Nutritional aspects of Eating Disorders

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Outline

- Role of the dietitian within the ED team
- Nutritional response to starvation
- Metabolism and nutritional requirements
- Anthropometry
 - Why is weight so important in treatment and -recovery?
 - Children and Adolescent growth and development –what's normal
 - Weight parameters, calculation and tips
 - Recognising & measuring risk
- Dietary intake typical vs ED
- Re-nourishment process
- Busting dietary myths

Eating Disorder Facts and Figures

- 70 million cases of ED's worldwide
- 90% are aged 12 25yrs

- BED is 3 times more common than AN and BN 40% of those with BED are males
- Girls who diet frequently are 12 times more likely to binge as girls who don't
- 1/3 of non-overweight girls reported dieting
- Overweight girls are more likely to engage in extreme dieting behaviours
- 35% of normal dieters progress to pathological dieting, of which 20 – 25% progress to partial or full syndrome EDs
- Diet industry is a 50 billion dollar/yr industry

Dietetic Role

- Examine current nutritional status and identify deficits, refeeding syndrome risk
- Assess the risk of low weight on growth and development
- Gain info about eating behaviours & beliefs
- Provide nutritional guidance to achieve safe re-nourishment, weight restoration or maintenance, physical development, flexible and intuitive eating

Pathophysiology of starvation

Insufficient energy
 ↓ insulin ↑glucagon

 Activation of hormone sensitive lipase.

5-↑ Fatty acids +glycerol
 delivered to the liver
 → ketone production

7- Shift to ketone and glucose metabolism

9- Muscle wasting – amino acid production



Institute of Child Health/ UCL - Nutrition Unit

2- Depleted glycogen stores in muscles and liver

> 4- Adipose tissue breakdown

6- Gluconeogenesis Amino acid and glycerol = glucose Brain, retina and nephrons

8- Serum electrolytes maintained: Bone and tissue catabolism Increased renal tubular reabsorption Dehydration

> 10- Autonomic nervous system disturbances – bradycardia, QT Interval prolongation.

Metabolism in starvation

- Healthy adolescents have very high energy requirements due to pubertal growth phase
- Low wt adolescents with AN have reduced requirements due to:
 - Depleted fat stores lead to:
 - Increase in cardiac vagal tone
 - Bradycardia
 - Hypotension
- Conservation of energy

Fuel used in starvation MARSIPAN



Figure 1 The five metabolic stages between the postabsorptive state and the near-steady state of prolonged starvation (62).

Ketones in starvation



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Figure 2 Concentrations of ketone bodies and plasma free fatty acids (FFA) in transition from the postabsorptive state to 4–6 weeks of starvation in a large number of subjects, male and female. Note the more than three orders of magnitude change in β -hydroxybutyrate and the doubling of FFA. Data courtesy of Dr. O. E. Owen.

Nutritional Requirements in ED

- Increased in ED 1.5 to 2 times higher
- 2 3 times higher than adults/parents in the home
- Brain MRI show comparisons between an anorexic brain and an individuals with alzheimers – brain substance loss, deficits are seen over time

The YP can still be achieving well for now



The percentage figures indicate the energy (calorie) needs as a percentage of the energy needs of an average adult woman.



The percentage figures indicate the energy (calorie) needs as a percentage of the energy needs of an average adult man.

Anthropometry – Weight

- Weight alone has limited use
 - Normal changes seen due to wt, ht and BMI throughout childhood and puberty
- Useful for tracking changes
- Cannot compare against population norms without taking into account ht, gender & age
- BMI centile charts
- Use %BMI calculator www.marsipan.org.uk
 - Actual BMI/(median weight for age and gender) x100

ate of birth:	30/12/2002					sex:	male		
ate of visit)	Weight (kg)	Height (cm)	BMI	Weight centile	Height centile	BMI centile	Weight for height		
9/01/2019	43.60	172.50	14.65	1.55	44.87	0.03	73.43		
4/01/2019	44.60	172.50	14.99	2.21	44.64	0.10	75.08		
24/01/2019	44.60	1/2.50	14.99	2.10	44.16	0.09	75.02		
0/01/2019	45.00	172.50	15.1Z 15.12	2.30 2.30	43.97	0.14	75.67		
1/02/2019	45.00	172.50	15.12	2.50	43.04	0.15	76.25		
8/02/2019	45 40	172.50	15.26	2.48	42.98	0.19	76.23		
5/02/2019	45.60	172.50	15.32	2.58	42.66	0.22	76.50		
6/03/2019	45.40	172.50	15.26	2.30	42.25	0.18	76.11		
3/03/2019	45.60	172.50	15.32	2.39	41.94	0.21	76.40		
20/03/2019	46.40	172.50	15.59	3.06	41.63	0.41	77.70		
7/03/2019	46.40	172.50	15.59	2.97	41.32	0.40	77.66		
4/04/2019	46.60	172.50	15.66	3.06	40.97	0.46	77.94		

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W4H Chart 🖉 Patient Record 🏒 Quick Reference Guide 🏒 About W4H 🏒 ધ /

50th Centile BMI values

age	boys girls				
years	Kg/	/m2			
9	16.037	16.399			
9.25	16.125	16.515			
9.5	16.219	16.637			
9.75	16.318	16.765			
10	16.423	16.898			
10.25	16.533	17.036			
10.5	16.648	17.179			
10.75	16.768	17.327			
11	16.892	17.478			
11.25	17.02	17.634			
11.5	17.154	17.793			
11.75	17.291	17.954			
12	17.433	18.117			
12.25	17.579	18.281			
12.5	17.729	18.446			
12.75	17.881	18.61			
13	18.037	18.772			
13.25	18.194	18.932			
13.5	18.354	19.09			
13.75	18.514	19.244			
14	18.675	19.395			
14.25	18.836	19.542			
14.5	18.997	19.684			
14.75	19.158	19.822			

age	boys	girls
years	, Kg/	/m2
15	19.317	19.955
15.25	19.475	20.083
15.5	19.632	20.206
15.75	19.786	20.324
16	19.938	20.438
16.25	20.087	20.547
16.5	20.234	20.652
16.75	20.378	20.751
17	20.519	20.847
17.25	20.656	20.938
17.5	20.791	21.026
17.75	20.923	21.11
18	21.052	21.19
18.25	21.178	21.267
18.5	21.301	21.342
18.75	21.422	21.413
19	21.54	21.482
19.25	21.655	21.548
19.5	21.768	21.612
19.75	21.878	21.674
20	21.986	21.735

BMI = weight in kg/ (height in metres)²

%mBMI = (actual BMI/50th Centile BMI) x 100 [see chart]

Example 14.5 year old girl, Weight: 30kg Height: 158cm BMI: 30/(1.58x1.58) = 12kg/m² 50th Centile BMI: 19.684 kg/m² %mBMI = (12/19.684 x100) = 61%





JunioMARSIPAN



Girls				
Weight change 50 th Weight Centile	Net increase	Age	Weight change 50 th Weight Centile	Net Increase
45 - 50kgs	5kgs	13– 14 yrs	43 - 49kgs	6kgs
50 - 53kgs	3kgs	14 – 15 yrs	49 - 55.5kgs	6.5kgs
53 - 55.5kgs	2.5kgs	15 – 16 yrs	55.5 – 61kgs	5.5kgs
55.5 - 57kgs	1.5kgs	16 - 17yrs	61 - 64.5kgs	3.5kgs
57 - 57.5kgs	0.5kgs	17 – 18yrs	64.5 - 67kgs	2.5kgs
Totals				
45 –57.5kgs	12.5kgs	13 – 18yrs	43 – 67kgs	24kgs

Adapted from the UK RCPCH Growth Charts (2012)

Weight - practical tips

- Same type of clothing
- Aim for same day and time of day
- No shoes
- Ask YP to attend bathroom before weighing
- Ensure nothing hidden in clothing
- Hair bun style or wet
- Check timing of last meal
- Fluid loading

Fluid loading

- IL = 1kg in weight gain
- > YP can be consuming up to 5L/d
 - Early satiety
 - Decrease appetite
 - Induce vomiting
 - Alter weight
- Check volume consumed pre-weighing
- Check time of last bathroom visit, request YP attends bathroom pre-weighing
- May need to re-weigh post appointment

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Version 4.23 UK

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Patient name: X

Peady

Date of birth: 01/08/2000

sex: female

About W4H

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Date of visit	Weight (kg)	Height (cm)	BMI	Weight centile	Height centile	BMI centile	Weight for height
14/09/2018	42.40	162.50	16.06	0.90	42.88	0.44	75.64
17/09/2018	42.80	162.50	16.21	1.11	42.87	0.58	76.35
20/09/2018	44.60	162.50	16.89	2.58	42.87	1.86	79.55
25/09/2018	45.00	162.50	17.04	3.04	42.86	2.31	80.25
05/10/2018	43.40	162.50	16.44	1.48	42.84	0.87	77.36
12/10/2018	42.60	162.50	16.13	0.99	42.82	0.49	75.92
19/10/2018	45.00	162.50	17.04	3.01	42.80	2.26	80.17
26/10/2018	44.20	162.50	16.74	2.13	42.79	1.41	78.72
05/11/2018	45.20	162.50	17.12	3.24	42.78	2.47	80.47
09/11/2018	44.80	162.50	16.97	2.74	42.78	1.98	79.75
16/11/2018	44.60	162.50	16.89	2.51	42.78	1.75	79.37
23/11/2018	42.60	162.50	16.13	0.96	42.78	0.46	75.79
05/12/2018	44.60	162.50	16.89	2.49	42.77	1.72	79.31
10/12/2018	44.20	162.50	16.74	2.08	42.76	1.35	78.58
14/12/2018	44.60	162.50	16.89	2.48	42.75	1.70	79.28
18/12/2018	44.40	162.50	16.81	2.27	42.74	1.51	78.92
21/12/2018	44.20	162.50	16.74	2.07	42.73	1.33	78.55
04/01/2019	45.80	162.50	17.34	4.00	42.71	3.18	81.35
08/01/2019	45.60	162.50	17.27	3.69	42.71	2.87	80.99
18/01/2019	45.40	162.50	17.19	3.40	42.71	2.56	80.60

Chart Layouts	Chart Styles



RSIP % median BMI alone not enough

- Hudson et al. 2012: BMI indices alone are poor proxies for medical instability in early onset Eds. >40% of cases with medical instability had BMI >2nd centile.
- Medical instability can occur at any BMI threshold with weight loss
- Thorough clinical assessment, including cardiovascular observations, essential in any young person presenting with weight loss¹.

Hudson LD, Nicholls DE, Lynn RM, Viner RM (2012) Medical Instability and Growth of Children and Adolescents with Early Onset Eating Disorders)



Parameters	RED	AMBER	GREEN	BLUE
% median BMI	<70% (0.4 th C)	70 - 80% (0.4 th -2 nd C)	80 - 85% (2 nd - 9 th C)	>85% (>9 th C)
Weight loss	+1kg/wk x2wks	0.5 – 1kg/wk x 2wks	Up to 0.5kg/wk	Nil
Hydration	Fluid refusal Severe dehydration (10%) reduced urinary output, dry mouth, tachycardia	Severe fluid restriction moderate dehydration	Fluid restriciton mild dehydration (<5%)	Not clinically dehydrated
Biochemical abnormalities	Low K, PO4, Na, Ca, hypoglycaemia, hypoalbuminaemia	Low PO4, K, Na, Ca	None	None
Disordered eating	Acute food refusal 400- 600kcals/d	Severe restriction, <50% daily requirement, purging	Moderate restriction bingeing	

Rate of weight loss

- Vital to establish same
- Risk Ax Junior Marsipan
- Use drop in clothing size if unable to quantify
- GP weight hx
- Growth and development charts from early childhood
- Pictures pre-eating disorder (mobile phone)

Weight loss – watch out!

<u>%</u>Weight Loss

- 11yr old girl
- 30.2kg
- 25th Centile for wt
- 9th Centile for ht
- ▶ W4H= 95.9% BMI
- 1kg/wk loss x 3wks = 9%
- Prev. wt 47kg, 160% BMI
- Actual weight loss
- 17kg x 16mths
- % wt loss = 36%

<u>**Rate</u> of weight loss**</u>

- 12yr old ğirl
- ▶ 38kg
- 25th Centile for wt
- ▶ 50th Centile for ht
- ▶ W4H =90.7%
- 1kg/wk loss x 8 wks = 17%
- Clinically signigficant

Blue for %BMI Red for weight loss

Blue for %BMI Red for weight loss

Dietary intake – getting it right

- Detailed account of past 3 days
- Food diary x 5/7, pre- appointment
- Try to avoid prompting
- Return to fill in the gaps
- Exact fluid intake
- Avoiding food groups dairy/CHO/fat
- Skipping meals
- Stopping snacks

Dietary intake – getting it right

- How much of that did you eat?
- What type of milk/spread/crisps, Low fat option?
- Pattern of eating ? Extended periods of fasting
- Kcals counting
- What was previous intake like 6, 9, 12 mths ago?
- Eating pattern and food choices pre Eating Disorder?
- Vegetarianism/veganism?
- Food rules

Fluid intake- ask!

- Quantify
 - Use examples glass, water bottle, can
 - Is it a mug or a cup
 - How many glasses/cups?
- Timing
 - Pre-meals
 - On appointment day

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- 11yr old girl
- ¼ of a slice of buttered toast at B + L + D = 160kcals
- 1actimel + 1 flavoured milk = 300mls & 270kcals
- Total intake =430kcals
- Meeting ~20% of energy needs

- 12yr old girl
- 500kcals or less x 10d
- Acute food refusal x 2d
- Minimal fluid
- Clinical evidence of dehyrdration –dry mucus membranes
- ▶ PO4 0.88 (0.9 1.1)
- Tachycardia
- ?hypovolemia

Red

Disordered eating Hydration

Red

Disordered eating Hydration Biochemistry

What's normal?

- B: Cereal + milk, toast + peanut butter
- MM: Banana + yoghurt
- L: Chicken salad mayo sandwich + crisps + orange
- MA: scone with butter + jam, milky coffee
- D: spaghetti bolognaise, garlic bread x 3 pieces, salad + OJ
- S: Cereal + milk

Boys 15 –18 meeting 2530kcals/d

- B: Muesli with natural yoghurt
 + banana + OJ
- MM: apple
- L: wholemeal roll + tuna + mayo + sweetcorn Low fat yoghurt + water
- MA: tea with milk + 2 digestive biscuits
- D: Jacket potato with butter, chicken breast, veg + gravy + lce-cream + water
- S: Fruit + water

Girls 15-18 meeting 2100kcals/d

What's normal?

- Snacking
- 83% of adolescents consume at least 1 snack/d
- Children snack ~3times/d
 - Consuming up to 27% of their energy needs in the form of desserts and sweetened drinks

Nutrition minefield

- Should I start slowly or dive straight in?
- Should I include my child in food decisions?
- Should I add more Carbohydrate?
- Is low fat milk ok?
- Is your child fearful of foods they used to love to eat?
- Why is my child eating only the same foods?
- Has the whole family changed to 'healthy eating'?

Plate by plate

- > You are in charge of all meals and snacks $\sqrt{}$
- Challenge Food Rules $\sqrt{}$
- Calorie counting x
- Food exchanges x
- Measuring/weighing food x
- Tools required: Dinner plate
- Aim: Help you to re-nourish and restore a child's health in the least restrictive manner, achieve food freedom and lasting recovery.

Step 1 -Choose a plate

▶ 10" / 25cm

Not suitable





Step 1 - Choose a plate

Suitable





Step 3 – Fill up the plate



Step 4 - Decide how many meals; how many snacks

- 3 meals/d
- 2 –3 snacks /d
 - Depending on the amount of snacks already consumed
 - Contain 2 –3 food groups
 - Don't use 2 of the same food group in 1 snack
 - Limit Fruit and Veg as snacks

Step 5 – Variety

- Important to challenge food rules
- Challenge Eating Disorder
- 'Fear foods'

Step 6 - Review the plate

- Final check over of the plate
- Are you happy with the food choices?
- Does it encompass all 5 food groups (meal)?
- Does it encompass 2 –3 food groups (snack)?
- Is the plate full?
- Have you challenged your child?

Ex. of a diet history: 13yr old girl with AN

- B: nil
 - (doesn't have time)
- MM: apple + 2 satsumas water (250mls)
- L: nil
 - (doesn't like to eat in front of peers) finishes water bottle (700mls)
- MA: green tea + sugar free jelly + 6 strawberries
- D: sweet potato, grilled fish+ veg x 2+ 2 gls of water

(nil butter, sauce added, prepares own dinner)

- S: dry crackers x 4 + 3 cups of green tea post dinner + 2 gls of water
 - Won't eat past 7pm

What's missing?

- Carbohydrate X
- Protein X
- Dairy X
- ► F&V ~

2/9 portions met1/3 portions met0/4 portions met5/5 portions met

 Requirements: E:2460kcals, P:41g, F: 2.1L

 Energy
 X
 28% met, 700kcals

 Protein
 X
 66% met, 27g

 Fluid
 X
 145% met, 3L

ED behaviours

- Avoiding food groups dairy + carbohydrate
- Nil snacks
- Increased fibre ensuring 5 F&V /d
- Increased fluid intake
- Restricted dietary intake
- kcals counting, <1000kcals/d</pre>
- Green tea increased metabolism myth
- Cut off for last meal
- Avoidance of fats, sauces, spreads

Avoidance behaviours

- Chop/shred/crumb food into small pieces
- Hide food under other food items
- Hide food under the table/napkin
- Feed a sibling
- Feed the family pet
- Place food in pockets/down clothes
- Arguing at mealtimes/creating a diversion
- Spoiling food deliberately/reheating
- Studying for prolonged periods of time

Minimising distress

- Choosing only pre-packaged foods with evident kcals
- Choosing foods with clear labelling
- Watching and inspecting food being prepared and cooked
- Ritualised behaviours

ED rules

- max. 3 wheat containing foods a day
- must have at least 2 brown/wholemeal foods a day
- none of the exact same foods a day or two `relating' foods (like sweet potato and mixed root veg fries)
- max. 2 flour containing foods a day
- must have 1 dairy containing food daily (even if i don't want it)
- must have 1 plant based protein and 1 quorn/processed protein

ED rules

- must have max. 2 processed foods in a meal
- must eat a food higher in fat if I eat a food higher in protein (to not waste it)
- can only have one chocolate/chocolate flavoured food if i have only chocolate fortisips
- must eat DIFFERENT snacks/meals every day and cannot repeat the same meal the next day (unless porridge or cereal)
- if i have a higher calorie snack, then i must have a lower calorie meal (and swap)
- high calorie snacks/meals must only be eaten on days where i do more walking/exercise

ED rules

- max. 200 calories for morning snack (always lower) max. 150 calories for afternoon snack (excluding fruit and soya milk)
- i will add a wheat product (even if i don't want it) if i have more meals/snacks that don't contain wheat
- i must finish my foods at a time that ends with 0 or 5 (i will wait until the next time if i pass my planned time)
- *i must finish half of my food 10 minutes before the time i plan to finish (not before)*
- i cannot use the microwave for over 3 minutes altogether in a day (if i use it, i only put a food in for 20-30 seconds

Dairy the facts!

Туре	Protein (g)	Calcium (mg)	Energy (kcals)	Carbohydrate (g)	Sugars (g)	Fat (g)	Saturated Fat (g)
Almond drink	1.0g	240mg	48kcals	6.0g	6.0g	2.2g	0.2g
Soya	6.0g	240mg	78kcals	5.0g	5.0g	3.6g	0.6g
Soya light	4.0g	240mg	44kcals	0.2g	0.2g	2.4g	0.4g
Coconut drink	0.2g	240mg	40kcals	5.4g	3.8g	1.8g	1.8g
Oat drink	2.0g	240mg	90kcals	13g	8g	3.0g	0.4g
Lactofree	6.8g	252mg	114kcals	5.6g	5.6g	7.0g	4.4g
Lactofree Skimmed	7.2g	248mg	80kcals	6.0g	6.0g	3.0g	1.8g
Whole milk	6.8g	244mg	130kcals	9.4g	9.4g	7.2g	4.6g
Semi- skimmed milk	7.2g	248mg	100kcals	9.6g	9.6g	3.6g	2.2g
Skimmed milk	7.2g	258mg	78kcals	9.8g	9.8g	<1.0g	<0.2g

Dairy the facts!

- 7 x more protein in Dairy Milk compared to Almond or 35 x more than Coconut beverages
- Coconut drink 100% of fat saturates
- Skimmed milk least amount of fat, with all the protein and calcium
- B12 60% less in non-dairy drinks
- A glass of milk provides:
- 16% of your daily protein needs
 1% of your daily carbohydrate needs
 2% of your daily fat needs
 25% of your calcium needs

Dairy the facts!

- Calcium requirements increase dramatically from about the age of 11 years – pre-pubertal growth spurt.
- A lack of calcium can lead to poor mineralization of bones and low bone mineral density.
 - Osteopenia
 - Osteoporosis
- Once in a lifetime opportunity to build strong bones.
 - ~ 30% of all mineral deposited in our bones throughout life, occurs during adolescence
 - 90% of our adult skeleton is formed by the age of 18 and even earlier in girls.
 - Essential that enough calcium is received to allow this to happen.

Myth 1 – Skipping breakfast is a good way to start the day

- Causes irritability and tiredness
- Decreased concentration
- Increases thoughts about food

Myth 2 – No treats

- Adds to rule making
- Increases Eating Disorder control
- Necessary for teenagers to snack and havetreats

Myth 3 – Not eating before 3pm or past 6pm

- Calories cannot tell the time!
- Body digests food in the same way whatever the time
- Helpful to have a carbohydrate source before bedtime

 aids with restorative sleep, help YP meet energy
 needs

Myth 4 - Coffee can help you lose weight

- Coffee does not contain any energy or fat burning properties.
- It does contain caffeine and drinking too much of it can lead to anxiety, sleeplessness and an increase in heart rate and blood pressure.

Myth 5 - Negative calorie foods - Some foods help burn more calories than they contain

- It has been suggested that eating some foods such as celery, grapefruit, lettuce and apple cider vinegar can actually help to burn calories.
- No research to suggest any foods burn more calories than they create.
- No foods can actually help you to burn fat.

Myth 6 - Carbs are fattening

- Low in fat
- High in vitamin B12
- Glucose fuels the brain

Myth 7 - No snacking

- Necessary to meet high energy needs
- Typical teen eating, experimenting with foods, especially quick and easy meals
- Every 3hrs

Myth 8 - You are what you eat

- Not true!
- Well being and happiness is not is made up of what you do or do not eat.
- It can be damaged by eating too little and can affect how you view yourself.

Myth 9 – Eat low fat only products only

- Fat is essential -protect organs/ heat/ energy
- Body cannot synthesise Essential Fatty acids must be ingested
- Necessary for heart health/ anti -inflammatory effect

Myth 10 – A gluten free diet is good for weight loss

- No evidence to suggest that removing glutencontaining foods from the diet will result in weight loss
- Only 1% of the population has coeliac disease and it is essential that they follow a gluten free diet
 Possible vitamin and mineral deficiency

Myth 11 – Drinking green tea raises metabolism

- Metabolism effect?
- A major review in 2012 of 18 studies involving 1,945 people found no significant effect of weight loss from drinking green tea.

Myth 12- Four x 100 calorie meals are better than one x 400 calorie meal

- Hungrier and tired
- Lead to food cravings

References

- J MaRSiPAN Management of Really Sick patients under 18 with Anorexia Nervosa 2015 (Summary)
- Refeeding guidelines for children and young people with feeding and eating disorders admitted to the Mildred Creak Unit at Great Ormond Street Hospital (2017)
- NICE guidelines: Eating Disorders: recognition and treatment (2017)
- CHEW <u>www.cwt</u>–chew.org.uk

