients with anorexia nervosa have a comorbid mood and/or anxiety disorder[7]

1. Eating Disorders Coalition, 2016
2. Smink FE et al, 2012
3. Gagne DA et al, 2015
4. Diemer EW et al, 2015
5. Jacobson IG et al, 2009
6. Arcelus J et al, 2016

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Prevalence

1. Hudson JI et al, 2007
2. Swanson SA et al, 2011
Image by Manseok Kim, Pixabay

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Etiology

- Multifactorial
  - Biological
  - Behavioral
  - Social

Trace SE et al, 2013
Image: https://pxhere.com/en/photo/288565
Image: https://www.maxpixel.net
Image: https://picryl.com/media/gymnastics-female-performance-sports-e37af2

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DSM-5 Diagnostic Criteria

A. Energy intake restriction relative to requirements leading to a significantly low body weight

B. Intense fear of gaining weight or becoming fat, or persistent behavior that interferes with weight gain, even though at a significantly low weight

C. Disturbance in the way one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or persistent lack of recognition of the seriousness of the current low body weight.

American Psychiatric Association, 2015

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Subtypes & Coding

- Subtypes
  - Restricting type
  - Binge-eating/purging type
- Severity
  - Mild: BMI 17-18.49
  - Moderate: BMI 16-16.99
  - Severe: BMI 15-15.99
  - Extreme: BMI <15
- Remission
  - Partial
  - Full

American Psychiatric Association, 2015

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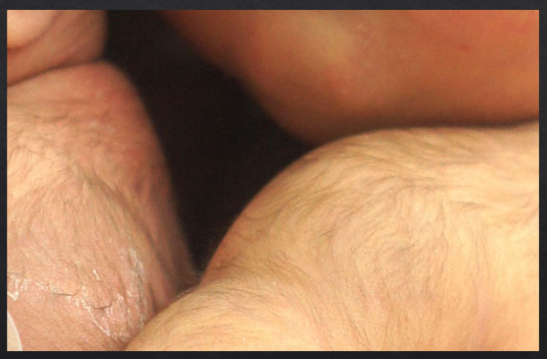
Clinical Presentation

- Emaciation, altered growth curves
- Hypothermia, cold extremities
- Menstrual disturbances or amenorrhea
- Lanugo
- Bradycardia, hypotension
- Skin, hair, nail changes
- Edema
- Hyperactivity or psychomotor retardation
- Depressed or anxious mood



Lanugo

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Intake & Weight-Related Manifestations

- Obsession or preoccupation with food
- Fear of foods, restricted repertoire of foods
- Overusing condiments and/or artificially sweetened products
- Food-related rituals
- Obsessive intake planning or tracking
- Overestimating number of calories consumed
- Fear of eating in public
- Exercise-related rituals

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Behavioral Manifestations

- Social withdrawal
- Denial of problem & resistance to weight gain
- Inflexible thinking & need for control
- Perfectionism
- Behavioral rigidity
- Sleep disturbance
- Low libido
- Self-induced vomiting, laxative abuse, over-exercising

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Eating Disorder Screening

- SCOFF – 5 clinician administered questions
- 2+ "yes" – sensitivity 100%, specificity 87.5%
  - Do you make yourself **S**ick because you feel uncomfortably full?
  - Do you worry you have lost **C**ontrol over how much you eat?
  - Have you recently lost more than **O**ne stone (14 lbs. or 6.35 kg) in a 3-month period?
  - Do you believe yourself to be **F**at when others say you are too thin?
  - Would you say that **F**ood dominates your life?

Morgan JF at al, 2000

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Diagnostics

- Clinical diagnosis
- CBC with differential: leukopenia and lymphocytosis
- CMP: hypokalemia, hypoglycemia
- ECG: ST/T changes, bradycardia, prolonged QTc
- Albumin & prealbumin: Low
- TSH: mild hypothyroidism
- 25-hydroxyvitamin D: low
- Values will normalize with nutritional rehabilitation and cessation of ED behavior

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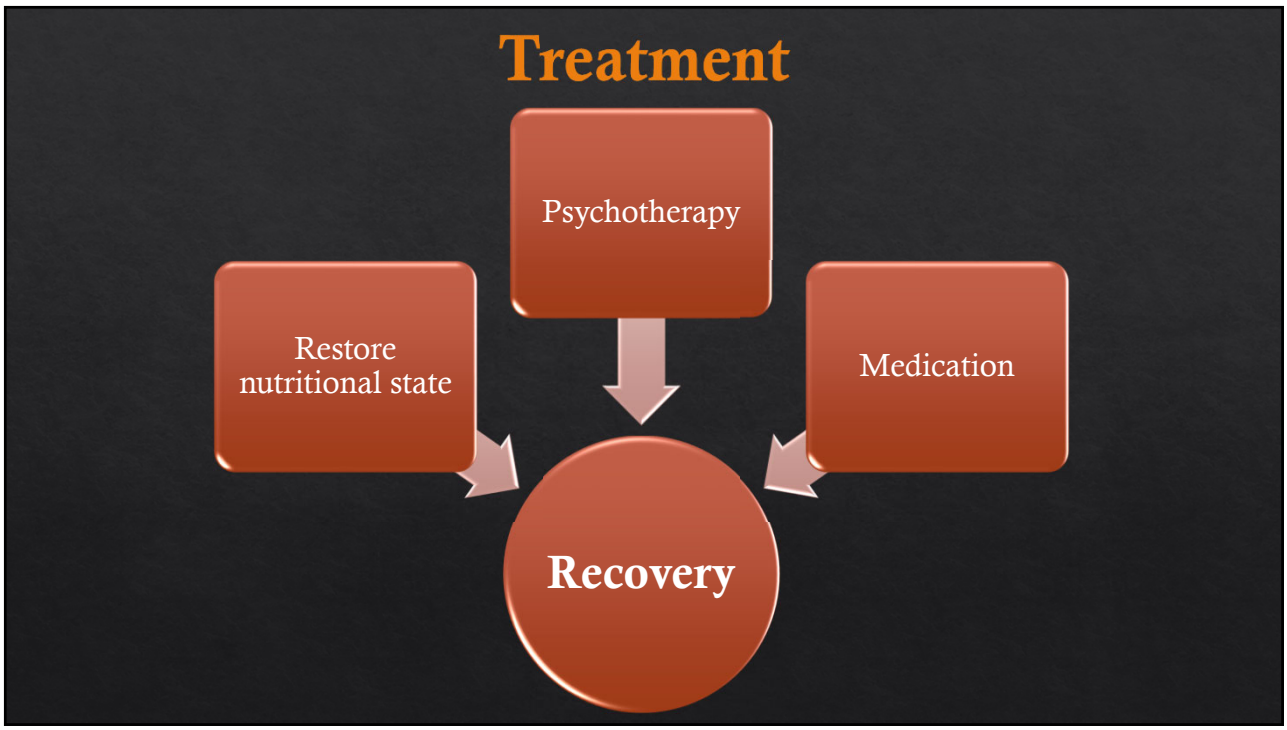
Treatment
Psychotherapy
Restore nutritional state
Medication
Recovery

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Restore Nutritional State

- First priority
- Refeeding syndrome is a concern
- Inpatient treatment if medically unstable
  - Pulse <40, BP <80/60
  - Orthostatic hypotension
  - Cardiac dysrhythmia
  - Cardiovascular, hepatic, or renal compromise
  - Marked dehydration
  - Serious medical complication of malnutrition (electrolyte imbalance, hypoglycemia, syncope)
  - BMI <15 or IBW <70%

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Nutritional Rehabilitation

- Settings
  - Inpatient hospitalization
  - Residential care
  - Partial hospitalization
  - Intensive outpatient
  - Outpatient
- Interdisciplinary approach recommended
  - Medical provider, dietitian, psychiatrist and/or psychologist

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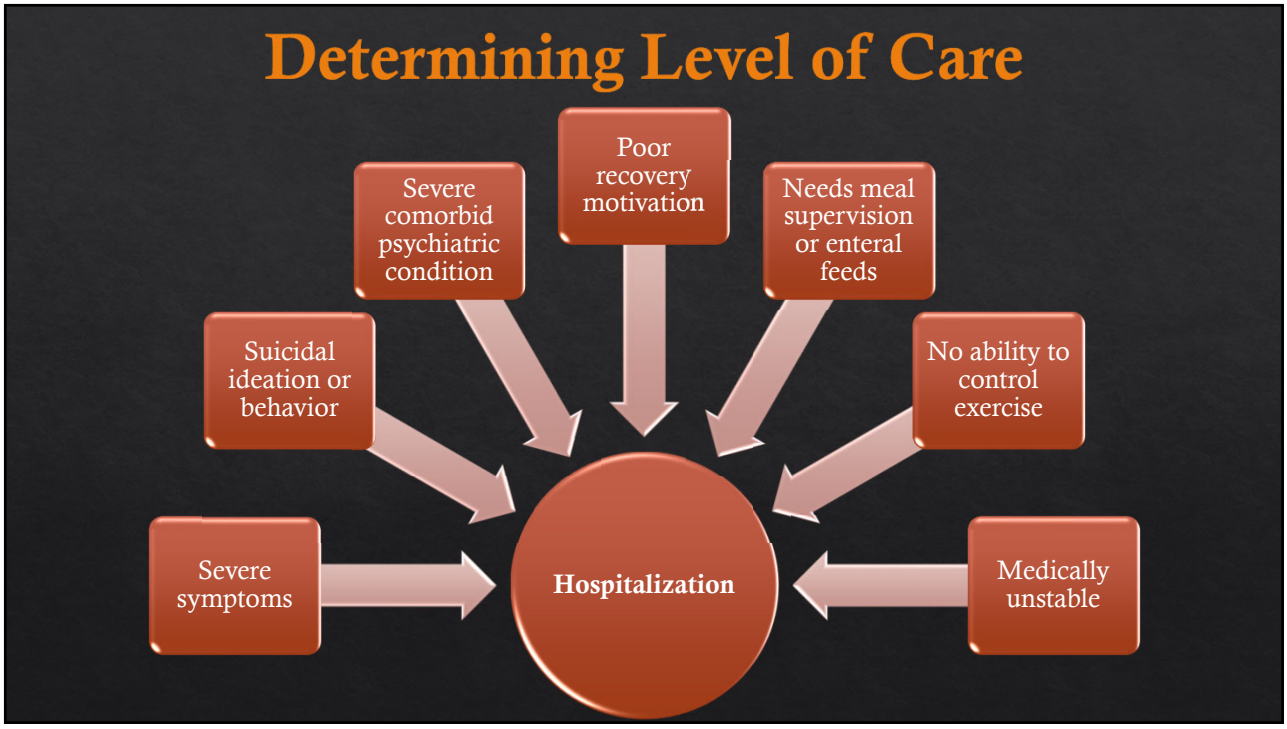
Determining Level of Care
Poor recovery motivation
Severe comorbid psychiatric condition
Needs meal supervision or enteral feeds
Suicidal ideation or behavior
No ability to control exercise
Severe symptoms
Hospitalization
Medically unstable

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Nutritional Rehabilitation

- Weight gain goals
  - Inpatient: 0.9 – 1.4 kg/week
  - Partial hospitalization: 0.5-0.9 kg/week
  - Outpatient: 0.2 – 0.5 kg/week
- Diet
  - Diet per USDA macronutrient guidelines
  - Include all major food groups
  - Daily multivitamin and mineral supplement
- Enteral feeding may be required
  - BMI <15 or highly refractory patients

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Caloric needs

- Goal to restore weight to healthy range – BMI ≥ 18.5
- 30-40 kcal/kg/day initially
- Consider starting 200 – 300 kcal over current intake to facilitate treatment alliance if medically stable
- As nutritional status improves, increased calories required to maintain weight gain
- Advance by 200 – 400 kcal every 2-4 days

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Complications

- Refeeding syndrome - rare
- Refeeding edema - common
  - Manage with bed rest and leg elevation; low sodium diets may help
- Constipation – common
  - Generally resolves with continued oral intake – NO LAXATIVES

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Refeeding Low Weight Hospitalized Adolescents With Anorexia Nervosa

A Multicenter Randomized Controlled Trial

- Evaluated initial rate of feeding in adolescents with AN
- Included 36 patients, age 10-16, with BMI <78% of normal and on a weight-losing trajectory
- Randomized to receive 500 kcal/day or 1200 kcal/day for initial refeeding; monitored over 10 days
- Measured QTc interval & serum phosphorus, magnesium, potassium
- Results:
  - Higher energy intervention group had greater wait gain at 10 days
  - No statistically significant difference between groups in QTc interval
  - Post-feeding phosphate concentration significantly related to initial BMI and WBC count, but not baseline energy intake

O'Connor et al, 2016

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Prognosis

- Relapse in up to 50% of patients
- Relapse less likely when closer to IBW at discharge
- Psychotherapy helpful
- High variety diets that include calorically-dense foods important
- Patients with restored weight have higher daily caloric requirements than controls
- 45-50 kcal/kg/day required for weight maintenance

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Psychotherapy & Pharmacotherapy

- Psychotherapy is essential
- No specific pharmacologic treatment for AN
- Treat comorbid disorder (depression, anxiety, etc.)
  - Avoid bupropion – increased seizure incidence in AN
- Avoid recommending exercise
  - Stretching, meditation, reading, art, music are appropriate

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Dronabinol in Severe, Enduring Anorexia Nervosa: A Randomized Controlled Trial

- Double-blind, RCT, crossover study in Denmark
- 24 adult women with AN included
- Dronabinol-placebo vs. placebo-dronabinol 4-week sequence with 4 week washout in between
- Results:
  - Dronabinol treatment participants gained 0.73kg (1.6 lbs) above placebo without severe adverse effects, $p<0.01$
  - Attitudinal and behavioral traits related to eating disorders unchanged during treatment with dronabinol or placebo

Andries A et al, 2014

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Treatment Pearls

- Treatment is terrifying for most patients
- Most patients will argue and criticize proposed treatment
- Family support of treatment is essential
- Emphasizing benefits may help patients get on board
- Empathy: regaining nutritional wellness is physically uncomfortable
- Compassion: stigma well-documented
- It takes a village

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AJ - ER Visit Continued

- Patient appears cachectic, is covered in lanugo, and has poor skin turgor. 2+ pitting edema bilateral lower extremities to the knee. Seems slightly dazed but answers questions correctly.
- You suspect anorexia nervosa
- K+ of 3.1, albumin of 2.6, glucose of 45
- What do you do next?

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Wernicke Encephalopathy

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Wernicke Encephalopathy (WE)

- Acute neurologic complication of thiamine (B1) deficiency
- Symptom Triad
  1. Encephalopathy
  2. Oculomotor disturbance
  3. Gait ataxia
- Clinical Diagnosis
- Can result in coma or death

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Epidemiology

- Risk factors: alcohol use disorder, malnutrition, increased metabolic requirement, increased water soluble vitamin loss
- 0.4 – 2.8% of patients with WE brain lesions at autopsy
- May be underdiagnosed clinically
- Chronic manifestation is Korsakoff syndrome

Harper C, 1983
Harper C et al, 1995

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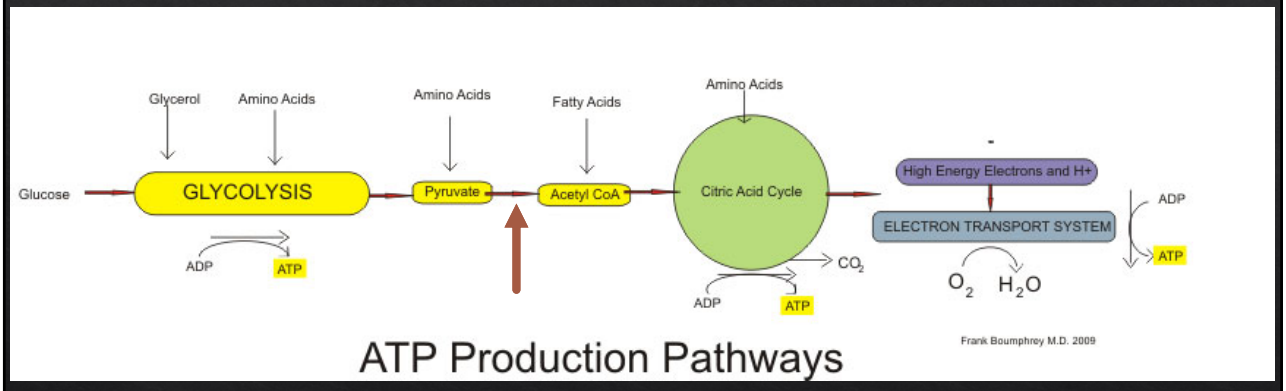
Role of Thiamine in Glucose Metabolism



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GLUCOSE BEFORE THIAMINE FOR WERNICKE ENCEPHALOPATHY: A LITERATURE REVIEW

- Included 19 papers: 13 case reports/series, 4 animal studies, 2 expert opinion articles
- No RCT, cohort studies, or case controlled studies found to exist
- Most frequently cited source never involved acute administration of glucose; only one case appeared to show acute mental status deterioration, but timeline and dose of glucose unclear
- All other case reports showed deterioration in mental status after prolonged or massive (>2L of D5%) glucose or evidence of WE before glucose administration
- Recommendation:
  - All patients with altered mental status should have glucose checked on arrival
  - Restore hypoglycemic patients to normoglycemia as soon as possible
  - Give thiamine IV as soon as possible to patients at risk for malnutrition

Schabelman et al, 2012

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Diagnosis & Treatment

- No laboratory studies diagnostic of WE
- Imaging studies not necessary, but can provide evidence
- Treat as soon as diagnosis entertained
- Treatment:
  - Thiamine 500mg IV TID x 2 days ***followed by***
  - Thiamine 250mg IV daily x 5 days
- Dextrose administration without thiamine may precipitate or worsen WE
- Administer thiamine before dextrose if reasonable or as soon as possible after normoglycemia achieved

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Unpeeling the Evidence for the Banana Bag: Evidence-Based Recommendations for the Management of Alcohol-Associated Vitamin and Electrolyte Deficiencies in the ICU

- Review article
- Patients with alcohol use disorder (AUD) are frequently prescribed a "banana bag"
- Thiamine dose in banana bag is likely insufficient for most patients with WE
- Conclusion: Dose thiamine as solo medication at sufficient dose

Typical Banana Bag Contents (in 1L 0.9% NS or D_5W)
Thiamine 100mg
Folic acid 1mg
Magnesium 1-2g
Multivitamin

Flannery AH et al, 2016

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Prognosis & Prevention

- Symptoms improve slowly – hours to weeks
- Residual deficits common
- Daily administration after WE until risk subsides
  - Thiamine 100mg PO daily
- Prevention with thiamine PO
- Thiamine is safe and low cost – supplement those at risk

Day E et al, 2004

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Back to AJ

- You give IV thiamine concurrently with IV dextrose. AJ initially resists the dextrose, but eventually agrees
- Oral potassium
- Continue lactated ringers
- Phosphorus level returns at 1.5 (normal 2.5-4.5 mg/dL)
- Admit to medicine & consult psychiatry and dietitian
- What next?

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Refeeding Syndrome

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Refeeding Syndrome

- Fluid and electrolyte shifts during aggressive nutritional rehabilitation of malnourished patients
- Hypophosphatemia is primary cause of clinical manifestations
- Can occur in any malnourished patient
- Can be fatal

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Epidemiology

- No clear incidence
- One study reported 8% of patients admitted to a community hospital internal medicine service in Amsterdam
- Incidence rates varied between 0% and 80% depending on definition and population in one review
- Highest risk in first two weeks of nutritional rehabilitation/weight gain

Kraaijenbrink BV et al, 2016
Friedli N et al, 2017

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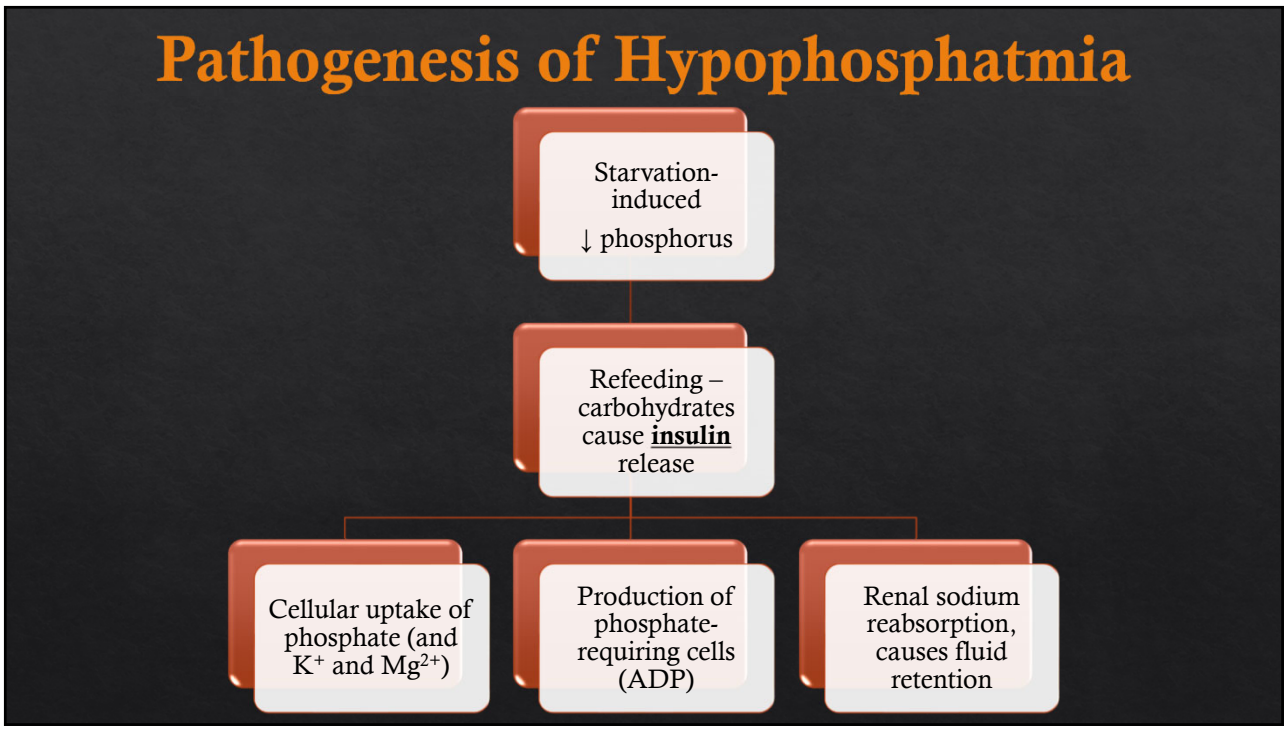
Pathogenesis of Hypophosphatmia
Starvation-induced
↓ phosphorus
Refeeding – carbohydrates cause **insulin** release
Cellular uptake of phosphate (and K^+ and Mg^{2+})
Production of phosphate-requiring cells (ADP)
Renal sodium reabsorption, causes fluid retention

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NICE Guidelines for RF Risk

One or more of:	Two or more of:
• BMI < 16 kg/m^2 • Unintentional weight loss of >15% in past 3-6 months • Little/no nutritional intake for >10 days • Low levels of potassium, magnesium, or phosphorus before refeeding	• BMI <18.5 kg/m^2 • Unintentional weight loss of >10% in past 3-6 months • Little/no nutritional intake for >5 days • History of alcohol misuse or drugs, including insulin, chemotherapy, antacids, or diuretics

Mehler PS, et al 2009

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Clinical Features & Diagnosis

- Clinical features
  - Hypophosphatemia, hypokalemia, hypomagnesemia
  - Thiamine deficiency
  - Volume overload
  - Rhabdomyolysis, seizures, and hemolysis can occur
- Diagnosis
  - Hypophosphatemia and signs of volume overload in a malnourished patient

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RF Treatment

- Hospitalize – telemetry
- Multidisciplinary team, dietitians ± nephrology
- Reduce/slow nutritional rehabilitation
- Optimize hydration status
- Aggressively correct electrolytes
- Manage related sequelae

Crook MA et al, 2014

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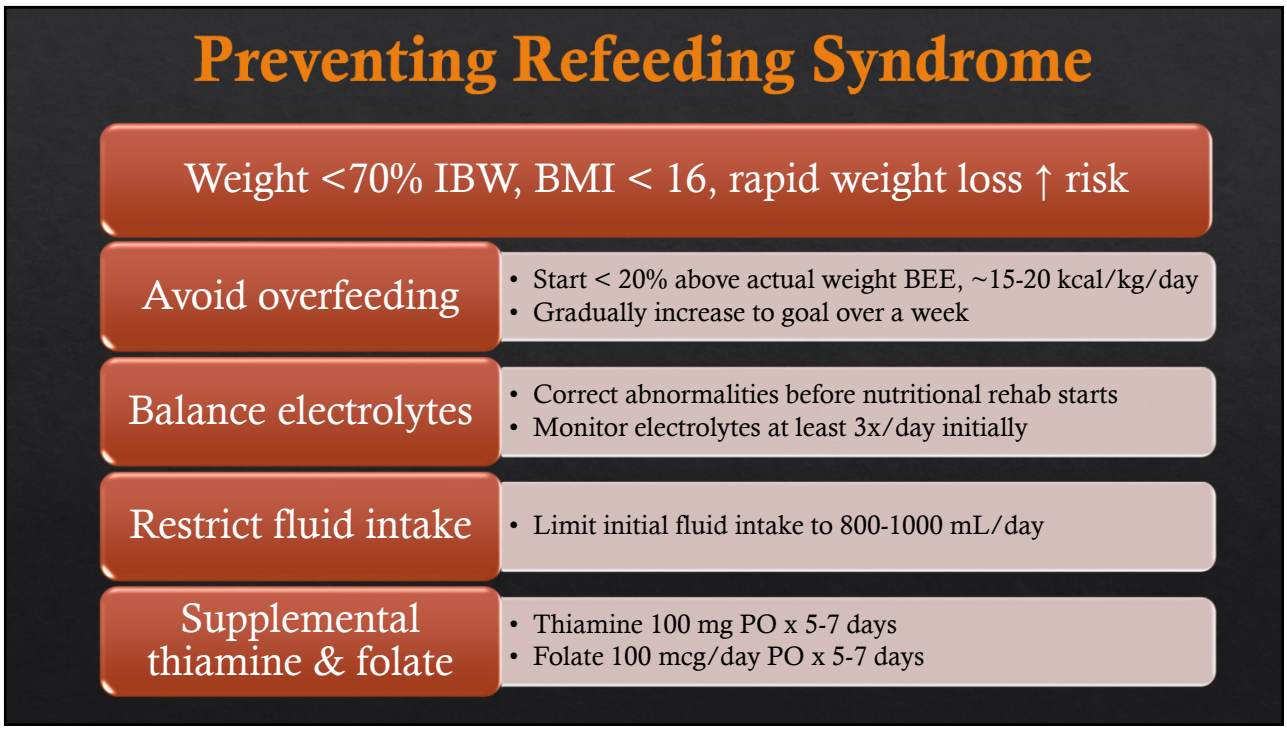
Preventing Refeeding Syndrome
Weight <70% IBW, BMI < 16, rapid weight loss ↑ risk
Avoid overfeeding
• Start < 20% above actual weight BEE, ~15-20 kcal/kg/day
• Gradually increase to goal over a week
Balance electrolytes
• Correct abnormalities before nutritional rehab starts
• Monitor electrolytes at least 3x/day initially
Restrict fluid intake
• Limit initial fluid intake to 800-1000 mL/day
Supplemental thiamine & folate
• Thiamine 100 mg PO x 5-7 days
• Folate 100 mcg/day PO x 5-7 days

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AJ – Day 1 Hospitalization

- Dietitian and hospitalist collaborate & agree on a plan
- Correct electrolyte disturbances 1st, then attempt slow refeeding starting at 15 kcal/kg/day
- Psychiatry sees patient- diagnoses with AN. Patient is very resistant to weight gain. Family arrives and with psychiatry/family encouragement, patient agrees to inpatient ED treatment after medically stabilized

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Key Points

- AN best treated by an experienced interdisciplinary team
- WE seen in more than alcohol misusers: remember the triad
- Give thiamine as soon as possible in suspected WE, preferably before dextrose
- Banana bags do not have enough thiamine to treat WE
- Correct electrolyte disturbances quickly before aggressive nutritional rehabilitation & slow down feeding and correct if they occur

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Question #1

Approximately how long will patients with anorexia nervosa require increased calories to maintain their restored weight?

a) Once weight is restored, they have the same caloric requirements as the general population
b) 1 month
c) 3 months
d) 6 months

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Question #2

Which medication, if given before thiamine, can precipitate or worsen Wernicke encephalopathy?

a) Dextrose
b) 0.9% Normal Saline
c) Lactated Ringers
d) Methylprednisolone

55

Question #3

Though refeeding syndrome can cause multiple electrolyte disturbances, the primary electrolyte responsible for disease manifestations is:

a) Potassium
b) Chloride
c) Phosphorus
d) Sodium

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Thank You

Contact: awildermuth8@gwu.edu

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Special thanks to Dr. Daniel Gih, Assistant Professor, UNMC Department of Psychiatry, for your inspiration and collaboration.

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