

Nutritional Assessment of patients in hospital

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Definition of malnutrition

- Undernutrition can occur as a result of inadequate intake as well as disorders of digestion or absorption of protein and calories. The term can also be used to refer to deficiencies in the intake of a particular vitamin or mineral.
- However, with the exception of iron deficiency anaemia, vitamin or mineral deficiencies are more likely to occur in clusters or alongside inadequate intake of protein or calories (Moore, 2001).



Consequences of malnutrition

- Acute illness compounded by PEM can lead to:
 - increased infection risk,
 - reduced immune response,
 - poor skin integrity,
 - delayed wound healing,
 - increased risk of complications and
 - prolonged hospital stay.



Nutritional assessment

- Nutritional assessment is used to evaluate nutritional status, identify disorders of nutrition and determine which individuals need instruction and/or support (Moore, 2005).
- An assessment should include screening for malnutrition using a validated tool. It is essential that screening is carried out initially on all patients to identify those in need of further investigation and subsequent nutritional support.

Assessment on admission

- Should include:
 - Height and weight;
 - Eating and drinking likes and dislikes;
 - Food allergies and medical dietary requirements (for example gluten-free diet for those with coeliac disease);
 - Cultural/ethnic/religious requirements (halal for Muslims or kosher for Jews);
 - Social/environmental mealtime requirements (such as minimising care-giving activities at mealtimes);
 - Physical difficulties with eating and drinking (such as tremor);
 - Need for equipment to help with eating and drinking.

Besides this...

- A general observation of the person, looking for signs of malnutrition, such as the appearance of hair and skin.
- Signs of weight loss such as thin appearance and a lack of subcutaneous fat.

Body Mass Index (BMI)

□ $\frac{\text{Weight (kg)}}{\text{Height}^2 (\text{m}^2)}$

Ranges: $<18 \text{ kg/m}^2$ – underweight

$20\text{-}25 \text{ kg/m}^2$ – normal range

$25\text{-}30 \text{ kg/m}^2$ – overweight range

$30\text{-}35 \text{ kg/m}^2$ – obese I range

35+ kg/m^2 – obese II range

BMI Graph

Height (feet and inches)

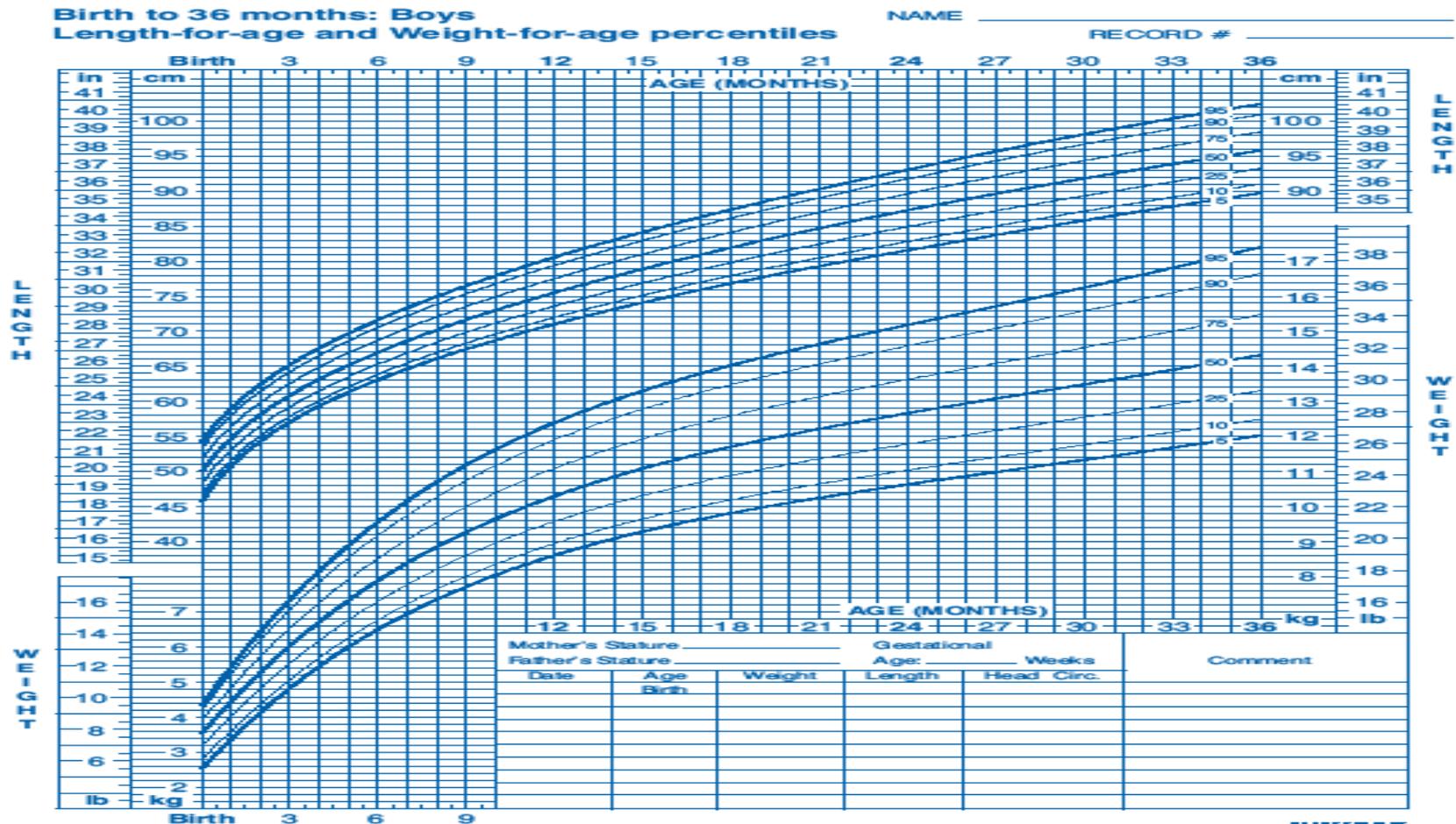
Weight (kilograms)

Weight (stones and pounds)

	4'10 ¹ / ₂	4'11	5'0	5'0 ¹ / ₂	5'1 ¹ / ₂	5'2	5'3	5'4	5'4 ¹ / ₂	5'5 ¹ / ₂	5'6	5'7	5'7 ¹ / ₂	5'8 ¹ / ₂	5'9 ¹ / ₂	5'10	5'11	5'11 ¹ / ₂	6'0 ¹ / ₂	6'1	6'2	6'3	
100	46	44	43	42	41	40	39	38	37	36	35	35	34	33	32	32	31	30	30	29	28	28	15 10
99	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	31	30	29	29	28	27	27	15 8
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95	43	42	41	40	39	38	37	36	35	34	33	32	31	30	30	29	28	28	27	27	27	27	15 0
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92	42	41	40	39	38	37	36	35	34	33	32	31	30	30	29	28	28	27	27	27	27	27	14 7
91	42	40	39	38	37	36	35	34	33	32	31	30	30	29	28	28	27	27	27	27	27	27	14 5
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42	19	19	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	6 4
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34	16	15	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	5 5

Height (metres)

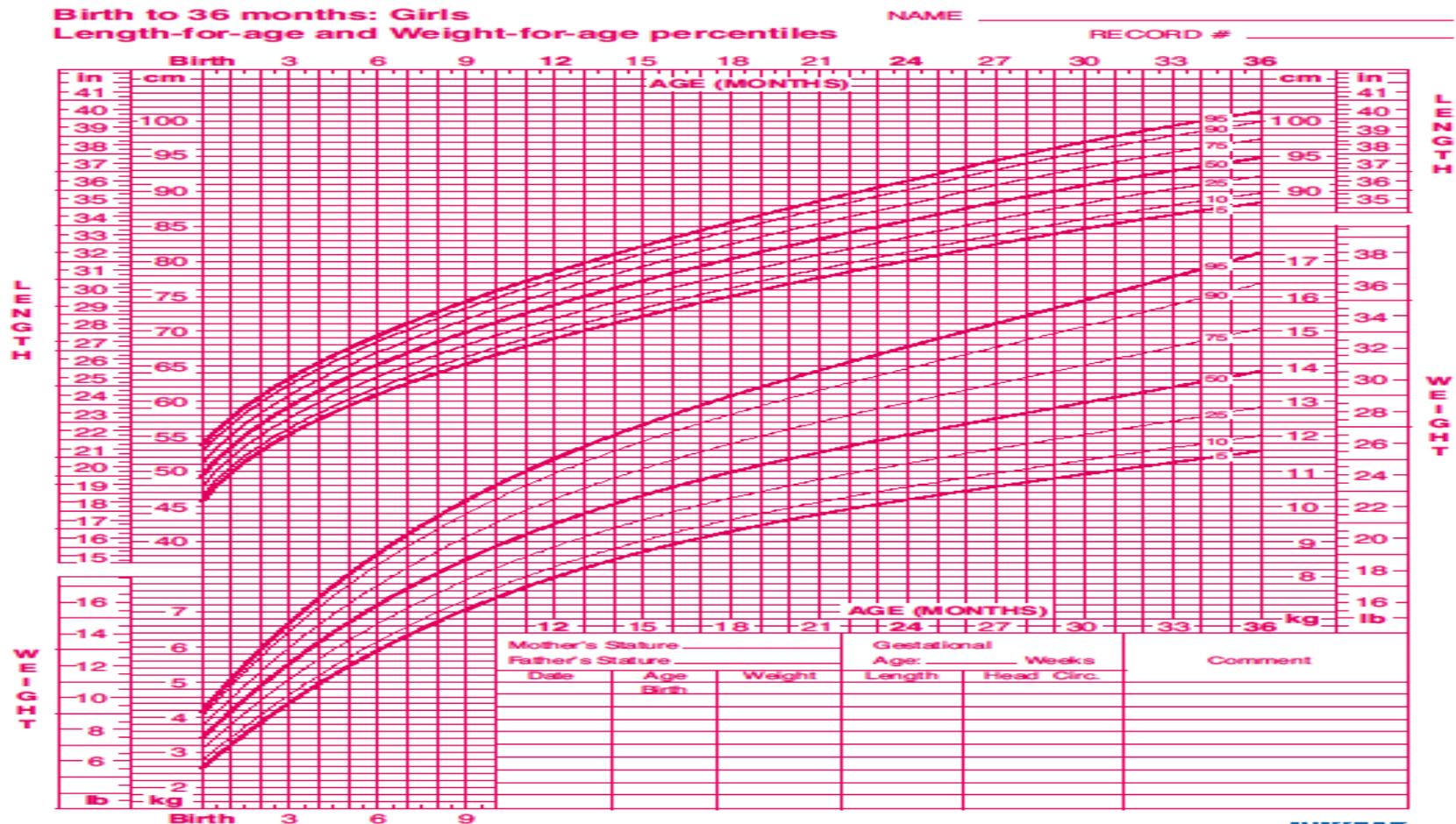
BMI Boys (birth-3 years)



Published May 30, 2000 (modified 4/26/01).
 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>



BMI Girls (birth-3 years)



Published May 30, 2000 (modified 4/20/01).
 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>





Mini Nutritional Assessment (MNA)

Personal Information

- Last name
- First name
- Sex
- Date
- Age
- Weight (kg)
- Height (cm)
- I.D. Number

Mini Nutritional Assessment (MNA)

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?

0 = severe loss of appetite

1 = moderate loss of appetite

2 = no loss of appetite

B Weight loss during the last 3 months

0 = weight loss greater than 3 kg (6.6 lbs)

1 = does not know

2 = weight loss between 1 and 3 kg (2.2 and 6.6 lbs)

3 = no weight loss

Mini Nutritional Assessment (MNA)

Screening

C Mobility

0 = bed or chair bound

1 = able to get out of bed/chair but does not go out

2 = goes out

D Has suffered psychological stress or acute disease in the past 3 months

0 = yes 2 = no

Mini Nutritional Assessment (MNA)

Screening

E Neuropsychological problems

0 = severe dementia or depression

1 = mild dementia

2 = no psychological problems

F Body Mass Index (BMI)

(weight in kg) / (height in m²)

0 = BMI less than 19

1 = BMI 19 to less than 21

2 = BMI 21 to less than 23

3 = BMI 23 or greater



Mini Nutritional Assessment (MNA)

Screening

Screening score (subtotal max. 14 points)

- 12 points or greater Normal – not at risk – no need to complete assessment
- 11 points or below Possible malnutrition – continue assessment

Mini Nutritional Assessment (MNA)

Assessment

G Lives independently (not in a nursing home or hospital)

0 = no 1 = yes

H Takes more than 3 prescription drugs per day

0 = yes 1 = no

I Pressure sores or skin ulcers

0 = yes 1 = no



Mini Nutritional Assessment (MNA)

Assessment

J How many full meals does the patient eat daily?

0 = 1 meal

1 = 2 meals

2 = 3 meals

Mini Nutritional Assessment (MNA)

Assessment

K Selected consumption markers for protein intake

- At least one serving of dairy products (milk, cheese, yogurt) per day

yes no

- Two or more servings of legumes or eggs per week

yes no

- Meat, fish or poultry every day yes no

0.0 = if 0 or 1 yes

0.5 = if 2 yes

1.0 = if 3 yes .

Mini Nutritional Assessment (MNA)

Assessment

L Consumes two or more servings of fruits or vegetables per day?

0 = no 1 = yes

M How much fluid (water, juice, coffee, tea, milk...) is consumed per day?

0.0 = less than 3 cups

0.5 = 3 to 5 cups

1.0 = more than 5 cups .



Mini Nutritional Assessment (MNA)

Assessment

N Mode of feeding

0 = unable to eat without assistance

1 = self-fed with some difficulty

2 = self-fed without any problem

O Self view of nutritional status

0 = views self as being malnourished

1 = is uncertain of nutritional state

2 = views self as having no nutritional problem

Mini Nutritional Assessment (MNA)

Assessment

P In comparison with other people of the same age, how does the patient consider his/her health status?

0.0 = not as good

0.5 = does not know

1.0 = as good

2.0 = better .

Q Mid-arm circumference (MAC) in cm

0.0 = MAC less than 21

0.5 = MAC 21 to 22

1.0 = MAC 22 or greater .

R Calf circumference (CC) in cm

0 = CC less than 31

1 = CC 31 or greater

Mini Nutritional Assessment (MNA)

Final Scoring

- **Assessment Score** (max. 16 points) .
- **Screening score**
- **Total Assessment** (max. 30 points) .

Malnutrition Indicator Score

17 to 23.5 points: at risk of malnutrition

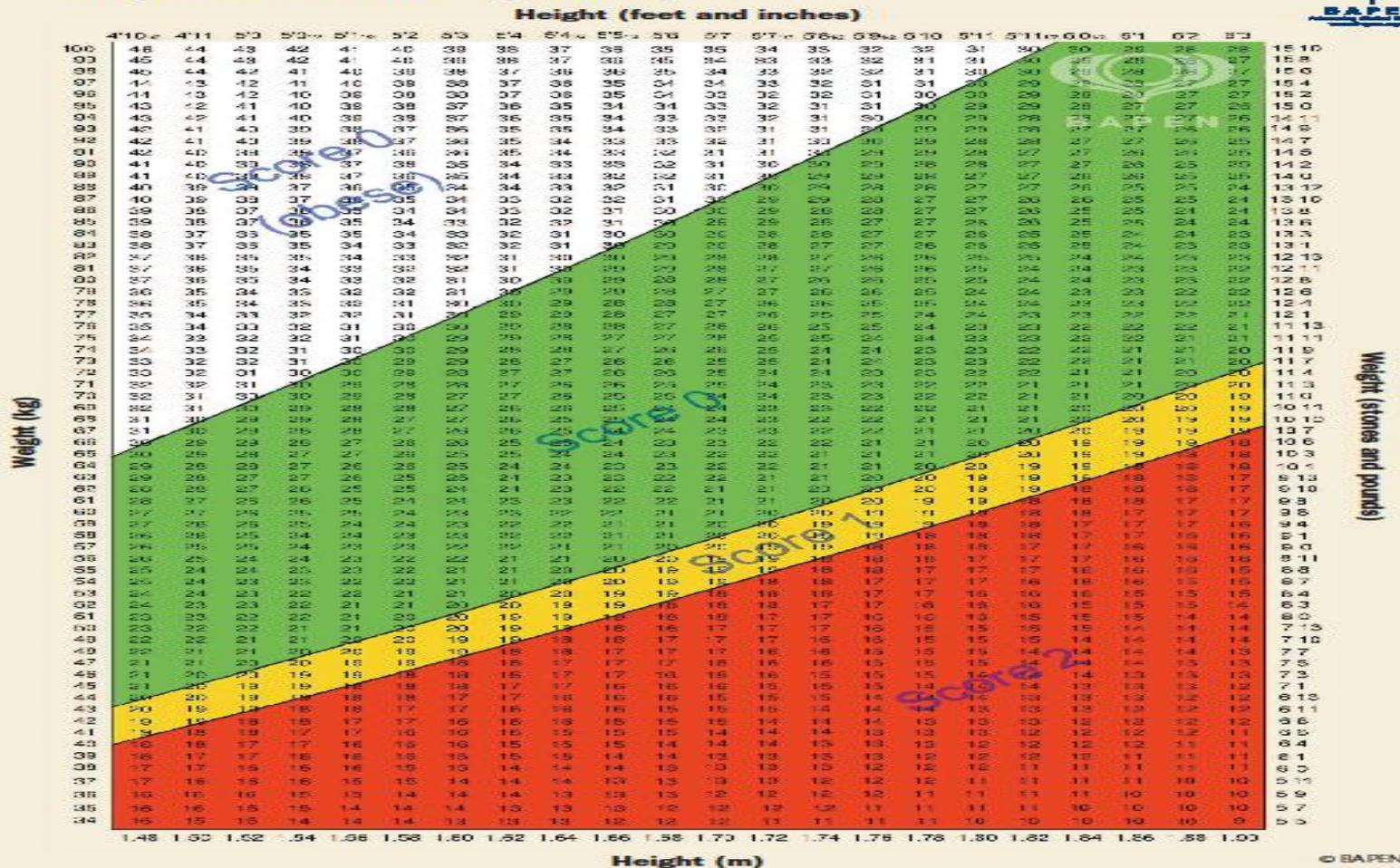
<17 points: malnourished

Malnutrition Universal Screening Tool (MUST) 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.

The 5 'MUST' Steps BMI Chart and Score

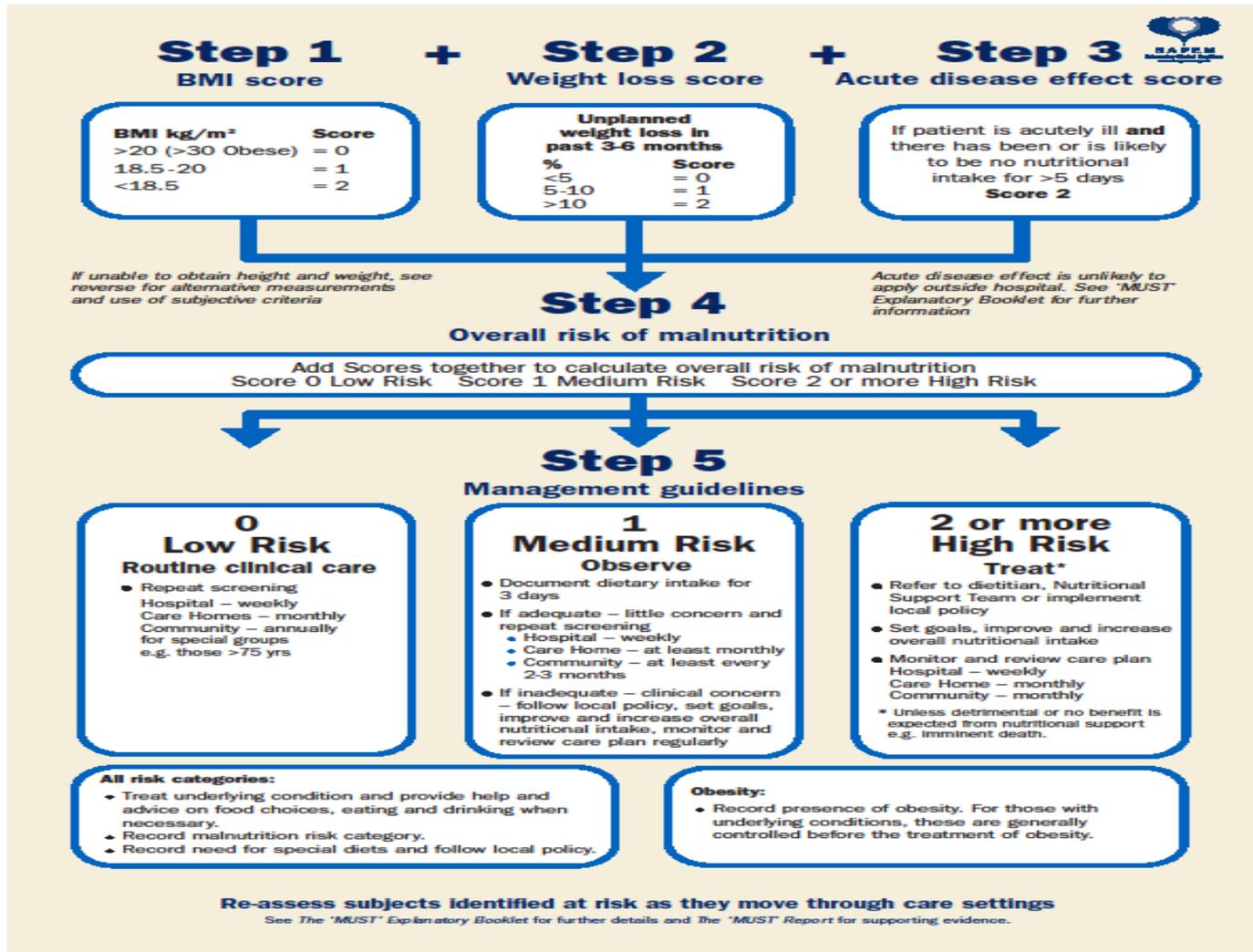
Step 1 – BMI score (& BMI)



Note : The black lines denote the exact cut off points (30,20 and 18.5 kg/m²), figures on the chart have been rounded to the nearest whole number.

The 5 'MUST' Steps

The MUST Flowchart



The 5 'MUST' Steps

Weight Loss Tables

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 (at 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

The 5 'MUST' Steps

Alternative Measurements (narrative)

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).

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 category. Please note, these criteria should be used collectively not separately as alternatives to steps 1 and 2 of 'MUST' and are not designed to assign a score. Mid upper arm circumference (MUAC) may be used to estimate BMI category in order to support your overall impression 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

- Acutely ill and 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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The 5 'MUST' Steps

Alternative Measurements (illustrations)



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).

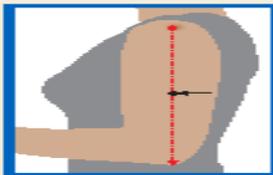
Estimating height from ulna length



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).

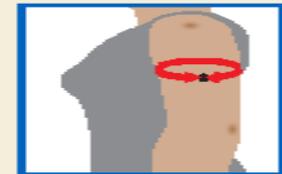
HEIGHT (m)	Men (<65 years)	1.94	1.93	1.91	1.89	1.87	1.85	1.84	1.82	1.80	1.78	1.76	1.75	1.73	1.71
	Men (≥65 years)	1.87	1.86	1.84	1.82	1.81	1.79	1.78	1.76	1.75	1.73	1.71	1.70	1.68	1.67
	Ulna length (cm)	32.0	31.5	31.0	30.5	30.0	29.5	29.0	28.5	28.0	27.5	27.0	26.5	26.0	25.5
HEIGHT (m)	Women (<65 years)	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.

The use of MUAC provides a general indication of BMI and is not designed to generate an actual score for use with 'MUST'. For further information on use of MUAC please refer to The 'MUST' Explanatory Booklet.