

## '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 score (& BMI)

## Height (feet and inches)

	4'9½	4'10½	4'11	5'0	5'0½	5'1½	5'2	5'3	5'4	5'4½	5'5½	5'6	5'7	5'7½	5'8½	5'9½	5'10	5'11	5'11½	6'0½	6'1	6'2	6'3	6'3½	6'4½	
100	47	46	44	43	42	41	40	39	38	37	36	35	35	34	33	32	32	31	30	30	29	28	28	27	27	15 10
99	46	45	44	43	42	41	40	39	38	37	36	35	34	33	33	32	31	31	30	30	29	28	28	27	27	15 8
98	46	45	44	42	41	40	39	38	37	36	36	35	34	33	32	32	31	30	30	29	28	28	27	27	26	15 6
97	46	44	43	42	41	40	39	38	37	36	35	34	34	33	32	31	31	30	29	29	28	27	27	26	26	15 4
96	45	44	43	42	40	39	38	38	37	36	35	34	33	32	32	31	30	30	29	28	28	27	27	26	26	15 2
95	45	43	42	41	40	39	38	37	36	35	34	34	33	32	31	31	30	29	29	28	27	27	26	26	25	14 13
94	44	43	42	41	40	39	38	37	36	35	34	33	33	32	31	30	30	29	28	28	27	27	26	25	25	14 11
93	44	42	41	40	39	38	37	36	35	35	34	33	32	31	31	30	29	29	28	27	27	26	25	25	25	14 9
92	43	42	41	40	39	38	37	36	35	34	33	33	32	31	30	30	29	28	28	27	27	26	25	25	24	14 7
91	43	42	40	39	38	37	36	36	35	34	33	32	31	31	30	29	29	28	27	27	26	26	25	25	24	14 5
90	42	41	40	39	38	37	36	35	34	33	33	32	31	30	30	29	28	28	27	27	26	25	25	24	24	14 2
89	42	41	40	39	38	37	36	35	34	33	32	32	31	30	29	29	28	27	27	26	26	25	25	24	24	14 0
88	41	40	39	38	37	36	35	34	34	33	32	31	30	30	29	28	28	27	27	26	25	25	24	24	23	13 12
87	41	40	39	38	37	36	35	34	33	32	32	31	30	29	29	28	27	27	26	26	25	25	24	24	23	13 10
86	40	39	38	37	36	35	34	34	33	32	31	30	30	29	28	28	27	27	26	25	25	24	24	23	23	13 8
85	40	39	38	37	36	35	34	33	32	32	31	30	29	29	28	27	27	26	26	25	25	24	24	23	23	13 5
84	39	38	37	36	35	35	34	33	32	31	30	30	29	28	28	27	27	26	25	25	24	24	23	23	22	13 3
83	39	38	37	36	35	34	33	32	32	31	30	29	29	28	27	27	26	26	25	25	24	23	23	23	22	13 1
82	38	37	36	35	35	34	33	32	31	30	30	29	28	28	27	26	26	25	25	24	24	23	23	22	22	12 13
81	38	37	36	35	34	33	32	32	31	30	29	29	28	27	27	26	26	25	24	24	23	23	22	22	22	12 11
80	38	37	36	35	34	33	32	31	30	30	29	28	28	27	26	26	25	25	24	24	23	23	22	22	21	12 8
79	37	36	35	34	33	32	32	31	30	29	29	28	27	27	26	26	25	24	24	23	23	22	22	21	21	12 6
78	37	36	35	34	33	32	31	30	30	29	28	28	27	26	26	25	25	24	24	23	23	22	22	21	21	12 4
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72	34	33	32	31	30	30	29	28	27	27	26	26	25	24	24	23	23	22	22	22	21	21	20	20	20	11 5
71	33	32	32	31	30	29	28	28	27	26	26	25	25	24	23	23	22	22	22	21	21	21	20	20	19	11 3
70	33	32	31	30	30	29	28	27	27	26	25	25	24	24	23	23	22	22	22	21	21	20	20	19	19	11 0
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64	30	29	28	28	27	26	26	25	24	24	23	23	22	22	21	21	20	20	19	19	18	18	18	17	17	10 1
63	30	29	28	27	27	26	25	24	24	23	23	22	22	21	21	20	20	19	19	19	18	18	17	17	17	9 13
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50	23	23	22	22	21	21	20	20	19	19	18	18	17	17	16	16	16	15	15	15	14	14	14	14	13	7 12
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48	23	22	21	21	20	20	19	19	18	18	17	17	16	16	15	15	15	14	14	14	14	14	13	13	13	7 8
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43	20	20	19	19	18	18	17	17	16	16	16	15	15	15	14	14	14	14	13	13	13	12	12	12	11	6 11
42	20	19	19	18	18	17	17	16	16	16	15	15	15	14	14	14	14	13	13	13	12	12	12	11	11	6 9
41	19	19	18	18	17	17	16	16	16	15	15	15	14	14	14	14	13	13	13	12	12	12	12	11	11	6 6
40	19	18	18	17	17	16	16	16	15	15	15	14	14	14	13	13	13	13	12	12	12					

# Step 1

BMI score

+

# Step 2

Weight loss score

+

# Step 3

Acute disease effect score

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

Unplanned weight loss in past 3-6 months	
%	Score
<5	= 0
5-10	= 1
>10	= 2

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*

*Acute disease effect is unlikely to apply outside hospital. See 'MUST' Explanatory Booklet for further information*

# 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 adequate – little concern and repeat screening
  - Hospital – weekly
  - Care Home – at least monthly
  - Community – at least every 2-3 months
- If inadequate – clinical concern – follow local policy, set goals, improve and increase overall nutritional intake, monitor and review care plan regularly

**2 or more  
High Risk**  
**Treat\***

- Refer to dietician, Nutritional Support Team or implement local policy
- Set goals, 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.*

## Step 2 – Weight loss score

<b>Score 0</b> Wt loss < 5%	<b>Score 1</b> Wt loss 5 - 10%	<b>Score 2</b> Wt loss > 10%
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### Weight loss in last 3 to 6 months

<b>Score 0</b> Wt loss < 5%	<b>Score 1</b> Wt loss 5 - 10%	<b>Score 2</b> Wt loss > 10%
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### Weight loss in last 3 to 6 months

**Current weight**

kg	Less than (kg)	Between (kg)	More than (kg)
30	1.6	1.6 - 3.3	3.3
31	1.6	1.6 - 3.4	3.4
32	1.7	1.7 - 3.6	3.6
33	1.7	1.7 - 3.7	3.7
34	1.8	1.8 - 3.8	3.8
35	1.8	1.8 - 3.9	3.9
36	1.9	1.9 - 4.0	4.0
37	1.9	1.9 - 4.1	4.1
38	2.0	2.0 - 4.2	4.2
39	2.1	2.1 - 4.3	4.3
40	2.1	2.1 - 4.4	4.4
41	2.2	2.2 - 4.6	4.6
42	2.2	2.2 - 4.7	4.7
43	2.3	2.3 - 4.8	4.8
44	2.3	2.3 - 4.9	4.9
45	2.4	2.4 - 5.0	5.0
46	2.4	2.4 - 5.1	5.1
47	2.5	2.5 - 5.2	5.2
48	2.5	2.5 - 5.3	5.3
49	2.6	2.6 - 5.4	5.4
50	2.6	2.6 - 5.6	5.6
51	2.7	2.7 - 5.7	5.7
52	2.7	2.7 - 5.8	5.8
53	2.8	2.8 - 5.9	5.9
54	2.8	2.8 - 6.0	6.0
55	2.9	2.9 - 6.1	6.1
56	2.9	2.9 - 6.2	6.2
57	3.0	3.0 - 6.3	6.3
58	3.1	3.1 - 6.4	6.4
59	3.1	3.1 - 6.6	6.6
60	3.2	3.2 - 6.7	6.7
61	3.2	3.2 - 6.8	6.8
62	3.3	3.3 - 6.9	6.9
63	3.3	3.3 - 7.0	7.0
64	3.4	3.4 - 7.1	7.1

kg	Less than (kg)	Between (kg)	More than (kg)
65	3.4	3.4 - 7.2	7.2
66	3.5	3.5 - 7.3	7.3
67	3.5	3.5 - 7.4	7.4
68	3.6	3.6 - 7.6	7.6
69	3.6	3.6 - 7.7	7.7
70	3.7	3.7 - 7.8	7.8
71	3.7	3.7 - 7.9	7.9
72	3.8	3.8 - 8.0	8.0
73	3.8	3.8 - 8.1	8.1
74	3.9	3.9 - 8.2	8.2
75	3.9	3.9 - 8.3	8.3
76	4.0	4.0 - 8.4	8.4
77	4.1	4.1 - 8.6	8.6
78	4.1	4.1 - 8.6	8.7
79	4.2	4.2 - 8.7	8.8
80	4.2	4.2 - 8.9	8.9
81	4.3	4.3 - 9.0	9.0
82	4.3	4.3 - 9.1	9.1
83	4.4	4.4 - 9.2	9.2
84	4.4	4.4 - 9.3	9.3
85	4.5	4.5 - 9.4	9.4
86	4.5	4.5 - 9.6	9.6
87	4.6	4.6 - 9.7	9.7
88	4.6	4.6 - 9.8	9.8
89	4.7	4.7 - 9.9	9.9
90	4.7	4.7 - 10.0	10.0
91	4.8	4.8 - 10.1	10.1
92	4.8	4.8 - 10.2	10.2
93	4.9	4.9 - 10.3	10.3
94	4.9	4.9 - 10.4	10.4
95	5.0	5.0 - 10.6	10.6
96	5.1	5.1 - 10.7	10.7
97	5.1	5.1 - 10.8	10.8
98	5.2	5.2 - 10.9	10.9
99	5.2	5.2 - 11.0	11.0

# 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](http://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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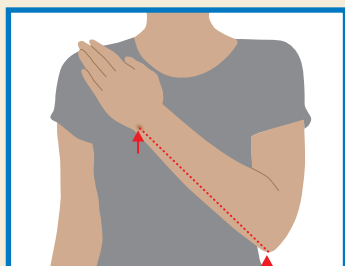


## Alternative measurements: instructions and tables

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).

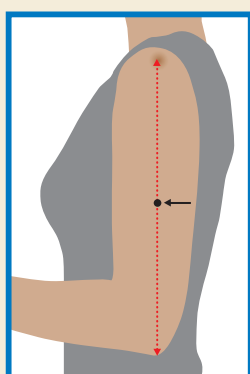
### Estimating height from ulna length



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).

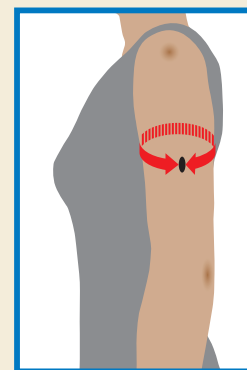
Height (m)	men (<65 years)	1.94	1.93	1.91	1.89	1.87	1.85	1.84	1.82	1.80	1.78	1.76	1.75	1.73	1.71
	men (≥65 years)	1.87	1.86	1.84	1.82	1.81	1.79	1.78	1.76	1.75	1.73	1.71	1.70	1.68	1.67
Ulna length (cm)		32.0	31.5	31.0	30.5	30.0	29.5	29.0	28.5	28.0	27.5	27.0	26.5	26.0	25.5
Height (m)	Women (<65 years)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

### 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/m<sup>2</sup>.

If MUAC is >32.0 cm, BMI is likely to be >30 kg/m<sup>2</sup>.

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*.