Nutrition

Sue Durrant

Overview

- Nutrition and Brain injury
  - Acute, sub acute, longer term
- Nutrition Screening
- Calculating Requirements
- Tube Feeding

Screening Nutritional Status

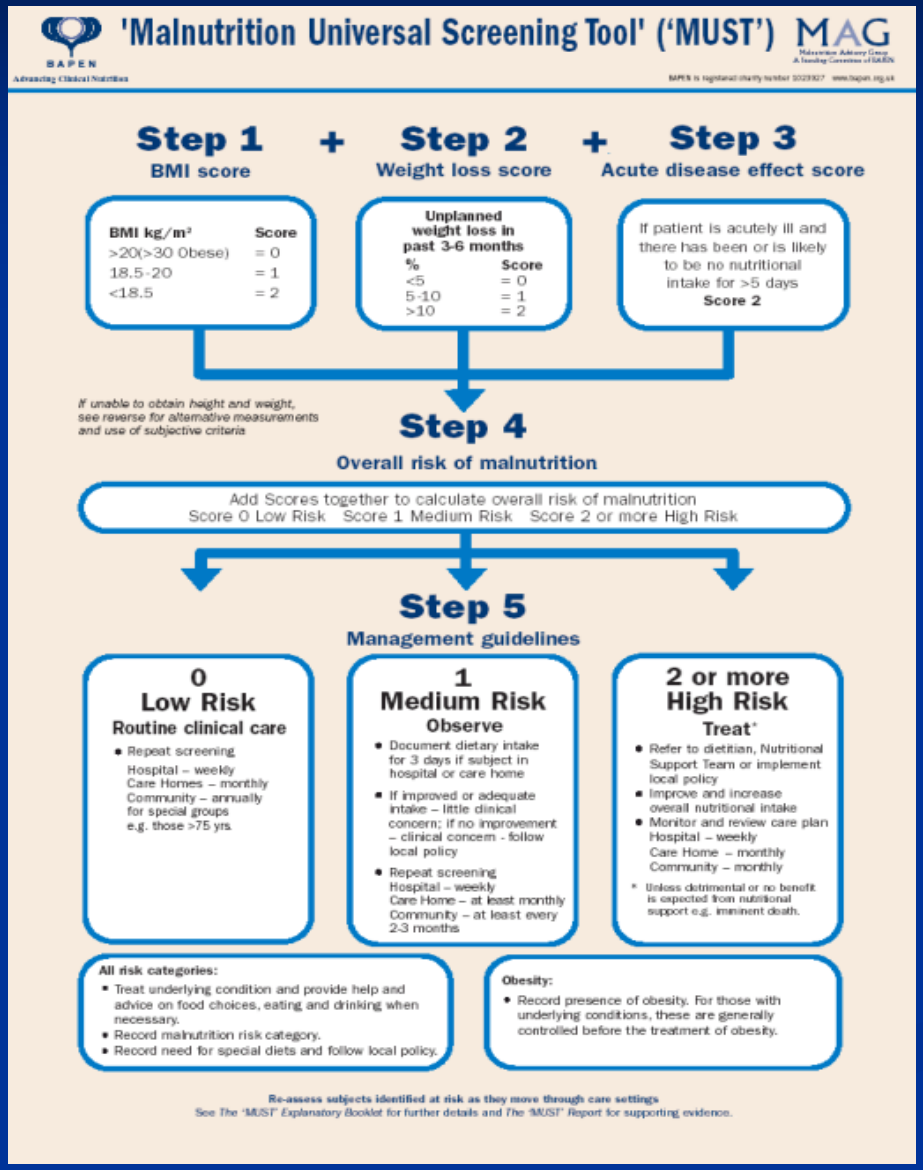
Why Screen for Malnutrition?

- Malnutrition is frequently unrecognised and untreated
- Malnutrition costs health and social care ≥£13bn/year
- Effective management of malnutrition improves clinical outcome and reduces costs
- Regular screening is the only way that malnourished individuals can be identified and appropriate action taken
- Recommended / required by various bodies e.g NICE, Council of Europe, Care Quality Commission

The 'Malnutrition Universal Screening Tool'

('MUST')

Malnutrition Universal Screening Tool



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Step 1 + Step 2 + Step 3

Step 1 — BMI score

BMI kg/m²	Score
>20(>30 Obese)	= 0
18.5-20	= 1
<18.5	= 2

Step 2 — Weight loss score

Unplanned weight loss in past 3-6 months

%	Score
<5	= 0
5-10	= 1
>10	= 2

Step 3 — Acute disease effect score

If patient is acutely ill and there has been or is likely to be no nutritional intake for >5 days
Score 2

If unable to obtain height and weight, see reverse for alternative measurements and use of subjective criteria

Step 4

Overall risk of malnutrition

Add Scores together to calculate overall risk of malnutrition
Score 0 Low Risk Score 1 Medium Risk Score 2 or more High Risk

Step 5

Management guidelines

0 Low Risk
Routine clinical care

- Repeat screening
  Hospital – weekly
  Care Homes – monthly
  Community – annually
  for special groups
  e.g. those >75 yrs

1 Medium Risk
Observe

- Document dietary intake for 3 days if subject in hospital or care home
- If improved or adequate intake – little clinical concern; if no improvement – clinical concern - follow local policy
- Repeat screening
  Hospital – weekly
  Care Home – at least monthly
  Community – at least every 2-3 months

2 or more High Risk
Treat*

- Refer to dietitian, Nutritional Support Team or implement local policy
- Improve and increase overall nutritional intake
- Monitor and review care plan
  Hospital – weekly
  Care Home – monthly
  Community – monthly

* Unless detrimental or no benefit is expected from nutritional support e.g. imminent death.

All risk categories:

- Treat underlying condition and provide help and advice on food choices, eating and drinking when necessary.
- Record malnutrition risk category.
- Record need for special diets and follow local policy.

Obesity:

- Record presence of obesity. For those with underlying conditions, these are generally controlled before the treatment of obesity.

Re-assess subjects identified at risk as they move through care settings
See *The 'MUST' Explanatory Booklet* for further details and *The 'MUST' Report* for supporting evidence.

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'MUST'

'MUST' is a five-step screening tool to identify **adults,** who are malnourished, at risk of malnutrition (undernutrition), or obese. It also includes management guidelines which can be used to develop a care plan.

It is for use in hospitals, community and other care settings and can be used by all care workers.

This guide contains:

- A flow chart showing the 5 steps to use for screening and management
- BMI chart
- Weight loss tables
- Alternative measurements when BMI cannot be obtained by measuring weight and height.

The 5 'MUST' Steps

Step 1

Measure height and weight to get a BMI score using chart provided. *If unable to obtain height and weight, use the alternative procedures shown in this guide.*

Step 2

Note percentage unplanned weight loss and score using tables provided.

Step 3

Establish acute disease effect and score.

Step 4

Add scores from steps 1, 2 and 3 together to obtain overall risk of malnutrition.

Step 5

Use management guidelines and/or local policy to develop care plan.

Please refer to *The 'MUST' Explanatory Booklet* for more information when weight and height cannot be measured, and when screening patient groups in which extra care in interpretation is needed (e.g. those with fluid disturbances, plaster casts, amputations, critical illness and pregnant or lactating women). The booklet can also be used for training. See *The 'MUST' Report* for supporting evidence. Please note that 'MUST' has not been designed to detect deficiencies or excessive intakes of vitamins and minerals and is of **use only in adults.**

Step 1: BMI

- Obtain weight and height
- Calculate BMI or use BMI chart provided to get score
- Use recalled height and weight or recommended alternative methods of measurement if actual values cannot be obtained

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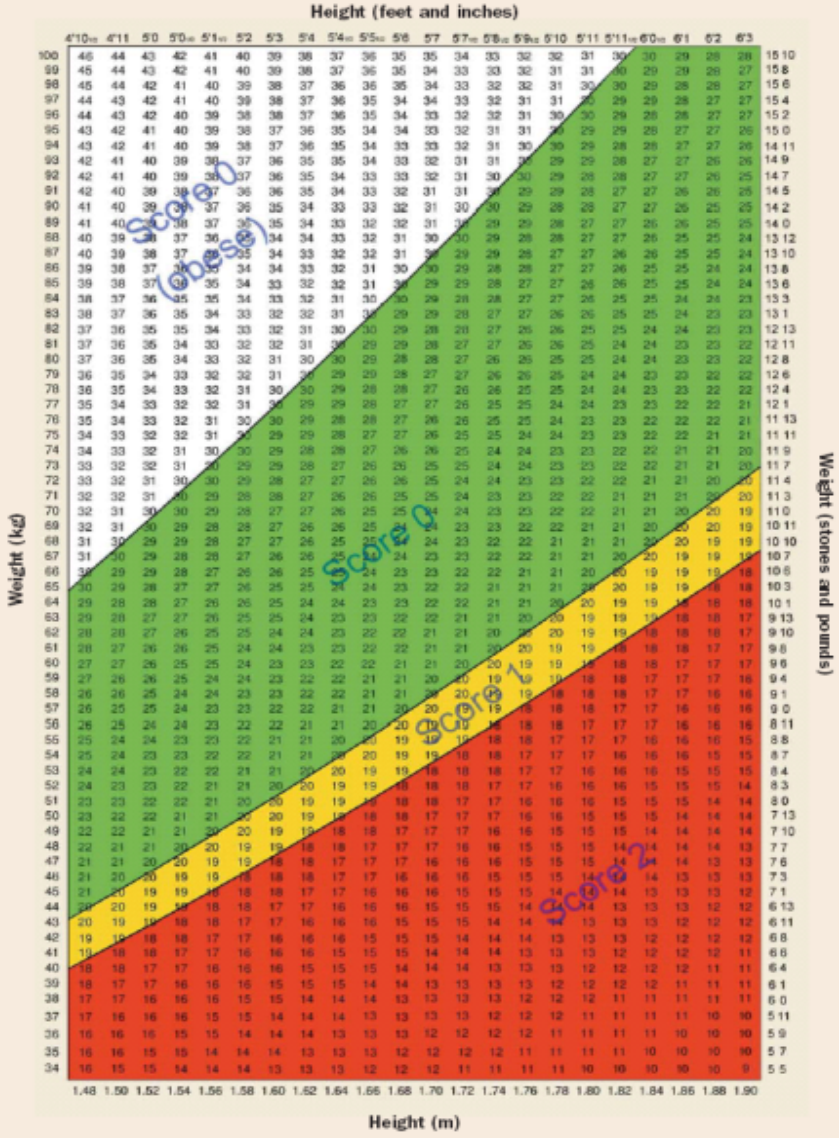
Step 1 – BMI score (& BMI)



Note : The black lines denote the exact cut off points (30,20 and 18.5 kg/m^2), figures on the chart have been rounded to the nearest whole number

Estimating height from Ulna length

- Measure between the point of the elbow and the midpoint of the prominent bone of the wrist
- Use chart to determine estimated height

Calculate BMI

- Use the chart to obtain BMI
- Height = 1.68m
- Weight = 62Kg
- BMI = 22
- Height = 5ft 8”
- Weight = 8 stone 2lb
- BMI = 17.4

Estimating BMI from MUAC

- Left arm, bent at elbow 90 degree angle
- Measure from bony protrusion on shoulder to point of elbow, mark mid point
- Let arm hang loose, measure around arm at mid point

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Alternative measurements and considerations

Step 1: BMI (body mass index)

If height cannot be measured

- Use recently documented or self-reported height (if reliable and realistic).
- If the subject does not know or is unable to report their height, use one of the alternative measurements to estimate height (ulna, knee height or demispan).

If height & weight cannot be obtained

- Use mid upper arm circumference (MUAC) measurement to estimate BMI category.

Step 2: Recent unplanned weight loss

If recent weight loss cannot be calculated, use self-reported weight loss (if reliable and realistic).

Subjective criteria

If height, weight or BMI cannot be obtained, the following criteria which relate to them can assist your professional judgement of the subject's nutritional risk.

1. BMI

- Clinical impression – thin, acceptable weight, overweight. Obvious wasting (very thin) and obesity (very overweight) can also be noted.

2. Unplanned weight loss

- Clothes and/or jewellery have become loose fitting (weight loss).
- History of decreased food intake, reduced appetite or swallowing problems over 3-6 months and underlying disease or psycho-social/physical disabilities likely to cause weight loss.

3. Acute disease effect

- No nutritional intake or likelihood of no intake for more than 5 days.

Further details on taking alternative measurements, special circumstances and subjective criteria can be found in *The 'MUST' Explanatory Booklet*. A copy can be downloaded at www.bapen.org.uk or purchased from the BAPEN office. The full evidence-base for 'MUST' is contained in *The 'MUST' Report* and is also available for purchase from the BAPEN office.

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Alternative measurements: instructions and tables

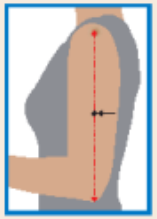
If height cannot be obtained, use length of forearm (ulna) to calculate height using tables below.
(See The 'MUST' Explanatory Booklet for details of other alternative measurements (knee height and demispan) that can also be used to estimate height).

Estimating height from ulna length

Measure between the point of the elbow (olecranon process) and the midpoint of the prominent bone of the wrist (styloid process) (left side if possible).

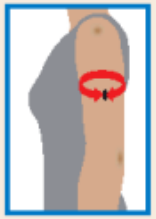
HEIGHT (m)														
	Men (<65 years)	1.94	1.93	1.91	1.89	1.87	1.85	1.84	1.82	1.80	1.78	1.76	1.75	1.73	1.71
	Men (>65 years)	1.87	1.86	1.84	1.82	1.81	1.79	1.78	1.76	1.75	1.73	1.71	1.70	1.68	1.67
	Ulna length (cm)	32.0	31.5	31.0	30.5	30.0	29.5	29.0	28.5	28.0	27.5	27.0	26.5	26.0	25.5
HEIGHT (m)	Women (<65 years)	1.84	1.83	1.81	1.80	1.79	1.77	1.76	1.75	1.73	1.72	1.70	1.69	1.68	1.66
	Women (>65 years)	1.84	1.83	1.81	1.79	1.78	1.76	1.75	1.73	1.71	1.70	1.68	1.66	1.65	1.63
HEIGHT (m)	Men (<65 years)	1.69	1.67	1.66	1.64	1.62	1.60	1.58	1.57	1.55	1.53	1.51	1.49	1.48	1.46
	Men (>65 years)	1.65	1.63	1.62	1.60	1.59	1.57	1.56	1.54	1.52	1.51	1.49	1.48	1.46	1.45
	Ulna length (cm)	25.0	24.5	24.0	23.5	23.0	22.5	22.0	21.5	21.0	20.5	20.0	19.5	19.0	18.5
HEIGHT (m)	Women (<65 years)	1.65	1.63	1.62	1.61	1.59	1.58	1.56	1.55	1.54	1.52	1.51	1.50	1.48	1.47
	Women (>65 years)	1.61	1.60	1.58	1.56	1.55	1.53	1.52	1.50	1.48	1.47	1.45	1.44	1.42	1.40

Estimating BMI category from mid upper arm circumference (MUAC)



The subject's left arm should be bent at the elbow at a 90 degree angle, with the upper arm held parallel to the side of the body. Measure the distance between the bony protrusion on the shoulder (acromion) and the point of the elbow (olecranon process). Mark the mid-point.

Ask the subject to let arm hang loose and measure around the upper arm at the mid-point, making sure that the tape measure is snug but not tight.



If MUAC is < 23.5 cm, BMI is likely to be <20 kg/m².
If MUAC is > 32.0 cm, BMI is likely to be >30 kg/m².

- If MUAC <23.5cm BMI likely to be <20
- If MUAC >30, BMI likely to be >30

BMI Score

BMI	Score
>20 kg/m^2	0
18.5-20 kg/m^2	1
<18.5 kg/m^2	2

>30 kg/m^2 (obese) 0

Step 2: Weight Loss Score

- Obtain current weight
- Obtain weight 3 – 6 months ago
- Calculate percentage weight loss

$$\frac{\text{Weight 3 – 6 months ago – current weight}}{\text{current weight}} \times 100$$

Example $\frac{73 - 62}{73} \times 100 = 15$

- Score percentage weight loss

Weight loss score

- Indicates acute or recent-onset malnutrition

	Score
<5% body weight:	0
5-10% body weight:	1
>10% body weight:	2

Unintentional weight loss over 3-6 months

<5% body weight: normal intra-individual variation

5-10% body weight: of concern

- decrease in voluntary physical activity
- increase in fatigue
- less energetic

>10% body weight: of significance

- changes in muscle function
- disturbances in thermoregulation
- poor response or outcome to surgery and chemotherapy

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Step 2 – Weight loss score

Weight before weight loss (kg)	SCORE 0 Wt Loss < 5%	SCORE 1 Wt Loss 5-10%	SCORE 2 Wt Loss > 10%
34 kg	<1.70	1.70 – 3.40	>3.40
36 kg	<1.80	1.80 – 3.60	>3.60
38 kg	<1.90	1.90 – 3.80	>3.80
40 kg	<2.00	2.00 – 4.00	>4.00
42 kg	<2.10	2.10 – 4.20	>4.20
44 kg	<2.20	2.20 – 4.40	>4.40
46 kg	<2.30	2.30 – 4.60	>4.60
48 kg	<2.40	2.40 – 4.80	>4.80
50 kg	<2.50	2.50 – 5.00	>5.00
52 kg	<2.60	2.60 – 5.20	>5.20
54 kg	<2.70	2.70 – 5.40	>5.40
56 kg	<2.80	2.80 – 5.60	>5.60
58 kg	<2.90	2.90 – 5.80	>5.80
60 kg	<3.00	3.00 – 6.00	>6.00
62 kg	<3.10	3.10 – 6.20	>6.20
64 kg	<3.20	3.20 – 6.40	>6.40
66 kg	<3.30	3.30 – 6.60	>6.60
68 kg	<3.40	3.40 – 6.80	>6.80
70 kg	<3.50	3.50 – 7.00	>7.00
72 kg	<3.60	3.60 – 7.20	>7.20
74 kg	<3.70	3.70 – 7.40	>7.40
76 kg	<3.80	3.80 – 7.60	>7.60
78 kg	<3.90	3.90 – 7.80	>7.80
80 kg	<4.00	4.00 – 8.00	>8.00
82 kg	<4.10	4.10 – 8.20	>8.20
84 kg	<4.20	4.20 – 8.40	>8.40
86 kg	<4.30	4.30 – 8.60	>8.60
88 kg	<4.40	4.40 – 8.80	>8.80
90 kg	<4.50	4.50 – 9.00	>9.00
92 kg	<4.60	4.60 – 9.20	>9.20
94 kg	<4.70	4.70 – 9.40	>9.40
96 kg	<4.80	4.80 – 9.60	>9.60
98 kg	<4.90	4.90 – 9.80	>9.80
100 kg	<5.00	5.00 – 10.00	>10.00
102 kg	<5.10	5.10 – 10.20	>10.20
104 kg	<5.20	5.20 – 10.40	>10.40
106 kg	<5.30	5.30 – 10.60	>10.60
108 kg	<5.40	5.40 – 10.80	>10.80
110 kg	<5.50	5.50 – 11.00	>11.00
112 kg	<5.60	5.60 – 11.20	>11.20
114 kg	<5.70	5.70 – 11.40	>11.40
116 kg	<5.80	5.80 – 11.60	>11.60
118 kg	<5.90	5.90 – 11.80	>11.80
120 kg	<6.00	6.00 – 12.00	>12.00
122 kg	<6.10	6.10 – 12.20	>12.20
124 kg	<6.20	6.20 – 12.40	>12.40
126 kg	<6.30	6.30 – 12.60	>12.60

Weight before weight loss (st lb)	SCORE 0 Wt Loss <5%	SCORE 1 Wt Loss 5-10%	SCORE 2 Wt Loss >10%
5st 4lb	<4lb	4lb – 7lb	>7lb
5st 7lb	<4lb	4lb – 8lb	>8lb
5st 11lb	<4lb	4lb – 8lb	>8lb
6st	<4lb	4lb – 8lb	>8lb
6st 4lb	<4lb	4lb – 9lb	>9lb
6st 7lb	<5lb	5lb – 9lb	>9lb
6st 11lb	<5lb	5lb – 10lb	>10lb
7st	<5lb	5lb – 10lb	>10lb
7st 4lb	<5lb	5lb – 10lb	>10lb
7st 7lb	<5lb	5lb – 11lb	>11lb
7st 11lb	<5lb	5lb – 11lb	>11lb
8st	<6lb	6lb – 11lb	>11lb
8st 4lb	<6lb	6lb – 12lb	>12lb
8st 7lb	<6lb	6lb – 12lb	>12lb
8st 11lb	<6lb	6lb – 12lb	>12lb
9st	<6lb	6lb – 13lb	>13lb
9st 4lb	<7lb	7lb – 13lb	>13lb
9st 7lb	<7lb	7lb – 13lb	>13lb
9st 11lb	<7lb	7lb – 1st 0lb	>1st 0lb
10st	<7lb	7lb – 1st 0lb	>1st 0lb
10st 4lb	<7lb	7lb – 1st 0lb	>1st 0lb
10st 7lb	<7lb	7lb – 1st 1lb	>1st 1lb
10st 11lb	<8lb	8lb – 1st 1lb	>1st 1lb
11st	<8lb	8lb – 1st 1lb	>1st 1lb
11st 4lb	<8lb	8lb – 1st 2lb	>1st 2lb
11st 7lb	<8lb	8lb – 1st 2lb	>1st 2lb
11st 11lb	<8lb	8lb – 1st 3lb	>1st 3lb
12st	<8lb	8lb – 1st 3lb	>1st 3lb
12st 4lb	<9lb	9lb – 1st 3lb	>1st 3lb
12st 7lb	<9lb	9lb – 1st 4lb	>1st 4lb
12st 11lb	<9lb	9lb – 1st 4lb	>1st 4lb
13st	<9lb	9lb – 1st 4lb	>1st 4lb
13st 4lb	<9lb	9lb – 1st 5lb	>1st 5lb
13st 7lb	<9lb	9lb – 1st 5lb	>1st 5lb
13st 11lb	<10lb	10lb – 1st 5lb	>1st 5lb
14st	<10lb	10lb – 1st 6lb	>1st 6lb
14st 4lb	<10lb	10lb – 1st 6lb	>1st 6lb
14st 7lb	<10lb	10lb – 1st 6lb	>1st 6lb
14st 11lb	<10lb	10lb – 1st 7lb	>1st 7lb
15st	<11lb	11lb – 1st 7lb	>1st 7lb
15st 4lb	<11lb	11lb – 1st 7lb	>1st 7lb
15st 7lb	<11lb	11lb – 1st 8lb	>1st 8lb
15st 11lb	<11lb	11lb – 1st 8lb	>1st 8lb
16st	<11lb	11lb – 1st 8lb	>1st 8lb
16st 4lb	<11lb	11lb – 1st 9lb	>1st 9lb
16st 7lb	<12lb	12lb – 1st 9lb	>1st 9lb

Calculate Weight Loss Score using chart

- Current weight = 60Kg
- Weight 6 months ago = 66Kg
- Weight loss = 6kg
  - Using chart
  - Look up weight before loss
  - Scan across until reach column indicating 6kg loss
  - Read off score

Step 3: Acute disease effect

- Patients who are acutely ill *AND* have had or are likely to have no nutritional intake for more than 5 days

- Most likely to apply to patients in hospital

Step 4: Overall risk of malnutrition

- Total of scores from Steps 1, 2 and 3
- Document score

0 = Low risk

1 = Medium risk

2 or more = High risk

Case Study

- Height = 1.65m
- Weight = 58kg
- Weight 6 months ago = 66kg
- With a chest infection, eating half of all meals

Case Study 1

- BMI=21 score =0 score = 0
- Weight loss=8 kg, 12% score = 2
- Acute disease effect score = 0

- Total MUST score = 2, high risk

Case Study 2

- Height = 1.8m
- Weight = 88kg
- Weight 6 months ago = 78kg
- No acute disease, on PEG feed

Case Study 2

- BMI=27 score = 0
- Weight loss=0 kg, score = 0
- Acute disease effect score = 0

- Total MUST score = 0, low risk

Action planning

- Low Risk: repeat screening monthly

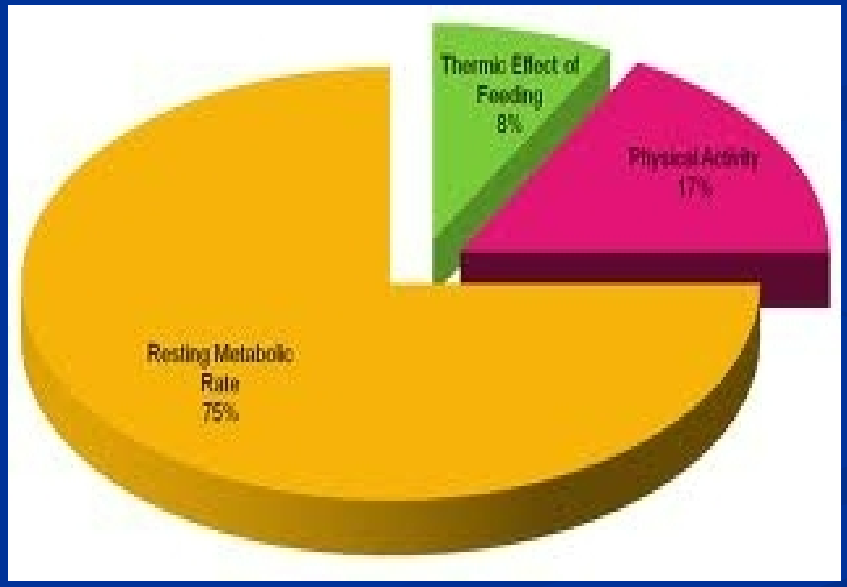
- Medium Risk: document food intake for 3 days, if intake improves – little concern, if not follow local policy, repeat screening monthly

Calculating Requirements

- 1. Determine approximate Basal metabolic rate
- 2. Add stress factor for metabolic state
- 3. Add a combined factor for activity and diet induced thermogenesis
- 4. Adjust for weight change required +/- 400 to 1000 calories

Basal Metabolic rate

- Use Schofield or Henry formula to calculate BMR



Calculate Energy Requirements

- 20 to 25 calories per Kg per day

Protein Requirements

- 0.8 – 1.5g/kg/day
- Up to 2g/kg/day if depleted

Fluid Requirements

- < 65 years = 35ml/kg
- > 65 years = 30ml/kg

- Replacement of losses
- - ml/kg for each degree rise in temp above 37

- Other – diarrhoea, vomiting, sweating

Total fluid

- Feed
- Water
- Water flushes with medications/pre and post feed

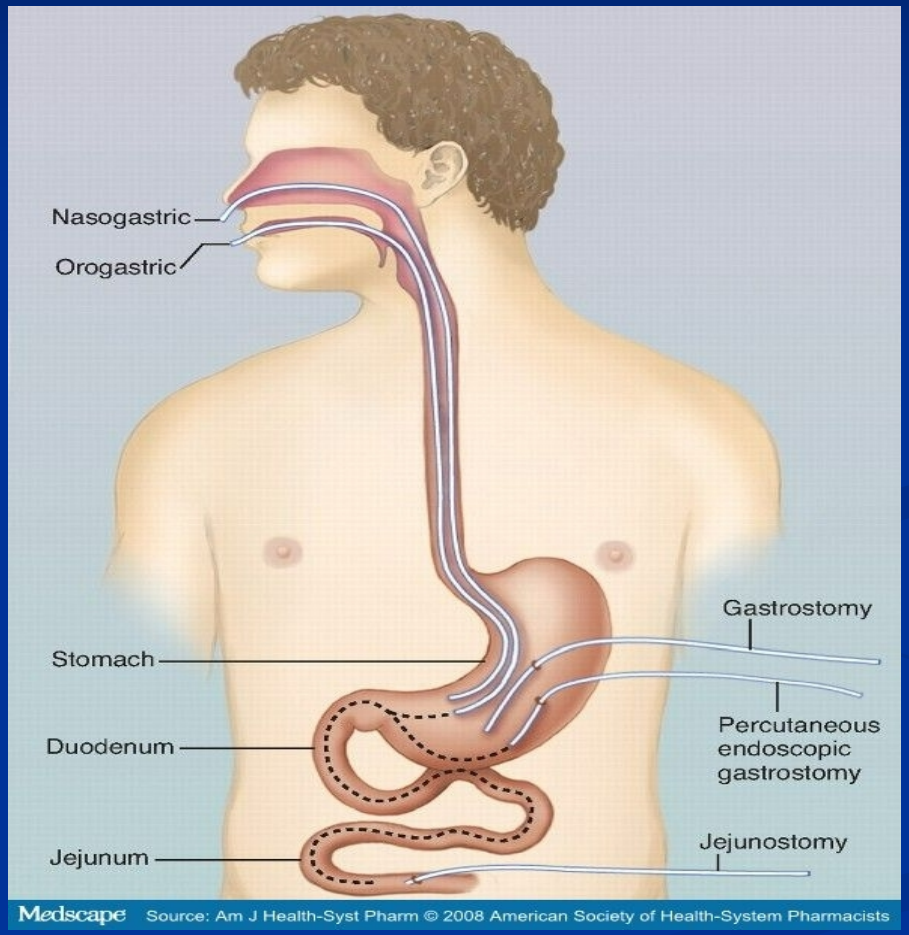
Fluid calculation

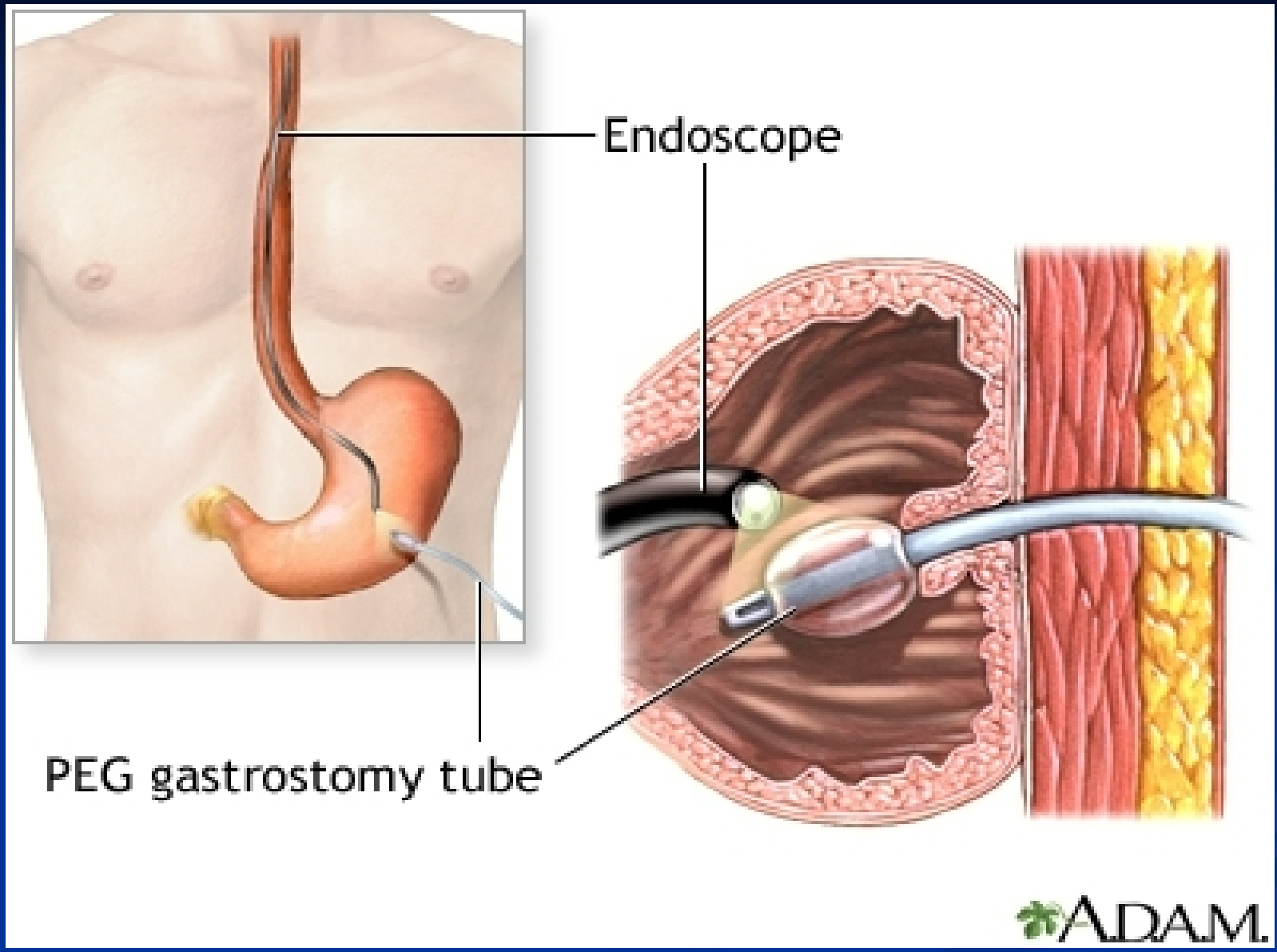
- 61kg lady, 53 years
- 61x35=2135ml
- Feed = 1000ml Promote
- Water = 900ml
- Flushes = estimated as 300ml
- Total 2200ml

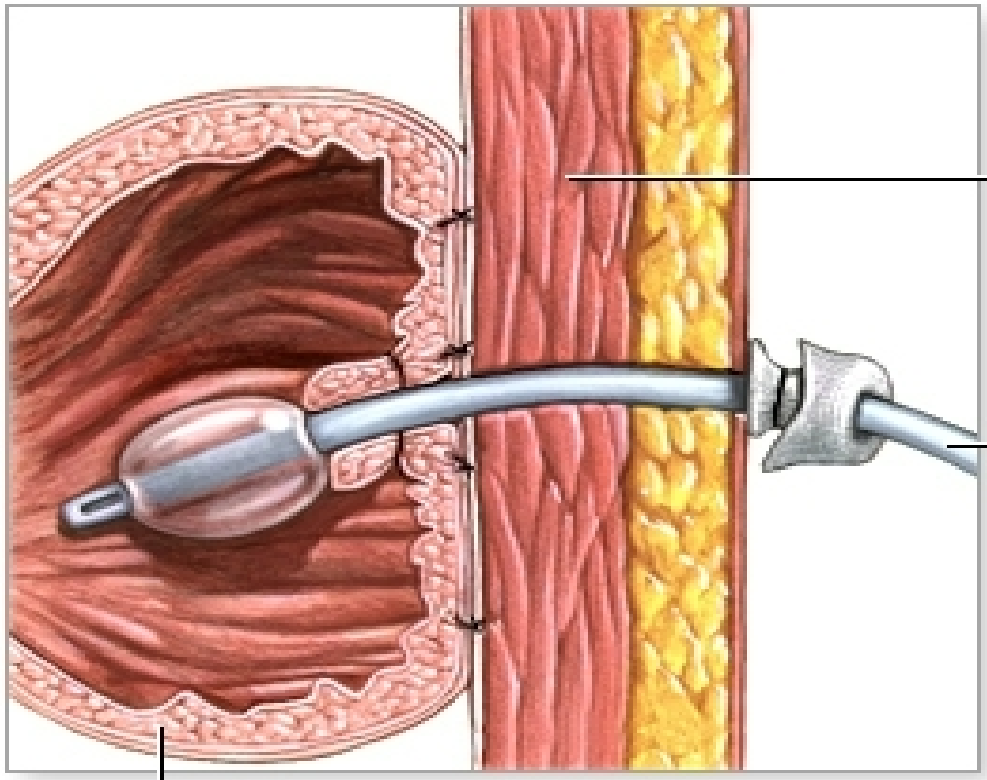
- Too much/ too little fluid

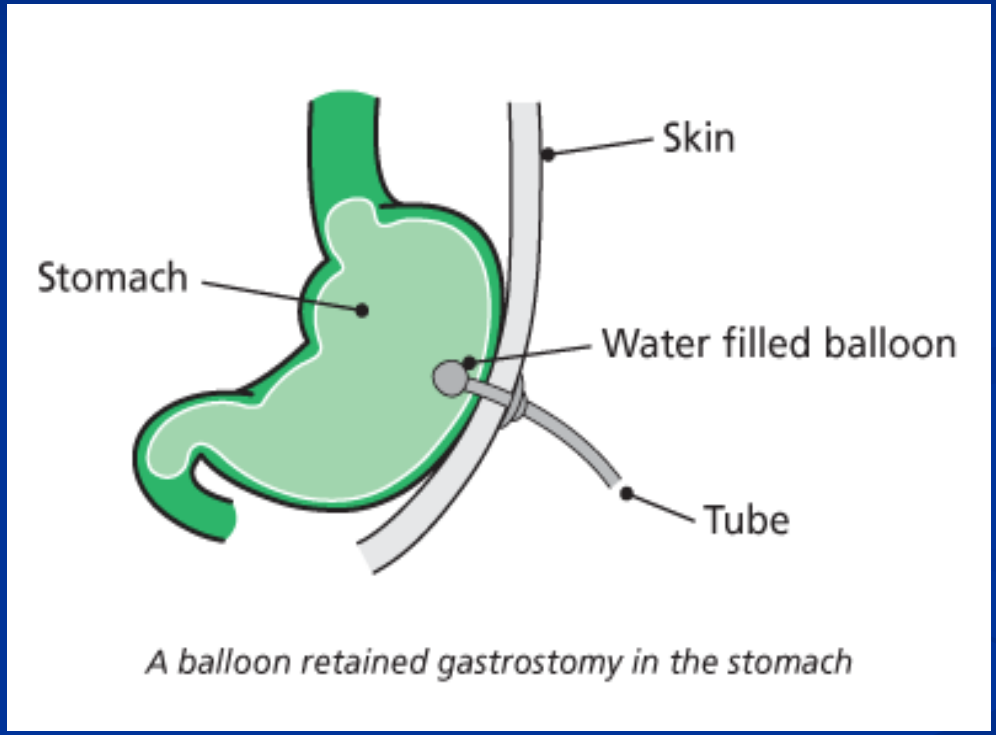
Tube Feeding

Types of Tube Feeding




Endoscope
PEG gastrostomy tube
A.D.A.M.


Abdominal wall in cross-section
Feeding tube
Stomach in cross-section
A.D.A.M.



A balloon retained gastrostomy in the stomach


Esophagus
Stomach
Skin
Gastrostomy Tube Placement


Medscape®
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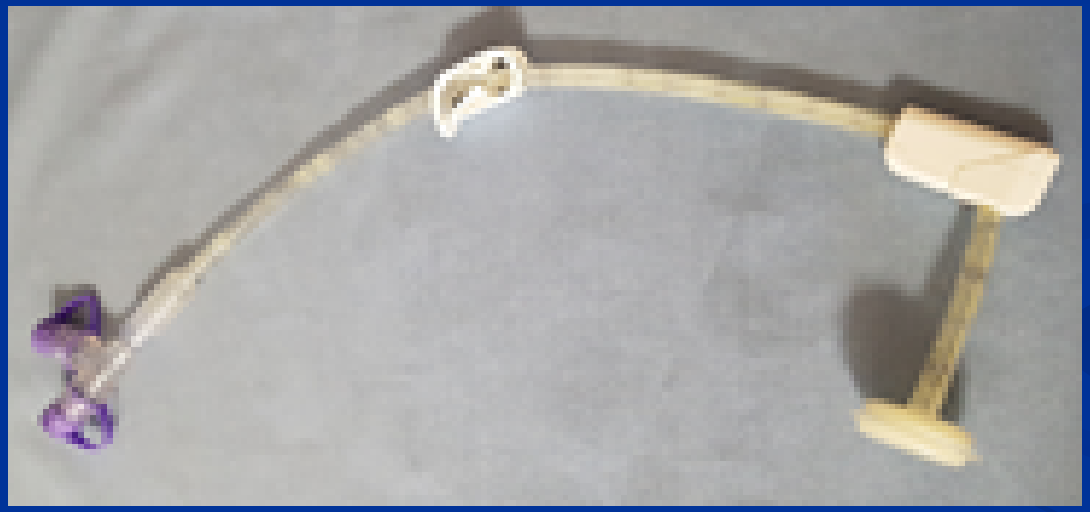
Balloon Gastrostomy

Merck Corflo Gastrostomy



Freka Gastrostomy

Freka PEG-J

Tube Feeds

- Nutricia Feeds