Eating Disorders:

Identification and Treatment

Michelle Jorgensen MD

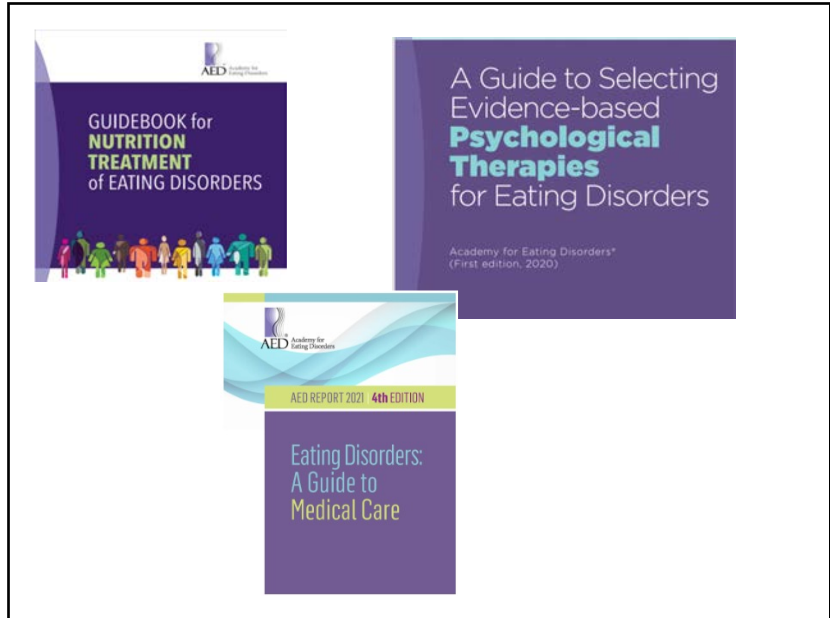
Sanford Health System

Eating Disorder Unit

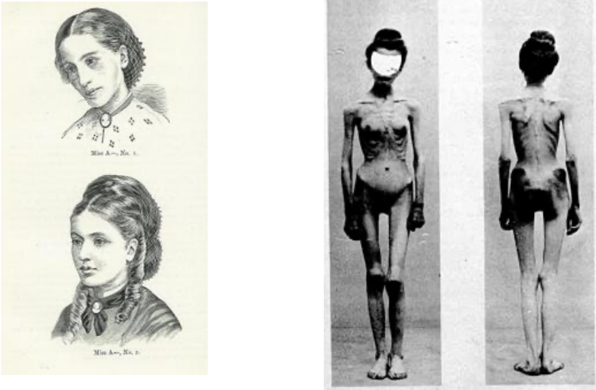
Resources for Providers in the community

https://www.nationaleatingdisorders.org/

https://www.aedweb.org/



History of Eating Disorder



Subtypes of Eating Disorders

- Anorexia Nervosa
- Bulimia nervosa
- Avoidant Restrictive Food Intake Disorder (ARFID)
- Binge eating disorder
- Other specified Feeding or Eating Disorder

- PICA
- Rumination Disorder

How common?

- Anorexia: 3.6% lifetime prevalence women. .3% men
- Bulimia: 3% female 1% males
- Binge Eating Disorder: 2 - 5%
- ARFID ?

- Problematic Eating Behaviors: 15 - 40%

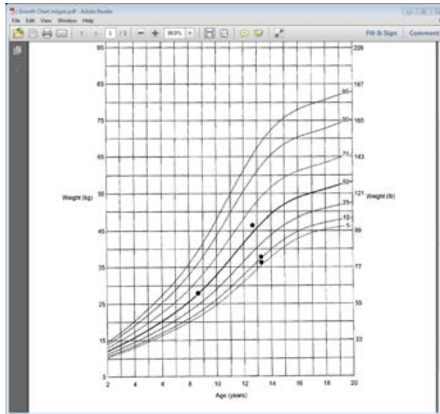
SCOFF

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

Risk Factors for Eating Disorderse

- Genetics
- Age
- Race/Socioeconomic Status
- Family History/Genetics
- Societal Emphasis on Thinness
- Personality characteristics
- High risk activities

Julia



EKG Tracings

EKG Link

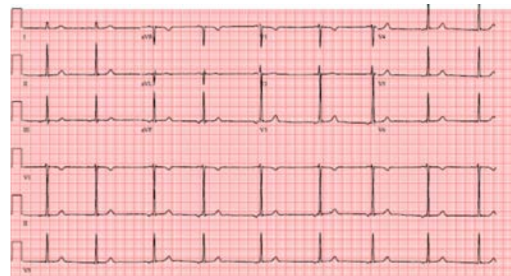
Component

EKG

WAVEFORM

Low right atrial bradycardic rhythm with varying Pwave morphology
No previous tracing available

Ventricular Rate: 53 BPM
Atrial Rate: 53 BPM
P-R Interval: 140 ms
QRS Duration: 84 ms
Q-T Interval: 436 ms
QTc Calculation(Bazett): 409 ms
Calculated P Axis: -79 degrees
Calculated R Axis: 78 degrees
Calculated T Axis: 51 degrees



Anorexia Nervosa

Restriction of energy intake relative to requirements, leading to a significantly low body weight in the context of age, sex, developmental trajectory, and physical health.

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

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 persistent lack of recognition of the seriousness of the current low body weight.

Specify whether:
Restricting type:
Binge-eating/purging type

Metropolitan Tables Ideal Body Weight -1959 Female

Height	Small Frame	Medium Frame	Large Frame
4'09"	90-97	94-106	102-118
4'10"	92-100	97-109	105-121
4'11"	95-103	100-112	108-124
5'00"	98-106	103-115	111-127
5'01"	101-109	106-118	114-130
5'02"	104-112	109-122	117-134
5'03"	107-115	112-126	121-138
5'04"	110-119	116-131	125-142
5'05"	114-123	120-135	129-146
5'06"	118-127	124-139	133-150
5'07"	122-131	128-143	137-154
5'08"	126-136	132-147	141-159
5'09"	130-140	136-151	145-164
5'10"	133-144	140-155	149-169

BMI Chart

Color key: Underweight (blue), Healthy (green), Overweight (yellow), Obese (orange), Extremely obese (red)

HEIGHT in/cm \ WEIGHT lbs (kgs)	100 (45.5)	105 (47.7)	110 (50.0)	115 (52.3)	120 (54.5)	125 (56.8)	130 (59.1)	135 (61.4)	140 (63.6)	145 (65.9)	150 (68.2)	155 (70.5)	160 (72.7)	165 (75.0)	170 (77.3)	175 (79.5)	180 (81.8)	185 (84.1)	190 (86.4)	195 (88.6)	200 (90.9)	205 (93.2)	210 (95.5)	215 (97.7)
5'0" - 152.4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
5'1" - 154.9	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	36	37	38	39	40
5'2" - 157.4	18	19	20	21	22	22	23	24	25	26	27	28	29	30	31	32	33	33	34	35	36	37	38	39
5'3" - 160.0	17	18	19	20	21	22	23	24	24	25	26	27	28	29	30	31	32	32	33	34	35	36	37	38
5'4" - 162.5	17	18	18	19	20	21	22	23	24	24	25	26	27	28	29	30	31	31	32	33	34	35	36	37
5'5" - 165.1	16	17	18	19	20	20	21	22	23	24	25	25	26	27	28	29	30	30	31	32	33	34	35	35
5'6" - 167.6	16	17	17	18	19	20	21	21	22	23	24	25	25	26	27	28	29	29	30	31	32	33	34	34
5'7" - 170.1	15	16	17	18	18	19	20	21	22	22	23	24	25	25	26	27	28	29	29	30	31	32	33	33
5'8" - 172.7	15	16	16	17	18	19	19	20	21	22	22	23	24	25	25	26	27	28	28	29	30	31	32	32
5'9" - 175.2	14	15	16	17	17	18	19	20	20	21	22	22	23	24	25	25	26	27	28	28	29	30	31	31
5'10" - 177.8	14	15	15	16	17	18	18	19	20	20	21	22	23	23	24	25	25	26	27	28	28	29	30	30
5'11" - 180.3	14	14	15	16	16	17	18	18	19	20	21	21	22	23	23	24	25	25	26	27	28	28	29	30
6'0" - 182.8	13	14	14	15	16	17	17	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27	28	29
6'1" - 185.4	13	13	14	15	15	16	17	17	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27	28
6'2" - 187.9	12	13	14	14	15	16	16	17	18	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27
6'3" - 190.5	12	13	13	14	15	15	16	16	17	18	18	19	20	20	21	21	22	23	23	24	25	25	26	26
6'4" - 193.0	12	12	13	14	14	15	15	16	17	17	18	18	19	20	20	21	22	22	23	23	24	25	25	26

2 to 20 years: Girls
Stature-for-age and Weight-for-age percentiles

NAME ______________
RECORD # ______________

Mother's Stature ______ Father's Stature ______

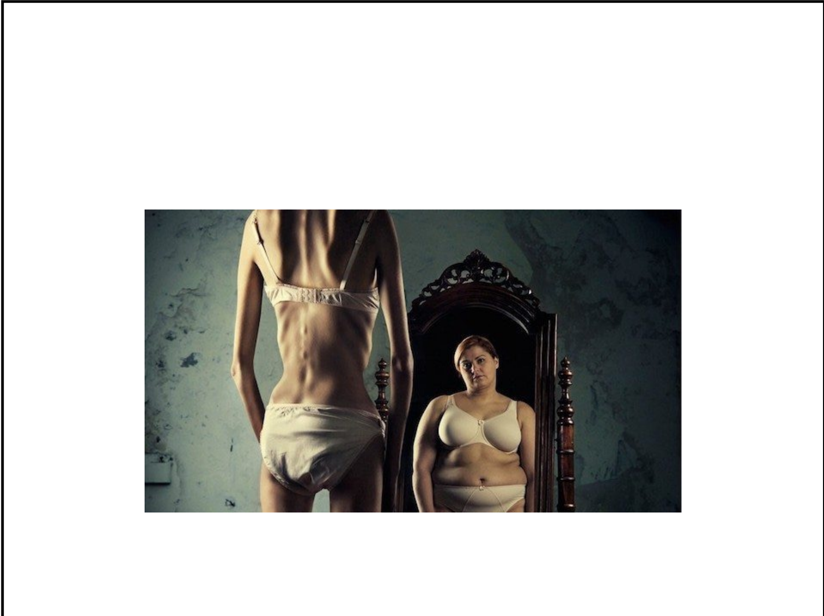
Date	Age	Weight	Stature	BMI*

AGE (YEARS)

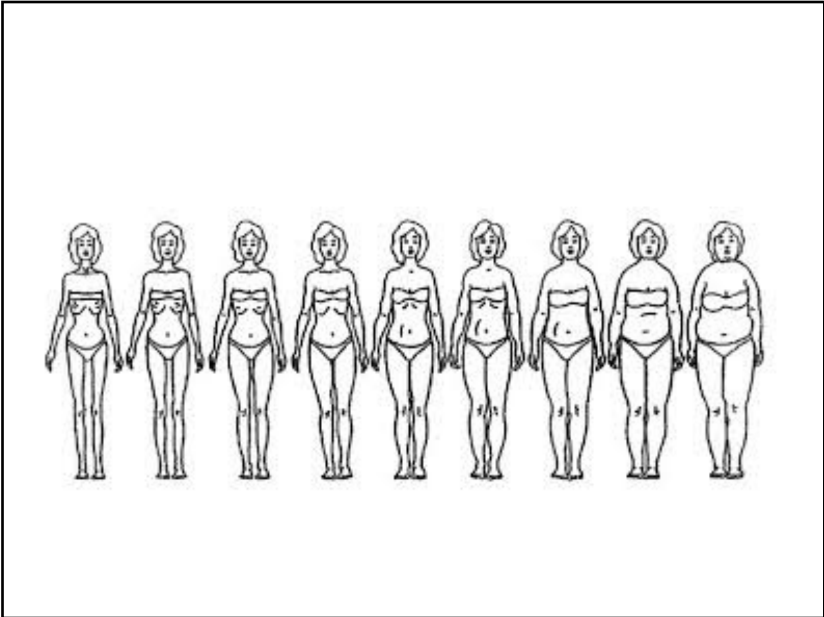
STATURE

WEIGHT

Published May 30, 2000 (modified 11/21/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts



15



16

Anorexia Nervosa: Behavioral Signs

- Restrictive eating
- Odd food rituals
- Fear/avoidance of food situations
- Rigid exercise rituals
- Dressing in layers

MEDICATIONS

- THERE ARE NO FDA approved medications for adolescents with eating disorders.

RCT for AN

- Olanzapine
  - Am J Psychiatry. 2008 Oct;165(10) Olanzapine in the treatment of low body weight and obsessive thinking in women with anorexia nervosa: a randomized, double-blind, placebo-controlled trial. Flexible dosing 2.5 mg to 15 mg showed "improvement". greater rate of increase in weight, earlier achievement of target body mass index, and a greater rate of decrease in obsessive symptoms
  - Attia E at Eating Disorder research society annual meeting 2018. 152 people. 1 lb per month weight gain in olanzapine group vs. placebo.
  - Meta-analysis Olanzapine in the treatment of anorexia nervosa: a systematic review. Egyptian Journal of Neurology, psychiatry and neurosurgery. 2020 56:60. Short term < 8 weeks higher dose > 5mg is effective in treatment of eating disorder.

Negative controlled trials for Anorexia Nervosa

- Pimozide – 4 to 6 mg – no significant weight change
- Sulpiride 300 to 400 mg – no significant weight change.(not available in the US)
- Cisapride – 10 mg TID cisapride improves gastroparesis/distress with refeeding (no longer available in the US due to concerns re: long QT)
- Clonidine – 500-700 mcg/day no beneficial effect
- Benzodiazepines – 75 mg alprazolam. did not improve calorie intake and increase fatigue without improving anxiety
- Zinc—14 mg daily zinc one RCT increased BMI

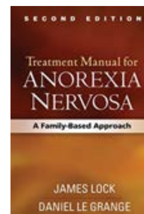
Negative for Anorexia Nervosa

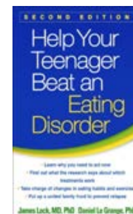
- Tetrahydrocannabinol
  - dronabinol in AN (1 kg per 4 weeks)
  - Δ9-THC at a high dose, found no effect
- Lithium – One double blind placebo controlled trial - no significant overall difference.
- Cyproheptadine –
  - “marginal effect” on decrease number of days to goal weight. Antidepressant effect.
  - “effective” in inducing weight gain in a subgroup of patients with AN who (a) history of birth delivery complications, (b) lost 41-52 per cent weight (from norm” and (c) history of prior outpatient treatment failure.
- Amitryptyline – 2 studies. 160mg max. no impact on weight gain or maintanence
- Clomipramine – 50 mg – lower weight gain compared to placebo
- Nortriptyline – no improvement as compared to fluoxetine
- Fluoxetine –
  - Limited effectiveness (all SSRI) due to malnutrition – tryptophan DID NOT potentiate effects.
  - 2006 study of fluoxetine after weight restoration (19 BMI) – did not differ from placebo in prevention relapse

21

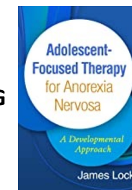
Psychotherapy for Anorexia Nervosa - Adolescent

- Family Based Treatment – **First line treatment** of Adolescent (19 or younger) with Anorexia Nervosa
  - At 6 months 40 % FBT achieved full remission vs 18% Adolescent focused therapy



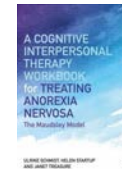


- Adolescent Focused therapy – **ONLY IN SPECIALIZED EATING DISORDER TREATMENT SETTING**



22

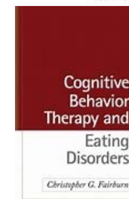
Psychotherapy Interventions for Anorexia Nervosa - Adults



Maudsley Model of Anorexia Nervosa Treatment for Adults - MANTRA
- NICE guidelines recommended treatment for adults with Eating Disorders

Cognitive Behavior Therapy – Enhanced.

Specialist Supported Clinical Management –SSCM



MOSAIC trial -MANTRA, SSCM, CBT-E
- 40% drop out (equal among groups)
- improvement in BMI – 50% (after removing drop outs) healthy weight at 1 year
- Patient rating more positive MANTRA

Helpful websites for Anorexia Nervosa

Academy for Eating Disorders – www.aedweb.org

NEDA – NationalEatingDisorders.org

F.E.A.S.T- https://www.feast-ed.org/

Maudlsey - http://www.maudsleyparents.org/

Other behavioral treatments for Anorexia Nervosa

- Case series support **Acceptance and Commitment therapy** for AN. RCT not more effective than TAU.
- **Cognitive remediation therapy** – as adjunct – improvement in cognitive patterns, treatment retention.
- **rTMS** – positive and negative RCT. NIH RCT in process – completion date 2024
- NO RCT for **dialectical behavioral therapy** for AN
- **Self Help** –evidence helpful as adjunct to face to face for motivation and relapse prevention
  - One RCT internet relapse prevention after inpatient AN completers greater weight gain than TAU

MEGAN

Glucose	89
Sodium	131** (135-1450
Potassium	2.8 ** (3.5 to 5.3)
Chloride	76** (99 to 110)
CO2	36** (20-29)
Anion Gap w/K	22** (6-20)
BUN	28** (6-22)
Creatinine	2.11
Calcium	9.2
Phosphorus	3.2
Magnesium	2.8** (.2-1.2)
ALT	13
AST	20
Total Protein	8.8** (3.5 to 5)
Amylase	215 ** (50-80)

Component

EKG

WAVEFORM

Normal sinus rhythm
Prolonged QT interval or tu fusion, consider myocardial disease, electrolyte imbalance, or drug effects
Abnormal ECG

Ventricular Rate: 69 BPM
Atrial Rate: 69 BPM
P-R Interval: 142 ms
QRS Duration: 96 ms
Q-T Interval: 466 ms
QTC Calculation(Bazett): 499 ms
Calculated P Axis: 79 degrees
Calculated R Axis: 82 degrees
Calculated T Axis: 63 degrees

Bulimia Nervosa- **DSM-5** Diagnostic Criteria

A. Recurrent episodes of binge eating characterized by BOTH of the following:
   1. Eating in a discrete amount of time (within a 2 hour period)large amounts of food.
   2. Sense of lack of control over eating during an episode.
B. Recurrent inappropriate compensatory behavior in order to prevent weight gain (purging).
C. The binge eating and compensatory behaviors both occur, on average, at least once a week for three months.
D. Self-evaluation is unduly influenced by body shape and weight.
E. The disturbance does not occur exclusively during episodes of anorexia nervosa.

Bulimia Nervosa: Behavioral Signs

- Binge eating (food gone, wrappers present)
- Eating in secret
- Avoidance of social situations with food
- Bathroom visits/showers after meals
- Abuse of diet pills/laxatives/diurectics
- Rigid/intense exercise

Bulimia Nervosa

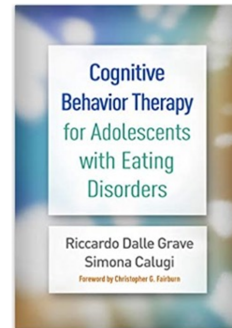
Medication Efficacy for Bulimia Nervosa – IN ADULTS
Fluoxetine – FDA Approval in adults   60 – 80 mg daily

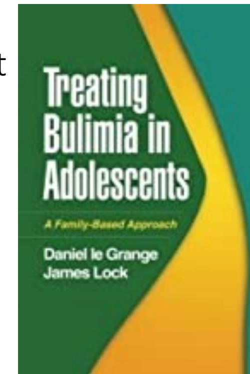
2nd Line Treatments for Bulimia Nervosa – in ADULTS

- Fluvoxamine – 200 mg day – reduction binge eating and purging episodes
- Citalopram – 20 to 40 mg daily -- statistically significant decrease both in binge-eating crises and purging episodes, reduced craving for carbohydrates and, modest reduction average caloric intake
- Sertraline – 100 mg daily. statistically significant reduction in the number of binge eating crises, purging, Mild reduction in caloric intake.
- Amitriptyline, 150 mg per day more effective than placebo in reducing binge eating (72 percent versus 52 percent) and vomiting (78 percent versus 53 percent
- Imipramine, 176 to 300 mg per day, more beneficial than placebo
- Desipramine 150 mg/day. frequency of binges decreased 84%
- Trazodone – 250 mg to 600 mg daily the number of binge eating and vomiting episodes significantly decreased
- Phenelzine 45 mg daily. significantly fewer binges per, lower Eating Attitudes Test score. Side effects problematic
- Topiramate – 25 mg to 400 mg. Binge and purge behaviors are reduced, improvements in self-esteem, eating attitudes, anxiety, and body image.
- Ondansetron – 4 mg TID reduced number of binge/purge episodes and time spent in episodes

Behavior Therapy BN Adolescent

- **Family Base Therapy**
- **Cognitive Behavior Therapy - Enhanced**





33

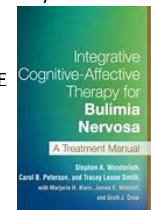
Behavioral Therapies for Bulimia Nervosa (BN)-ADULTS

First Line

- Cognitive Behavior Therapy Enhanced (CBT-E)
  - Effective in treatment of BN
- Integrative Cognitive Behavior Therapy
  - Effective in Treatment of BN –equal to CBT-E

Second Line

- Interpersonal Psychotherapy
  - Effective in treatment of BN
- Psychodynamic psychotherapy –
  - Effective in Treatment of BN
- Guided Self Help
  - More effective than no treatment for BN



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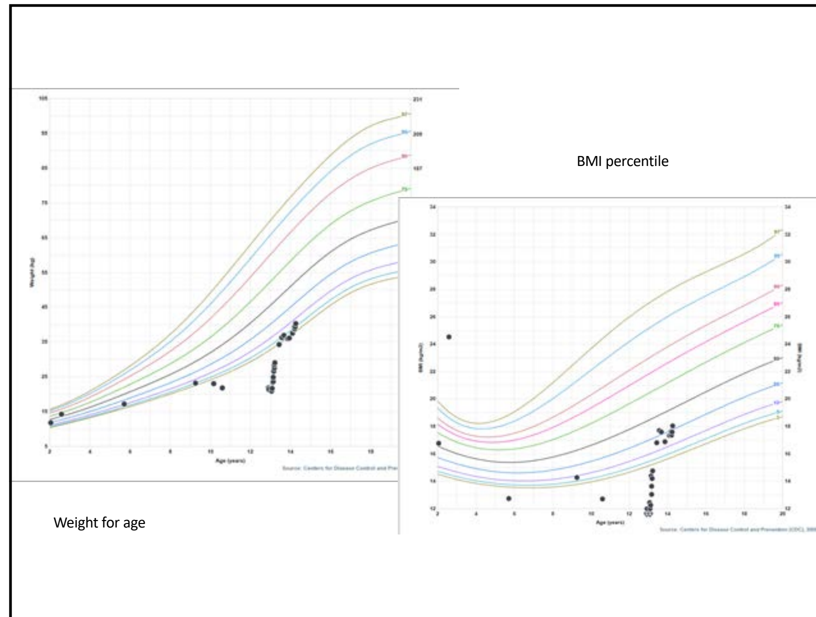


35

Avoidant Restrictive Food Intake Disorder

Lack of interested in food, avoidance based on sensory characteristics, concern about aversive consequences of eating

- Weight loss or failure to achieve expected gains
- Significant nutritional deficiency
- Dependence on enteral feeding or oral nutritional supplements
- Marked interference with social functioning

36

Avoidant Restrictive Food Intake Disorder

Medication Treatment – NO controlled trials

- Mirtazapine - Uncontrolled open trial14 individuals – mirtazapine showed greater weight gain
- Cyproheptadine increases appetite and weight gain in all age groups of underweight patients (not specific to ARFID)
- Olanzapine – retrospective chart review

Behavioral Therapy for ARFID

- Family Based Treatment for Children/Adolescent – case reports
- Cognitive Behavior Therapy – case reports, case series
- Applied Behavior Analysis – case reports

Binge Eating Disorder

Recurrent episodes of binge eating. An episode of binge eating is characterised by both of the following:

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 and under similar circumstances.

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).

The binge eating episodes are associated with three or more of the following:

eating much more rapidly than normal
eating until feeling uncomfortably full
eating large amounts of food when not feeling physically hungry
eating alone because of feeling embarrassed by how much one is eating
feeling disgusted with oneself, depressed or very guilty afterward

Marked distress regarding binge eating is present
Binge eating occurs, on average, at least once a week for three months

BED treatment

- Psychotherapy
  - CBT
  - Interpersonal Psychotherapy
  - DBT
- Medications
  - Lisdexamfetamine (Vyvanse) - FDA approved FOR ADULTS

Binge Eating Disorder

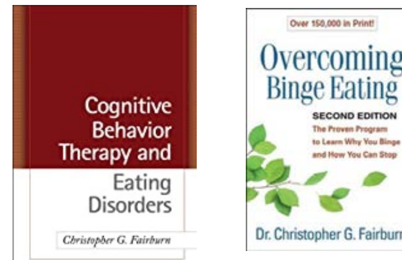
FDA approved Medications for BED	Medication shown effective
Lis-dexamfetamine • 50-70 mg daily	• Fluvoxamine – 150 mg – 300 mg daily – decreased binge eating behavior. Wt loss (2.7 lbs vs. 0.3lbs placebo) • Citalopram – mean dose 57 mg daily Wt loss (4.7 lbs vs 0.4 lbs placebo) – doses above 40 mg typically not used. • Sertraline – mean dose 187 mg. Effective for binge eating. 100-200 mg daily in a single dose. • Duloxetine- mean dose 78.7 mg. impact on frequency of binge eating. • Bupropion • Topiramate – 200 to 300 mg daily. Effective in treating BED. Weight loss seen over the long term. • Zonisamide – mean daily dose 436 mg. Weight loss (10.6 vs 2.2 lbs placebo). (200-600 mg daily). • Acamporsate 666 mg TID. Decrease in binge day frequency.

NOT EFFECTIVE FOR BED

- Fluoxetine – did not separate from placebo in BED. 60-80 mg daily effective in bulimia nervosa.
- Escitalopram – 26.5 mg/day. Not more effective than placebo in binge eating components.
- Lamotrigine – mean dose 236. Did not separate from placebo for binge eating.

Treatment for BED

- Cognitive Behavior Therapy
- Interpersonal therapy



PICA

A. Persistent eating of nonnutritive, nonfood substances over a period of at least 1 month.
B. The eating of nonnutritive, nonfood substances is inappropriate to the developmental level of the individual.
C. The eating behavior is not part of a culturally supported or socially normative practice.
D. If the eating behavior occurs in the context of another mental disorder (e.g., intellectual disability [intellectual developmental disorder], autism spectrum disorder, schizophrenia) or medical condition (including pregnancy), it is sufficiently severe to warrant additional clinical attention.

PICA

Rule out medical contribution (anemia)

Behavioral Treatment with RCT evidence

- Contingent Reinforcement
- Discrimination Training
- Physical restraint

Rumination Disorder

- Repeated regurgitation of food for a period of at least one month. Regurgitated food may be re-chewed, re-swallowed, or spit out.
- The repeated regurgitation is not due to a medication condition (e.g., gastrointestinal condition).
- The behavior does not occur exclusively in the course of anorexia nervosa, bulimia nervosa, BED, or avoidant/restrictive food intake disorder.
- If occurring in the presence of another mental disorder (e.g., intellectual developmental disorder), it is severe enough to warrant independent clinical attention.

Rumination Disorder

- Medication Treatment - case
  - Simethicone 120 mg decreased regurgitation by 74%
  - Baclofen 10 mg TID subjective improvement in regurgitation 63%

NO EVIDENCE/negative studies
- TCA/SSRI
- H2 blokers
- Proton pump inhibitor
- Prokinetics
- Antiemetics
- Nissen Fundoplication – effective short term – not in the long term

Diagnosis and treatment of Rumination Syndrome a Critical review. Am J gastronenterol. 2019 April. 562-578.

Behavioral Treatment Rumination Disorder

- **Diaphragmatic Breathing** - first line
  case report, chart review, open clinical trial, 1 RTC

CBT-RD (from CBT-E) – some positive evidence

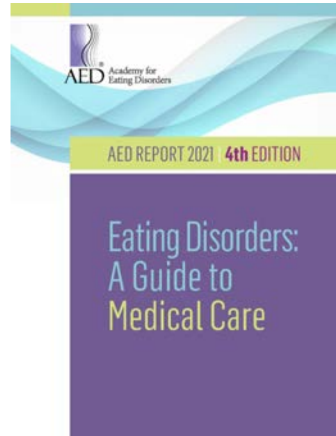
Night Eating Syndrome

- Diagnostic Criteria
- Hyperphagia – consumption greater than or equal to 25% of daily calories after dinner and/or nocturnal awakenings accompanied by food intake and (3 of 5)
  1. Morning Anorexia
  2. Insomnia
  3. Desire to Eat between dinner and bedtime
  4. Ned to eat to fall asleep or return to sleep
  5. Depressed mood, most often at night

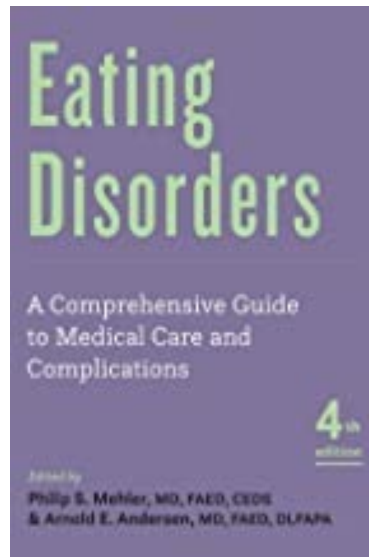
Night Eating Syndrome

- Medication Treatment – Studies in Adults only
  - Phototherapy- 10,000 lux 30 minutes in the morning – improvement NES in 14 sessions.
  - Sertraline – improvement in NES and quality of life
  - Escitalopram- improvement in NES and depression
  - Case reports Topiramate – improvement in NES

Medical Complications of Eating Disorders



https://www.aedweb.org/medical-care-standards



Eating Disordered Behaviors

- Starvation
- Self Induced Vomiting
- Laxative Abuse
- Diuretic Abuse
- Diet Pills
- Ipecac Syrup
- Other Purging Behavior
  - Insulin Abuse
  - Prolonged Lactation
  - Enemas
  - Chewing and spitting
  - Rumination
  - Sweating

Prevalence of behaviors in Eating Disorders

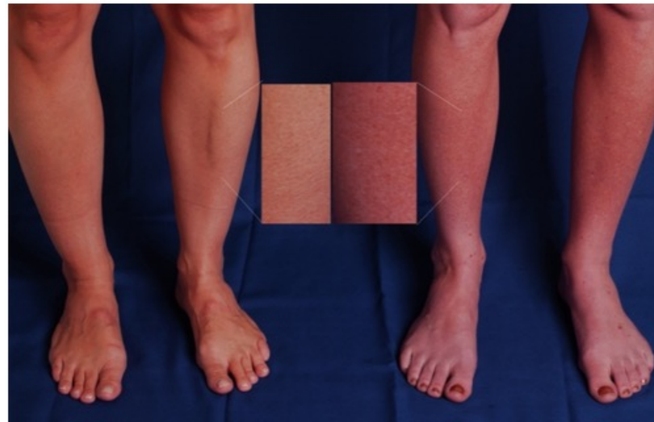
Behavior	Prevalence
Vomiting	90%
Laxatives	60%
Diet Pills	50%
Fasting	40%
Rumination	30%
Chew and Spit	20%
Diuretics	15%
Ipecac	8%
Enemas	7%
Saunas	5%
Water Loading	30%

SKIN

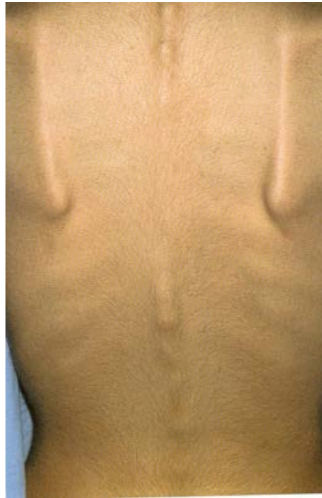
- Xerosis (dry skin)
  - Nutritional deficiency/altered sebaceous gland secrection
- Hypertrichosis lanuginosa (lanugo hair) - women
- Increase Striae distensae (stretch marks) - men
- Telogen effluvium (hair loss)
  - Increased number of hairs in telogen phase (resting phase)
- Nail fragility
- Acrocyanosis
  - Arterial constriction/venous dilation ??energy saving
- Purpura and easy bruising
  - secondary to thrombocytopenia

55

acrocyanosis



56



Lanugo

Head, Ears, Eyes, Nose, Throat

Anorexia Nervosa

- Lagophthalmos – inability to fully close eye leading to irritation
  - secondary orbital fat wasting
- Autophonia – hyperperception of one’s own voice/breathing
  - Loss of eustation tube fatty tissues
- Otopharyngeal dysphagia –n weakness of swallowing muscles

Bulimia Nervosa

- Dental erosion
- Increased dental cariers
- sialadenosis

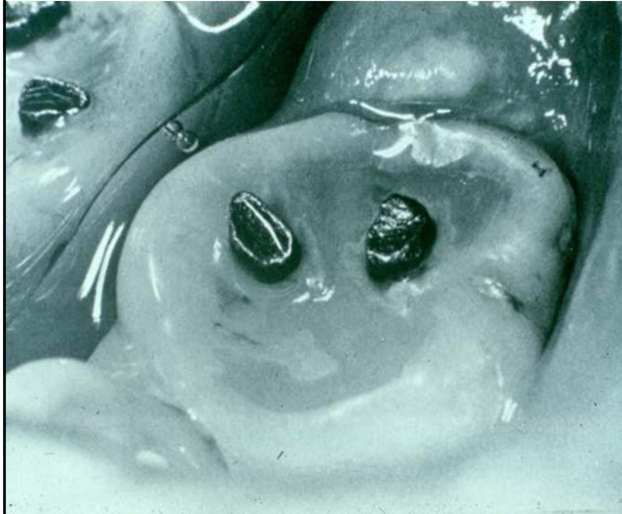
sialadenosis

59

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

60



Enamel Erosion

Dental Care After Purging

- Swish and spit after purging (DO NOT BRUSH)
- Rinse with alkaline mouthwash
- Dental consult for pro-enamel toothpaste

Pulmonary

- Aspiration Pneumonia –
  - oropharyngeal weakness
  - purging via emesis

Cardiac

- Sudden Cardiac Death
  - QT prolongation secondary to hypokalemia secondary to purging/laxative abuse
- Mitral Valve Prolapse – cardiac muscle wasting secondary malnutrition
- Pericardial Infusion – 1/3 of AN due to level of malnutrition

COMMON

- Hypotension/orthostatic hypotention – AN and BN
- Bradycardia – in AN
  - Secondary to increased vagal tone
- Arrythmia secondary to electrolyte imbalance (purging subtypes)

Gastrointentestional

- Gastroparesis of malnutrition – near universal as wt loss increases
  - Bloating
  - Constipation
  - Early satiety
  - Nausea
- Pancreatitis
- Superior Mesenteric Artery Syndrome
  - Treatment soft liquid diet/feeding tube (surgery NOT recommended)
- GERD –
  - H2 blocker/proton pump inhibitor
  - Cessation of purging
- Mallory-Weiss Tear/Esophageal Rupture
- Cathartic Colon Syndrome – laxative abuse
  - Reduction/loss of peristalasis

Gastric Motility/Fullness

Metoclopramide 5 to10mg TID

Erythromycin 500 mg TID

2nd Line

Prochlorperazine 5 to10 mg TID

Ondansetron 8mg daily

Omeprazole 20mg BID

Simethicone 180mg TID

Bowel Regimen

- Psyllium Fiber twice daily/Power Pudding QID
- Colace 200mg BID
- Magnesium Hydroxide 2400 mg daily
- Miralax 17gm in 8 oz fluid QID
- Lactulose 30ml QID
- Glycerin suppository
- Fleets Enema
- GoLytely

Hepatic

- Starvation Hepatits – greater weight loss – secondary autophagy
- Refeeding elevation AST/ALT
    - Decrease carbohydrate/simple carbohydrate load to allow resolution (2 to 3 days)

Hematology/Immunology

- Anemia (low hemoglobin)
- Leukopenia (low leukocytes)
- Neutropenia (low neutrophils)
- Thrombocytopenia (low platlets)
- Pancytopenia in the very low weight
- Decrease bone marrow cellularity/gelatinous bone marrow transformation

Endocrine

- Hypoglycemia
  - Depleted glycogen stores
  - Common cause of sudden death in AN
- Hypothyroid
  - Low T3/LowT4/Normal thyrotryptan
  - Disregulated HPT axis
  - AN and normal weighted BN
- Reduced Estrogen and Androgens
  - Osteopenia/osteoporosis – Decrease bone formation/increase reabsorption
  - Growth hormone resistance – decrease insulinlike growth factor 1
  - Within 6 months of loss of menstrual cycle
  - Men > Women
- **TRANSDERMAL ESTROGEN – effective to protect bone**
- **Weight restoration with resumption of menses – Effective to protect bone**
- NO EVIDENCE THAT ORAL CONTRACEPTIVES OR ORAL ESTROGEN REPLACMENT PRESERVE BONE

Renal and Electrolytes

- Hypokalemic Nephropathy – purging
- Pseudo-Bartter Syndrome with cessation of laxative use or purging
  - Gentle fluid resuscitation
  - Spironolactone
- HYPOPHOSPHATEMIA – refeeding syndrome
  - Depletion of total body phosphorus/intracellular shifting
  - Phosphorus monitored and supplemented orally (or IV)
- THIAMINE deficiency
  - Case reports Wernicke Korsakoff in adolescent with AN with refeeding

Initial workup

- Low Weight (BMI 18.5 or less, significant drop on growth curve)
- Height, weight, calculate BMI percentile for <20
- Plot on growth Chart
- Lying and standing HR and BP
- Oral Temperature
  - Comprehensive Metabolic Profile
  - EKG
  - CONSIDER
    - TSH (sick euthyroid possible)
    - Gonadotropins
    - ESR
    - Prealbumin

Initial Workup - Purging

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