Malnutrition Screening & MUST

Lilia Malcolm

Dietitian

Lilia.Malcolm@nhs.net

Conflicts of Interests Declaration

- I have no conflicts of interest to declare

Malnutrition

Malnutrition is a state in which a deficiency or excess (or imbalance) of energy, protein, and other nutrients causes measurable adverse effects on tissue/body form (body shape, size and composition) and function and clinical outcome.

- Both extremes can impact on clinical outcome
- Sarcopenic obesity
- Most screening tools are designed to detect undernutrition

How much of a problem is it?

BAPEN 2022 survey – **45% of adults screened are at risk of disease-related malnutrition**
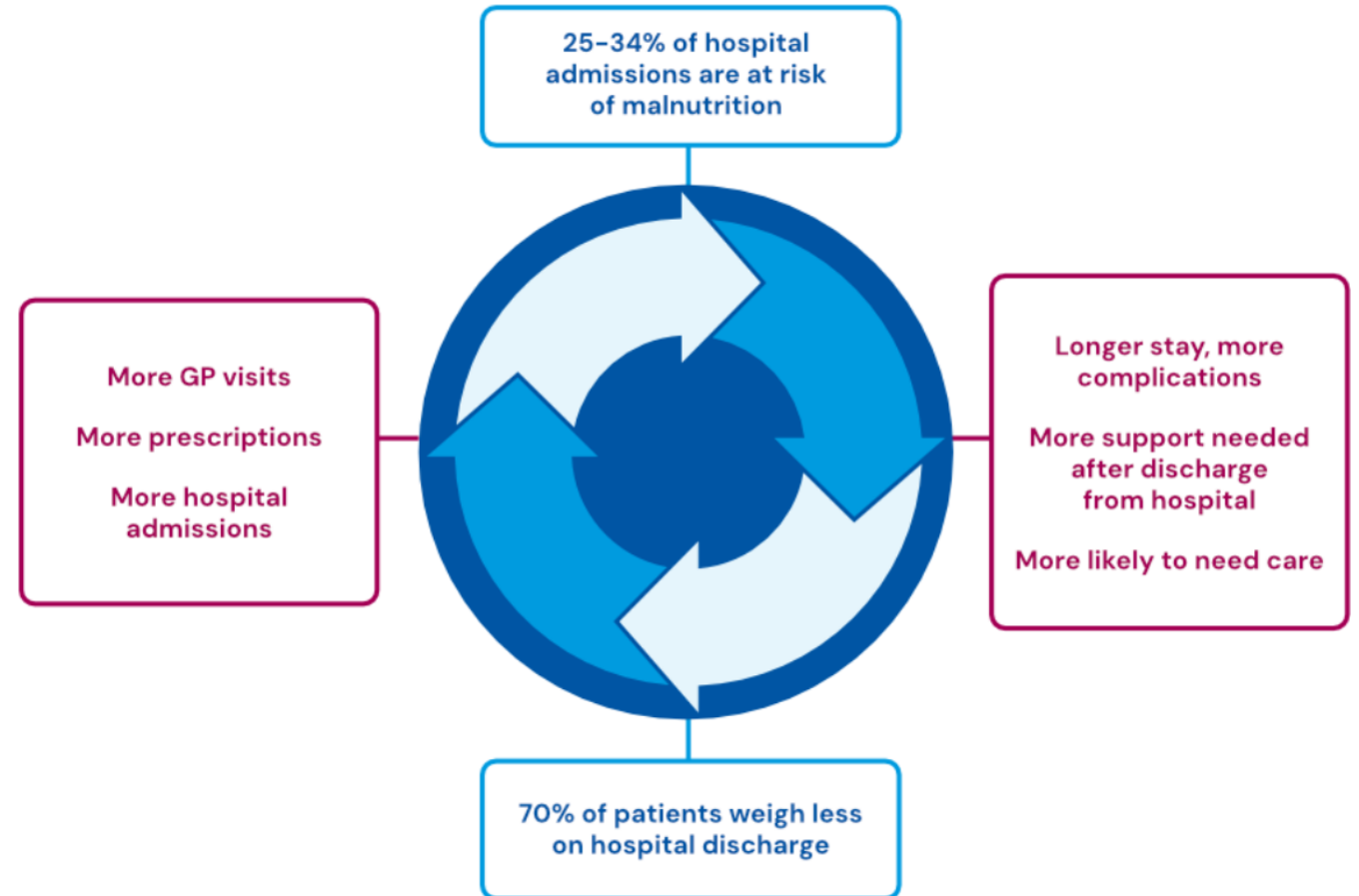
Cancer – 62%
GI conditions – 50%
Resp. conditions – 48%
Frailty – 45%
Neuro – 43%

25–34% of hospital admissions are at risk of malnutrition

More GP visits

More prescriptions

More hospital admissions

Longer stay, more complications

More support needed after discharge from hospital

More likely to need care

70% of patients weigh less on hospital discharge

https://www.bapen.org.uk

Diagnosing Malnutrition

GLIM criteria – ESPEN 2019

Phenotypic and etiologic criteria for the diagnosis of malnutrition

Phenotypic Criteria[g]		Reduced muscle mass[a]	Etiologic Criteria[g]	
Weight loss (%)	Low body mass index (kg/m^2)		Reduced food intake or assimilation[b,c]	Inflammation[d–f]
>5% within past 6 months, or >10% beyond 6 months	<20 if < 70 years, or <22 if >70 years Asia: <18.5 if < 70 years, or <20 if >70 years	Reduced by validated body composition measuring techniques[a]	≤50% of ER > 1 week, or any reduction for >2 weeks, or any chronic GI condition that adversely impacts food assimilation or absorption[b,c]	Acute disease/injury[d,f] or chronic disease-related[e,f]

GRADE SEVERITY OF MALNUTRITION based on phenotypic criteria	WEIGHT LOSS	LOW BMI	REDUCED MUSCLE MASS
STAGE 1 MODERATE MALNUTRITION requires 1 criterion	>5-10% in 6 months or >10-20% in more than 6 months	<20 if <70 years or <22 if >70 years	Mild to moderate deficit (per validated assessment methods)
STAGE 2 SEVERE MALNUTRITION requires 1 criterion	>10% in 6 months or >20% in more than 6 months	<18.5 if <70 years or <20 if >70 years	Severe deficit (per validated assessment methods)

FINAL factsheet_GLIM (espen.org)

@BRITSOCGASTRO   @BAPENUK

What is screening?

- **Nutritional screening** is a process to identify those at risk of malnutrition

✓ Quick

✓ easy to use

✓ First line of action in detecting at-risk patients

NICE 2012 – screen on admission and weekly

- **Nutritional assessment** is a detailed review to determine nutritional status

Comparison of Screening Tools

Article

Comparison of Three Nutritional Screening Tools with the New Glim Criteria for Malnutrition and Association with Sarcopenia in Hospitalized Older Patients
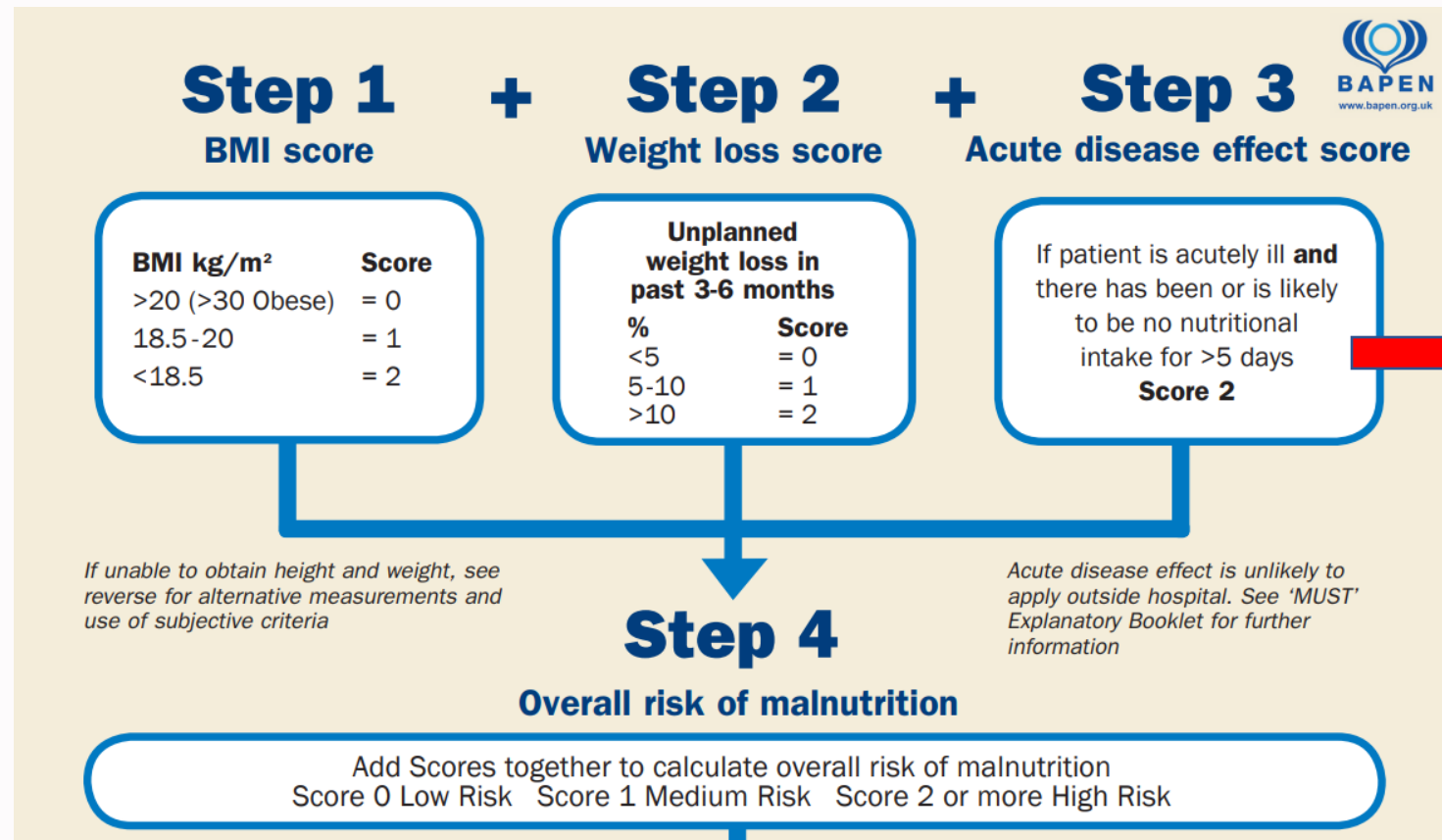
Duration of the nutritional screening tools

	MUST	SGA	NRS-2002
Sensitivity	64.3	95.7	47.2
Specificity	81.7	14.6	75.6
Accuracy	73.7	52.0	62.5
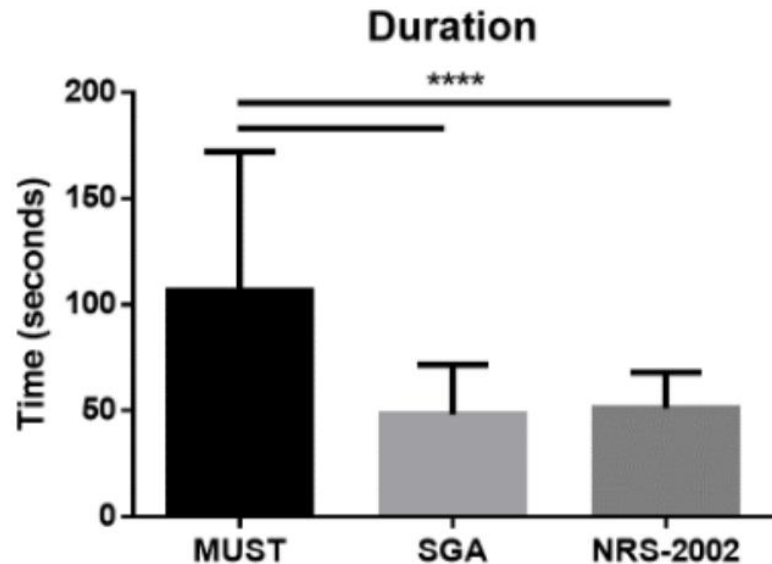
MUST: Malnutrition Universal Screening Tool
SGA: Subjective Global Assessment (SGA)
NRS-2002: Nutritional Risk Screening 2002

Bellanti F et al., J. Clin. Med. 2020

@BRITSOCGASTRO   @BAPENUK

Malnutrition Universal Screening Tool (MUST)

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

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

@BRITSOCGASTRO   @BAPENUK

- ✓ Stroke
- ✓ Swallowing difficulties
- ✓ Malabsorption
- ✓ Critically ill
- ✓ Head injury
- ✓ Decompensated Liver disease

Calculating BMI

1. **Weight** (actual, reported or estimated)

Calculating a dry weight:

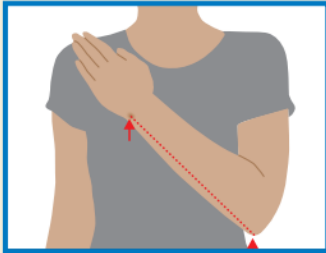|	Ascites	Oedema
Mild	2.2kg	1.0kg
Moderate	6.0kg	5.0kg
Severe	14.0kg	10.0kg

*Mendenhall 1992/PENG

2. Height (actual, reported or estimated)

Ulna length as an alternative measure to estimate height

Alternative Measurements – Ulna Length

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)

@BRITSOCGASTRO   @BAPENUK

Alternative Measurements - MUAC

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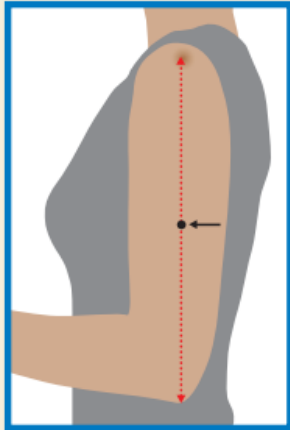
The subject's left arm should be bent at the elbow at a 90 degree angle, with the upper arm held parallel to the side of the body. Measure the distance between the bony protrusion on the shoulder (acromion) and the point of the elbow (olecranon process). Mark the mid-point.

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.
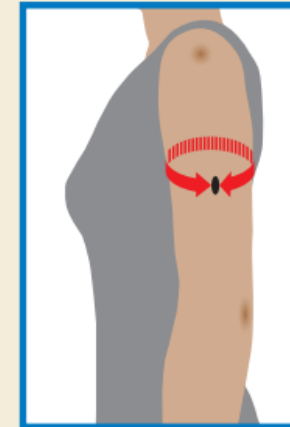
If MUAC is <23.5 cm, BMI is likely to be <20 kg/m^2.
If MUAC is >32.0 cm, BMI is likely to be >30 kg/m^2.

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*.

@BRITSOCGASTRO   @BAPENUK

Malnutrition Universal Screening Tool (MUST)
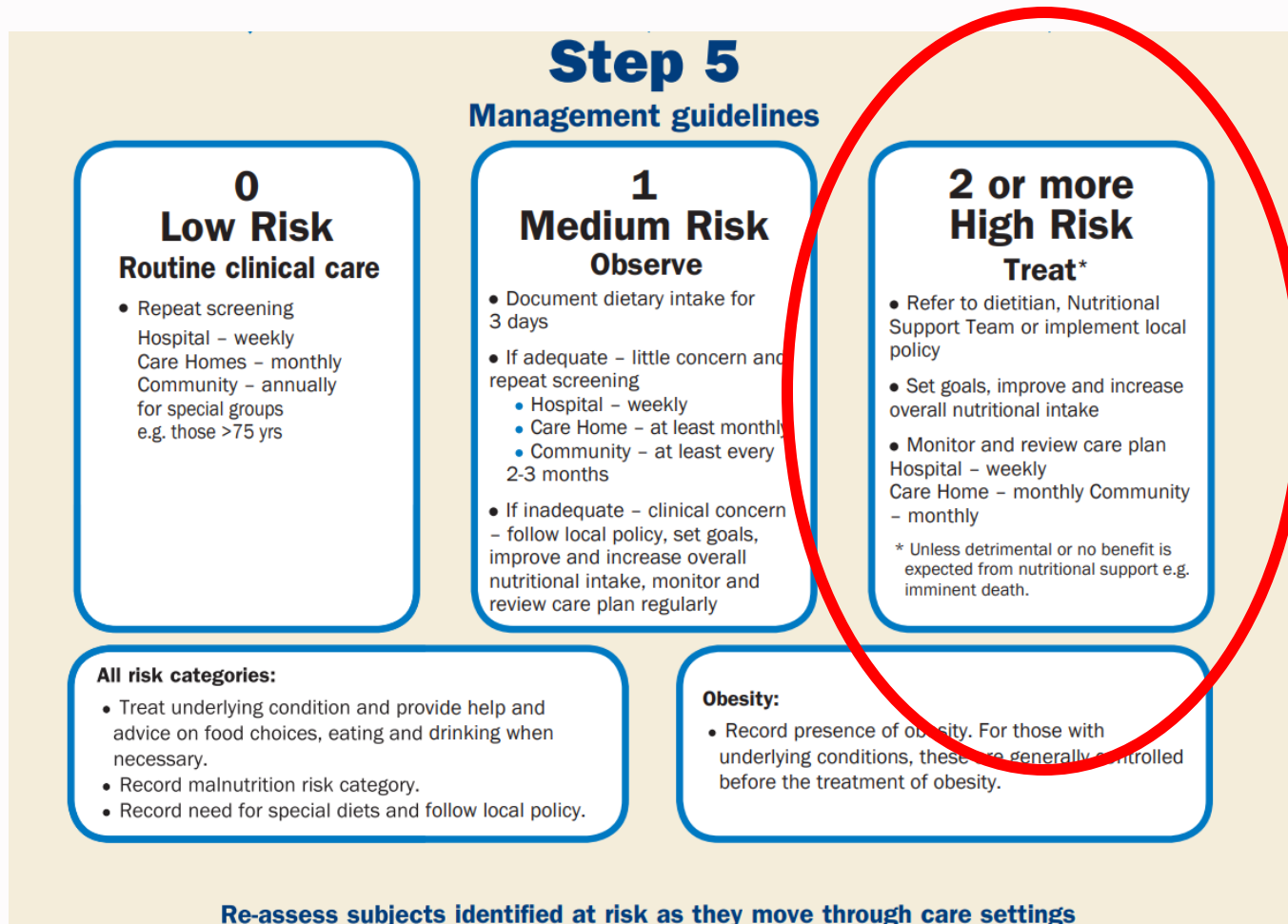
Case Study

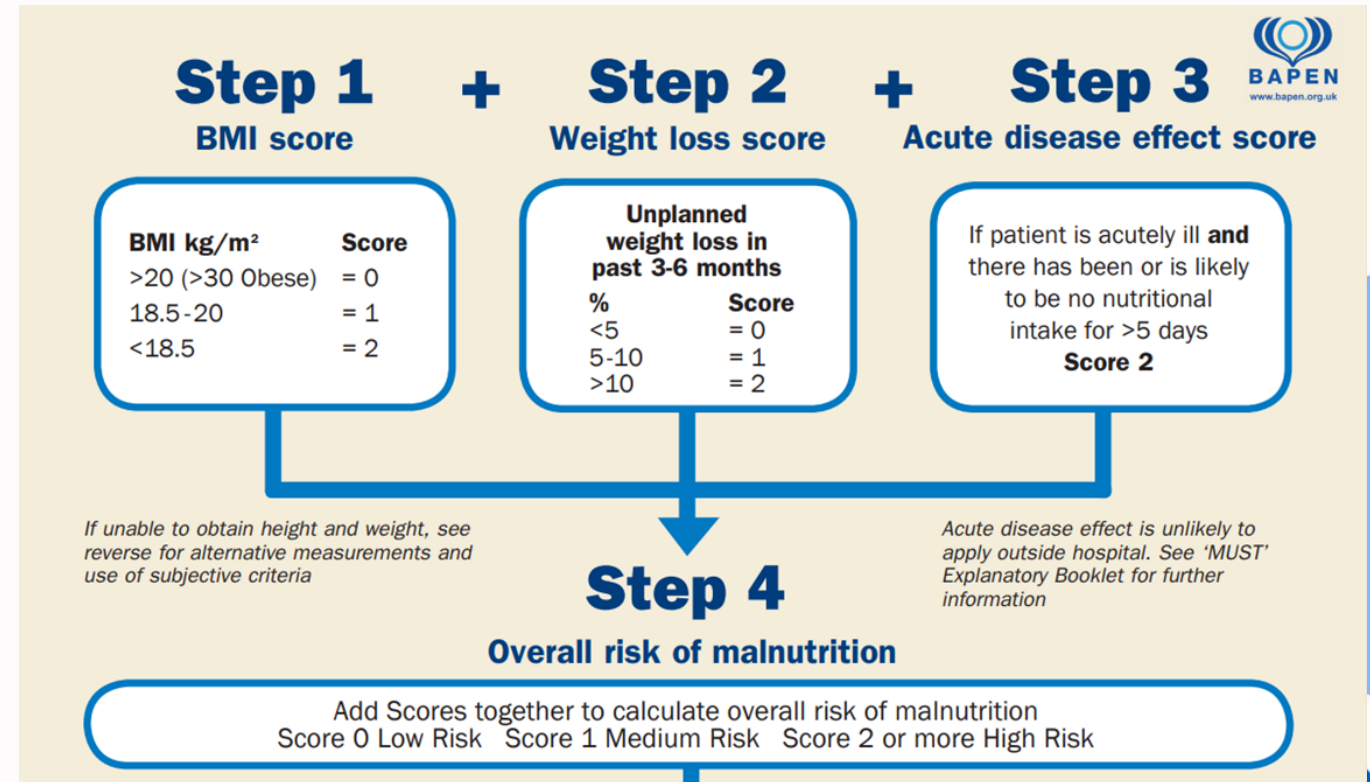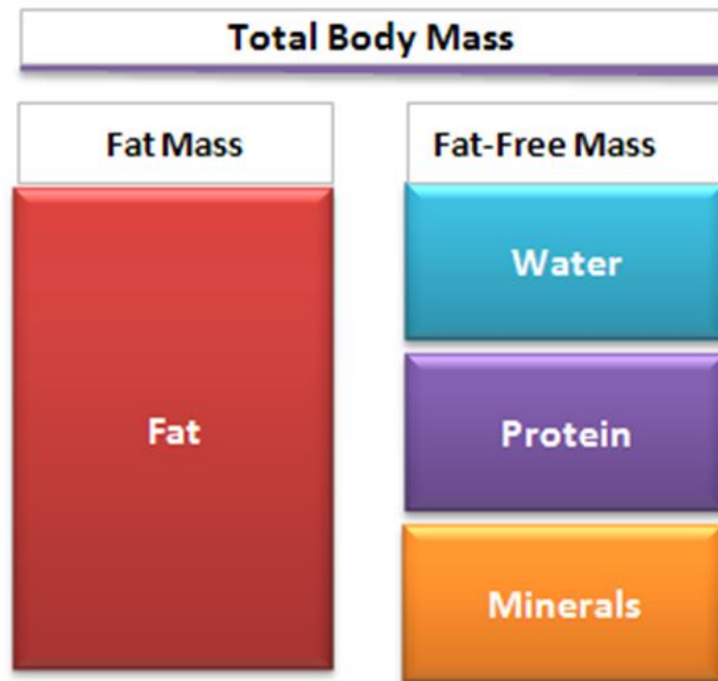51yr male admitted with jaundice, confusion and ascites

Weight – 62kg
Height – 1.7m

Previous weight from last admission 4 months ago 65kg

What would you score his malnutrition risk as?

Any other thoughts?

Step 1 + Step 2 + Step 3

BAPEN
www.bapen.org.uk

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

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

Nutritional Assessment

Total Body Mass

Fat Mass | **Fat-Free Mass**

Fat | Water

Protein

Minerals

* Denisty of water, protein, & bone minerals can change with age, activity, illness, & ethinicty

- Measurement of **skeletal FFM** is more relevant and useful, compared to BMI, to activities of daily living and when considering **efficacy of nutritional interventions**

In clinical practice….

- **Assessment of FM/FFM** – skinfolds and circumferences
- **Assessment of strength and function** – hand grip strength (HGS) and sit to stand

Gold Standard
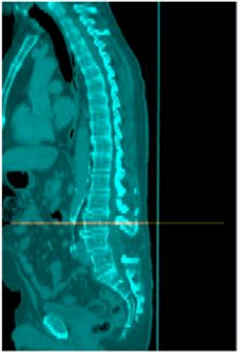
Figure 1. Identification of the mid-point of L3 on sagittal CT images (orange line).
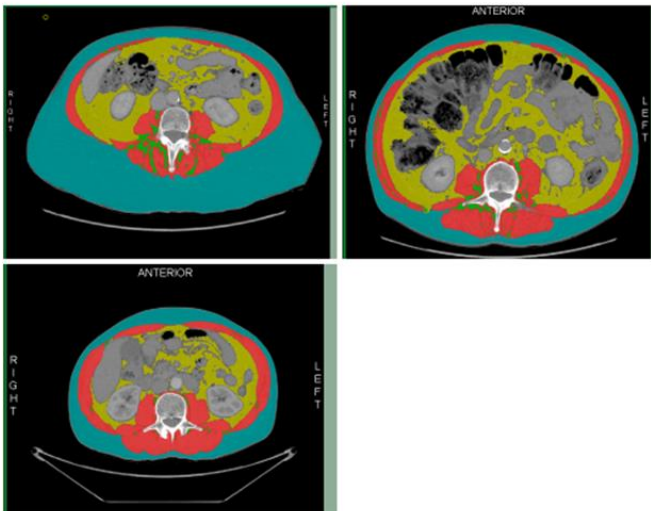
Figure 2. Division of skeletal muscle (red); intramuscular adipose tissue (green); visceral adipose tissue (yellow); and subcutaneous adipose tissue (blue).

1. **Computed Tomography (CT)**

2. Magnetic Resonance Imaging (MRI)

3. Dual Energy XRay Absorptiometry (DEXA)

4. **Bioelectrical Impedance Analysis (BIA)**

Muscle Matters!

Automated CT Analysis of Body Composition as a Frailty Biomarker in Abdominal Surgery

Ijeamaka Anyene Fumagalli, MPH[1]; Sidney T. Le, MD[1,2]; Peter D. Peng, MD[3]; et al

» Author Affiliations

Almost 50,000 patients

Correlation with Hospital Frailty Risk Score (HFRS) and adverse outcomes

Higher muscle quantity and density scores:
- Inversely correlated with HFRS
- Associated with reduced 30-day readmission or mortality, 30-day postop morbidity

@BRITSOCGASTRO   @BAPENUK

Association of Low Muscle Mass and Low Muscle Radiodensity With Morbidity and Mortality for Colon Cancer Surgery

Jingjie Xiao, PhD,[1,2] Bette J. Caan, DrPH,[3] Elizabeth M. Cespedes Feliciano, ScD, MSc,[3] Jeffrey A. Meyerhardt, MD,

- SMI and low SMD as important preoperative risk factors of worse outcomes after colon resection

- low SMI and low SMD were associated with even higher risk of morbidity and mortality after accounting for adiposity levels

Body Composition – Clinical Practice
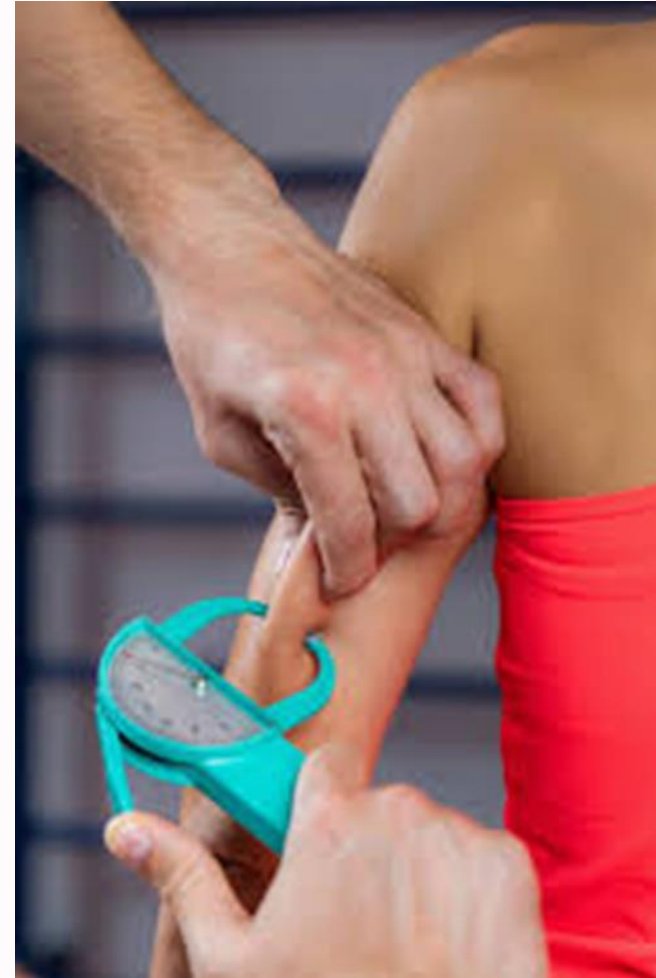

Mid-upper arm circumference (MUAC)

- Reflects both FM and FFM

Tricep Skin Fold (TSF)

- Indicator of FM

Mid arm muscle circumference (MAMC)

- Indicator of FFM

Muscle Strength and Function

Hand Grip Strength

- Measure of upper extremity strength

- Positive correlation with FFM

- FFM is a determinant of muscle function but isn't the only factor – muscle function responds earlier to both nutritional deprivation and repletion than parameters such as FFM

(Changes in electrolyte status are more responsible for early muscle function changes)

- Different measuring positions give different results – document and standardise

- Repeat 3 measurements and take best of 3

Practice

1. Ulna length

2. MUAC

3. TSF

4. HGS

Feedback?

Conclusion

- Malnutrition screening identifies AT RISK patients and is the first step in the process

- Still in clinical practice there is an over reliance on Wt/BMI with changes in actual FM, FFM, function, QoL, being largely overlooked

- Should not use single measurements in isolation to diagnose malnutrition – assessment should be multi component in nature and consider mass, functionality, dietary assessment