

Nutritional Assessment in Pancreatic Cancer

Rebekah Lord

Senior Specialist HPB Dietitian

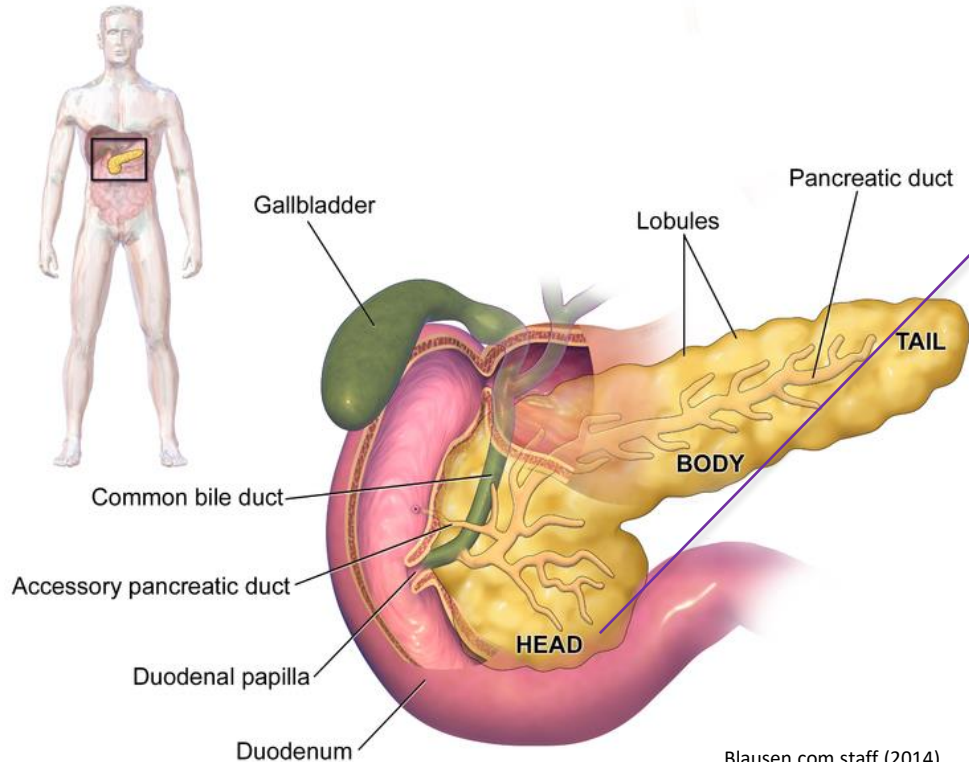
Glenfield Hospital, Leicester





- Normal pancreatic function
- Type 3c Diabetes
- Malnutrition, sarcopenia, cachexia and frailty in pancreatic cancer
- Nutritional requirements
- Assessment tools and functional tests
- Prehabilitation

Pancreas and its functions



Blausen.com staff (2014)

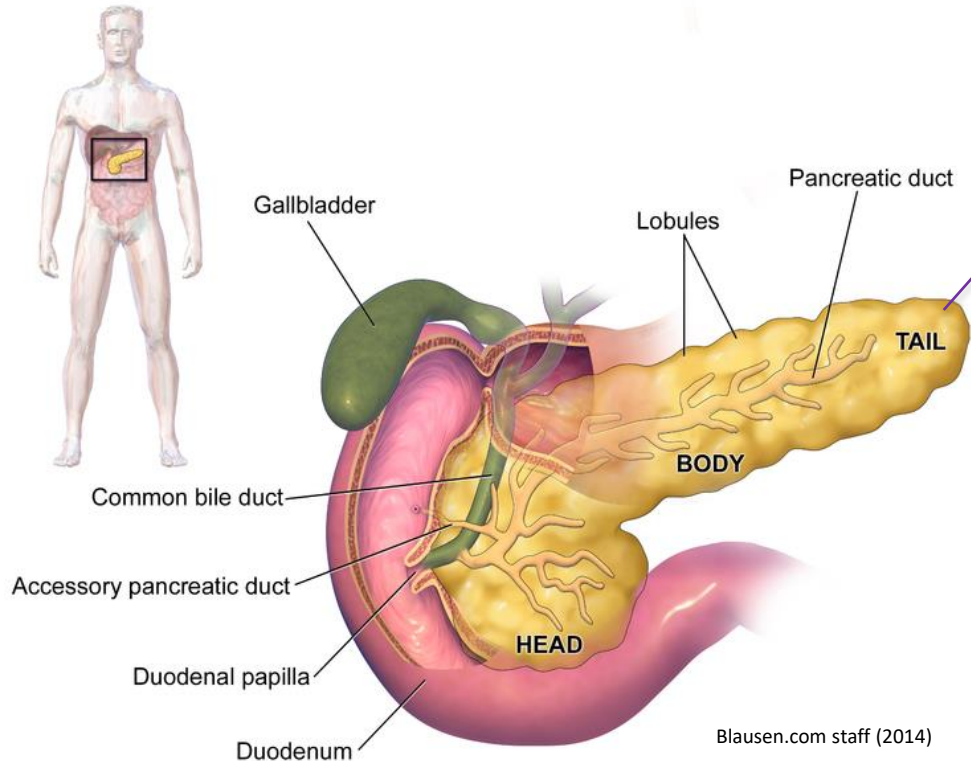
Exocrine function (Acinar cells and ducts)

- Produces and secretes enzymes:
 - Lipase (fats)
 - Amylase (carbohydrates)
 - Protease (proteins)

Digestion + absorption

80-90% pancreatic cancer patients display signs of pancreatic exocrine insufficiency

Pancreas and its functions



Endocrine function (Islets of Langerhans)

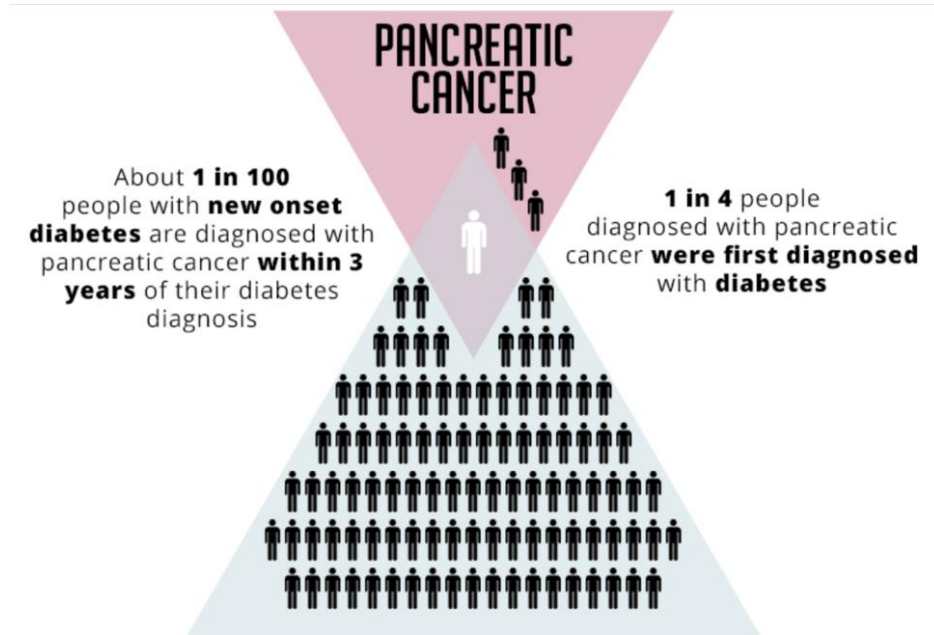
Produce and secrete hormones into the bloodstream:

- Beta cells – Insulin (↓)
- Alpha cells – glucagon (↑)
- Delta cells - Somatostatin

Blood glucose regulation

Type 3c Diabetes

Type 3c Diabetes



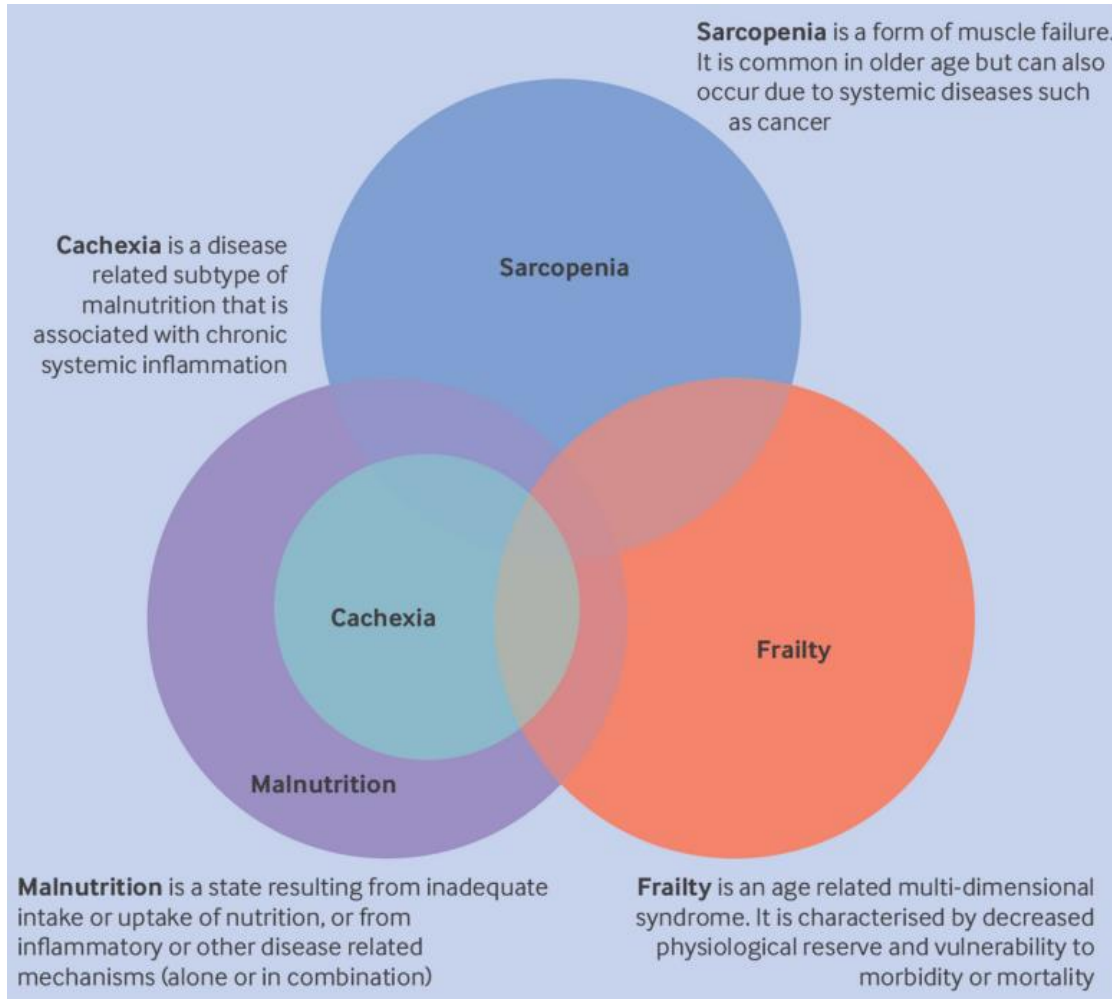
National cancer institute, 2021

Early identification of type 3c Diabetes

- UK-EDI study – biomarkers present in newly diagnosed Diabetes with pancreatic cancer
- Earlier diagnosis, treatment options and survival

HbA1c 48mmol/mol

- Masked by PEI
- Average measure 6-8 weeks



Malnutrition in pancreatic cancer

'Malnutrition is a state of nutrition 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.'

(BAPEN, 2020)

More than 1/3 of patients with pancreatic cancer have experienced >10% weight loss at diagnosis

Malnutrition leads to (Gartner et al, 2016):

- Longer Hospital stay
- Increased risk of complications (e.g. infections)
- Reduced quality of life
- Increased morbidity + mortality
- Poorer outcomes

Early nutritional screening, assessment and Dietetic intervention is crucial

Inadequate nutritional intake

- Increased nutritional requirements (inflammatory response)
- Symptoms; pain, nausea, vomiting, constipation, diarrhoea, taste changes, PEI
 - Prolonged fasting
 - Psychological impact of diagnosis
 - Obstruction
 - Food aversion/restriction

Why is malnutrition common in pancreatic cancer?

Malabsorption/ maldigestion

- Pancreatic exocrine insufficiency
 - Obstructive jaundice
- Misdiagnosed/undiagnosed hyperglycaemia
 - GI resection
- Ischaemia/ileus/delayed gastric emptying
 - Gastric outlet obstruction

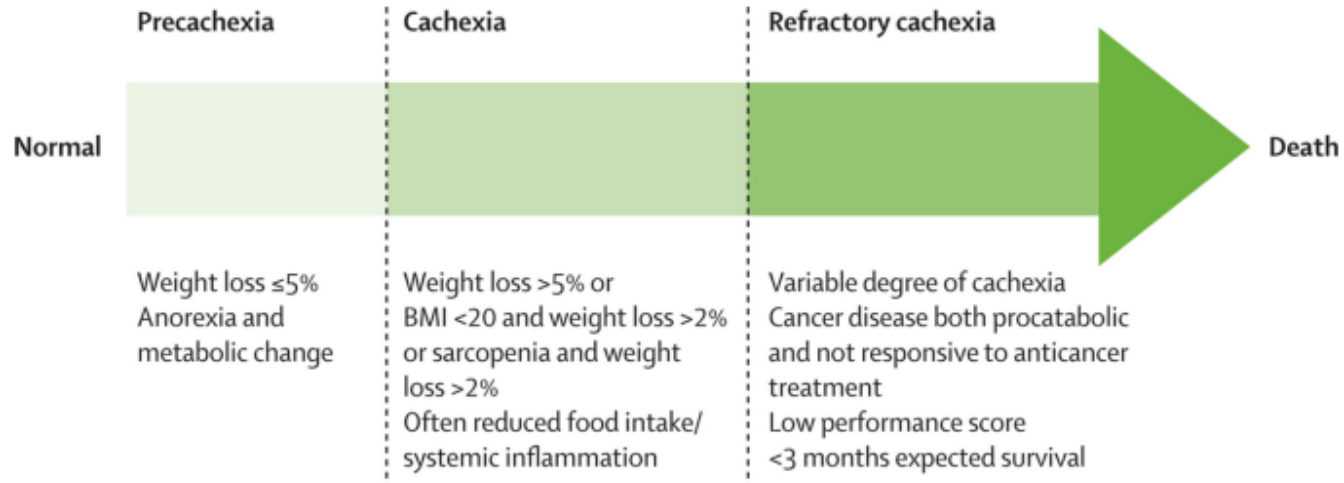


Cancer cachexia

Multifactorial syndrome characterised by an ongoing loss of skeletal muscle mass (with or without loss of fat mass) that cannot be fully reversed by conventional nutritional support and leads to progressive functional impairment (Fearon et al, 2011)

- Thought to be present in up to **46-89%** of patients with pancreatic cancer (Yule MS, et al, 2024)
- **~40%** of patients with pancreatic cancer develop cachexia **before surgery** (Yule MS, et al, 2024)
- **Preoperative** cachexia is associated with **poorer survival** in pancreatic cancer (Bachmann et al, 2009)
- Physical symptoms; muscle wasting, reduced physical activity, negative energy/protein balance, fatigue and social withdrawal
 - Evidence suggests hypothalamic dysfunction (from inflammation) interacts with ghrelin (hunger) + leptin (satiety) contributing to cachexia
- Can have a psychological impact on the families of patients

Cancer cachexia



Fearon et al, 2008



Cancer cachexia management

Prehabilitation programmes + exercise

Nutrition

- Regular screening + intervention for patients with prognosis >few months (ESMO)
- Artificial feeding not recommended if prognosis <2 months

Psychological support + end of life care

- Input from Specialist Nurses and/or palliative care team

Corticosteroids (Dexamethasone/Prednisolone)

- Short term (weeks) improvement of appetite
- Need PPI (to protect stomach) and monitoring of blood glucose levels
- Research has found no effect on body weight

Progesterones (Megastrol acetate)

- Appetite stimulant but weight gain rather than lean body mass

Olanzapine (antipsychotic)

- American Society of Clinical Oncology (ASCO) advised low dose once daily can be offered to patients with advanced cancer for nausea + weight gain



MENAC trial

Multimodal intervention - Exercise, Nutrition and Anti-inflammatory medication for Cachexia

Patients with incurable lung, cholangiocarcinoma or pancreatic cancer for chemotherapy with cachexia (>5% weight loss)

What will help reverse or slow down cachexia?

- Anti-inflammatory medication (high dose fish oil supplements)
- Exercise – resistance and aerobic exercise
- Dietetic counselling and ONS

Measured weight, muscle mass, physical function and quality of life at 3, 6 and 12 weeks

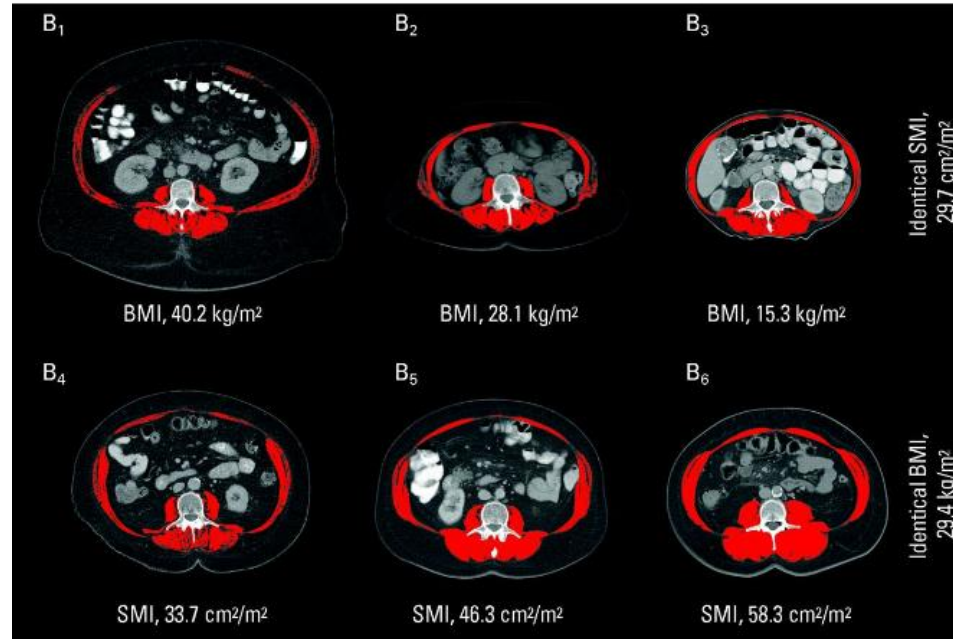
Results – patients assigned to multimodal treatment, weight stabilised at 6 weeks compared to standard care. No conclusive difference to muscle mass/physical activity.

Sarcopenia

“Progressive and generalized skeletal muscle disorder that is associated with increased likelihood of adverse outcomes including falls, fractures, physical disability and mortality” (Cruz-Jentoft et al, 2018)

Prevalence of **55.9%-63%** reported in pancreatic cancer patients

High BMI can mask sarcopenia



(Martin L et al, 2013)



Sarcopenia in pancreatic cancer

Patients with advanced pancreatic cancer undergoing Folfirinox **chemotherapy** had (Kurita et al, 2019):

- Poorer outcomes/worse overall survival if sarcopenic
- Increased toxicities from treatment with sarcopenic obesity

Surgical patients

- Increase in perioperative and overall mortality if sarcopenic (Bundred et al, 2019)
- If sarcopenic, significantly reduced survival and higher complication rate when undergoing resection for pancreatic ductal adenocarcinoma

Sarcopenia management

- Protein intake – aim 1-1.5g/kg/day
- Benefits to increasing activity levels
 - HIIT, aerobic, resistance
- Vitamin D – increases muscle strength, reverses muscle atrophy

FEED study - Effectiveness of a 12 week multi-modal nutrition-led intervention in preventing loss of muscle strength during neo-adjuvant chemotherapy

Fish oil, **E**xercise, **E**nzyme, **D**ietary Counselling

FEED trial – RCT with control group + intervention (additional Dietitian and Physiotherapy appointments)

Frailty

“A person’s mental and physical resilience, or their ability to bounce back and recover from events like illness and injury.” Age UK

Prevalence in pancreatic cancer is **45%** (Zhang F, Yan Y, Ge C, 2024)

Associated with an increased risk of mortality (Zhang F, Yan Y, Ge C, 2024)

Clinical frailty scale score

Interventions can help to reduce frailty:

- Exercise to improve strength and balance
- Addressing nutritional deficiencies

Clinical Frailty Scale*



1 Very Fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.



2 Well – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.



3 Managing Well – People whose **medical problems are well controlled**, but are **not regularly active** beyond routine walking.



4 Vulnerable – While **not dependent** on others for daily help, often **symptoms limit activities**. A common complaint is being “slowed up”, and/or being tired during the day.



5 Mildly Frail – These people often have **more evident slowing**, and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.



6 Moderately Frail – People need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.



7 Severely Frail – **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).



8 Very Severely Frail – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.



9. Terminally Ill - Approaching the end of life. This category applies to people with a **life expectancy <6 months**, who are **not otherwise evidently frail**.

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do **personal care** with prompting.

In **severe dementia**, they cannot do personal care without help.

* 1. Canadian Study on Health & Aging. Revised 2008.
2.K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489-495.

Nutritional requirements in pancreatic cancer

ESPEN guidelines (2016)

Energy

- 25-30kcal/kg/day
- Evidence level: low

Protein

- 1-1.5g/kg/day
- Evidence level: moderate

PENG (2018)

Energy

- 24kcal/kg/day
 - ≤65 yrs
 - (BMI 18.5-30kg/m²)
- 24kcal/kg/day (range 22-27)
 - > 65 yrs
 - (BMI 18.5-30kg/m²)
- 25kcal/kg/day (range 24-26)
 - (BMI<18.5kg/m²)

Protein

- Based on ESPEN guidelines
- 1-1.5g/kg/day



What nutritional assessment do you regularly use for patients with pancreatic cancer?



How do we assess risk of
malnutrition?

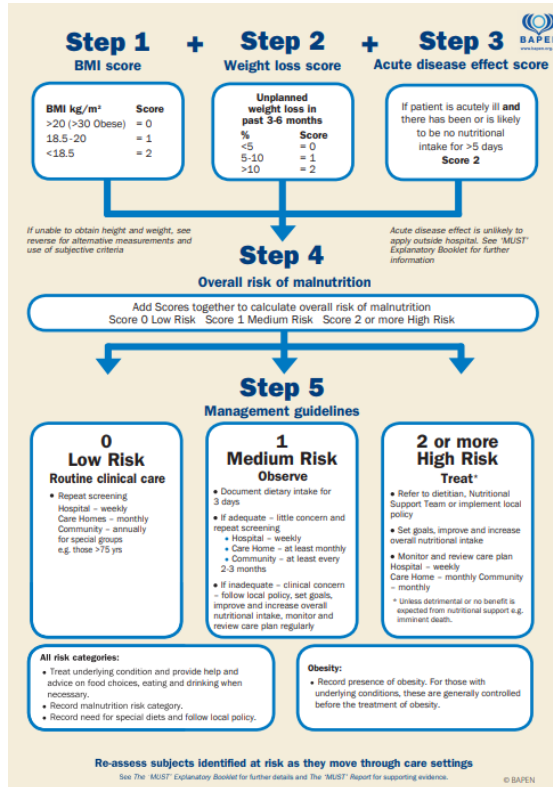
Screening tools

Malnutrition Universal Screening Tool (MUST)

Widely used in many Hospitals
Considers BMI, weight loss and acute illness

BUT

- Lower sensitivity in oncology patients
- Does not consider if treatment is likely to affect nutritional status
- Does not consider sarcopenia or nutrition impact symptoms
- **Early intervention is key**





Scored Patient Generated Subjective Global Assessment (PG-SGA)

Scored Patient-Generated Subjective Global Assessment (PG-SGA)

Patient ID Information

Pt should complete if possible; not professional or family unless needs help (sight, literacy, etc.)

History Boxes 1-4 are **designed to be completed by the patient.**
[Boxes 1-4 are referred to as the PG-SGA Short Form (SF)]

1. Weight *(See Worksheet 1)*

In summary of my current and recent weight:

I currently weigh about _____ pounds
I am about _____ feet _____ tall

One month ago I weighed about _____ pounds
Six months ago I weighed about _____ pounds

During the past two weeks my weight has:

decreased ⁽¹⁾ not changed ⁽⁰⁾ increased ⁽⁰⁾ Box 1

Box 1 max score = 5 points: up to 4 pts from wt loss + up to 1 point for past 2 wks

While height is not essential for scoring, the app calculates BMI

Complete both 1 & 6 months; for scoring, use 1 mo if available. Use 6 mos only if 1 mo is not available

2. Food Intake: As compared to my normal intake, I would rate my food intake during the past month as:

- unchanged ⁽⁰⁾
- more than usual ⁽⁰⁾
- less than usual ⁽¹⁾

I am now taking:

- normal food but less than normal amount ⁽¹⁾
- little solid food ⁽²⁾
- only liquids ⁽³⁾
- only nutritional supplements ⁽³⁾
- very little of anything ⁽⁴⁾
- only tube feedings or only nutrition by vein ⁽⁴⁾ Box 2

Score how the patient self-rates his/her intake during the past month; this helps to address recent deficit / current risk

Box 2 not additive; max = 4; use the highest score checked, no matter how many checked

3. Symptoms: I have had the following problems that have kept me from eating enough during the past two weeks (check all that apply):

- no problems eating ⁽⁰⁾
- no appetite, just did not feel like eating
- nausea ⁽¹⁾
- constipation ⁽¹⁾
- mouth sores ⁽²⁾
- things taste funny or have no taste ⁽¹⁾
- problems swallowing ⁽²⁾
- pain; where? ⁽¹⁾ _____
- other** ⁽¹⁾ _____
- vomiting ⁽¹⁾
- diarrhea ⁽¹⁾
- dry mouth ⁽¹⁾
- smells bother me ⁽¹⁾
- feel full quickly ⁽¹⁾
- fatigue ⁽¹⁾

** Examples: depression, money, or dental problems

Box 3 Any symptoms that patient reports (checks off) that has kept them from eating enough during the past 2 weeks gets scored. Add all points for Box 3 total score

4. Activities and Function:

Over the past month, I would generally rate my activity as:

- normal with no limitations ⁽⁰⁾
- not my normal self, but able to be up and about with fairly normal activities ⁽¹⁾
- not feeling up to most things, but in bed or chair less than half the day ⁽²⁾
- able to do little activity and spend most of the day in bed or chair pretty much bedridden, rarely out of bed ⁽³⁾

This is the WHO or ECOG performance status in patient terms. Patient rates his/her activity level over the past month regardless of the cause – inadequate intake, metabolic stress (corticosteroids, fever, inflammation, trauma) or significant inactivity. Remember, 1 week of complete bed rest is associated with up to 4% loss in lean tissue/muscle mass

Box 4

Additive Score of the Boxes 1-4 A

The remainder of this form is to be completed by your doctor, nurse, dietician, or therapist. Thank you.

Scored Patient-Generated Subjective Global Assessment (PG-SGA)

<p>Worksheet 1 - Scoring Weight (Wt) Loss To determine score, use 1 month weight data if available. Use 6 month data only if there is no 1 month weight data. Use points below to score weight change and add one extra point if patient has lost weight during the past 2 weeks. Enter total point</p> <table style="width:100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Wt loss in 1 month</th> <th style="text-align: left;">Points</th> <th style="text-align: left;">Wt loss in 6 months</th> </tr> <tr> <td>10% or greater</td> <td>4</td> <td>20% or greater</td> </tr> <tr> <td>5-9.9%</td> <td>3</td> <td>10 - 19.9%</td> </tr> <tr> <td>3-4.9%</td> <td>2</td> <td>6 - 9.9%</td> </tr> <tr> <td>2-2.9%</td> <td>1</td> <td>2 - 5.9%</td> </tr> <tr> <td>0-1.9%</td> <td>0</td> <td>0 - 1.9%</td> </tr> </table> <p style="text-align: center;">Numerical score from Worksheet 1 <input type="text"/></p>	Wt loss in 1 month	Points	Wt loss in 6 months	10% or greater	4	20% or greater	5-9.9%	3	10 - 19.9%	3-4.9%	2	6 - 9.9%	2-2.9%	1	2 - 5.9%	0-1.9%	0	0 - 1.9%	<p style="text-align: right;">Additive Score of the Boxes 1-4 (See Side 1) <input type="text"/> A</p> <p>5. Worksheet 2 - Disease and its relation to nutritional requirements</p> <p>All relevant diagnoses (specify) _____ Primary disease stage (circle if known or appropriate) I II III IV Other _____</p> <p>One point each: <input type="checkbox"/> Cancer <input type="checkbox"/> AIDS <input type="checkbox"/> Pulmonary or cardiac cachexia <input type="checkbox"/> Presence of decubitus, open wound, or fistula <input type="checkbox"/> Presence of trauma <input type="checkbox"/> Age greater than 65 years <input type="checkbox"/> Chronic renal insufficiency</p> <p style="text-align: right;">Numerical score from Worksheet 2 <input type="text"/> B</p>																																																							
Wt loss in 1 month	Points	Wt loss in 6 months																																																																								
10% or greater	4	20% or greater																																																																								
5-9.9%	3	10 - 19.9%																																																																								
3-4.9%	2	6 - 9.9%																																																																								
2-2.9%	1	2 - 5.9%																																																																								
0-1.9%	0	0 - 1.9%																																																																								
<p>6. Work Sheet 3 - Metabolic Demand Score for metabolic stress is determined by a number of variables known to increase protein & caloric needs. The score is additive so that a patient who has a fever of > 102 degrees (3 points) and is on 10 mg of prednisone chronically (2 points) would have an additive score for this section of 5 points</p> <table style="width:100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Stress</th> <th style="text-align: left;">none (0)</th> <th style="text-align: left;">low (1)</th> <th style="text-align: left;">moderate (2)</th> <th style="text-align: left;">high (3)</th> </tr> <tr> <td>Fever</td> <td>no fever</td> <td>>99 and <101</td> <td>≥101 and <102</td> <td>≥102</td> </tr> <tr> <td>Fever duration</td> <td>no fever</td> <td><72 hrs</td> <td>72 hrs</td> <td>> 72 hrs</td> </tr> <tr> <td>Corticosteroids</td> <td>no corticosteroids</td> <td>low dose</td> <td>moderate dose</td> <td>high dose steroid</td> </tr> <tr> <td></td> <td></td> <td>(<10mg prednisone equivalents/day)</td> <td>(≥10 and <30mg prednisone equivalents/day)</td> <td>(≥30mg prednisone equivalents/day)</td> </tr> </table> <p style="text-align: right;">Numerical score from worksheet 3 <input type="text"/> C</p>		Stress	none (0)	low (1)	moderate (2)	high (3)	Fever	no fever	>99 and <101	≥101 and <102	≥102	Fever duration	no fever	<72 hrs	72 hrs	> 72 hrs	Corticosteroids	no corticosteroids	low dose	moderate dose	high dose steroid			(<10mg prednisone equivalents/day)	(≥10 and <30mg prednisone equivalents/day)	(≥30mg prednisone equivalents/day)																																																
Stress	none (0)	low (1)	moderate (2)	high (3)																																																																						
Fever	no fever	>99 and <101	≥101 and <102	≥102																																																																						
Fever duration	no fever	<72 hrs	72 hrs	> 72 hrs																																																																						
Corticosteroids	no corticosteroids	low dose	moderate dose	high dose steroid																																																																						
		(<10mg prednisone equivalents/day)	(≥10 and <30mg prednisone equivalents/day)	(≥30mg prednisone equivalents/day)																																																																						
<p>7. Worksheet 4 - Physical Exam Physical exam includes a subjective evaluation of 3 aspects of body composition: fat, muscle, & fluid status. Since this is subjective, each aspect of the exam is rated for degree of deficit. Muscle deficit impacts point score more than fat deficit. Definition of categories: 0 = no deficit, 1+ = mild deficit, 2+ = moderate, 3+ = severe</p> <table style="width:100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Muscle Status:</th> <th colspan="4"></th> <th style="text-align: left;">Fluid Status:</th> <th colspan="4"></th> </tr> <tr> <td>clavicles (pectoralis & deltoids)</td> <td>0</td> <td>1+</td> <td>2+</td> <td>3+</td> <td>0</td> <td>1+</td> <td>2+</td> <td>3+</td> </tr> <tr> <td>interscapular muscles</td> <td>0</td> <td>1+</td> <td>2+</td> <td>3+</td> <td>0</td> <td>1+</td> <td>2+</td> <td>3+</td> </tr> <tr> <td>thigh (quadriceps)</td> <td>0</td> <td>1+</td> <td>2+</td> <td>3+</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Global muscle status rating</td> <td>0</td> <td>1+</td> <td>2+</td> <td>3+</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>orbital fat pads</td> <td>0</td> <td>1+</td> <td>2+</td> <td>3+</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>triceps skin fold</td> <td>0</td> <td>1+</td> <td>2+</td> <td>3+</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Global fat deficit rating</td> <td>0</td> <td>1+</td> <td>2</td> <td>3+</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p style="text-align: right;">Numerical score from Worksheet 4 <input type="text"/> D</p> <p style="text-align: right;">Total PG-SGA score <input type="text"/> (Total numerical score of A+B+C+D above) (See triage recommendations below) Global PG-SGA rating (A, B, or C) = <input type="text"/></p> <p>Clinician Signature _____ RD RN PA MD DO Other _____ Date _____</p>		Muscle Status:					Fluid Status:					clavicles (pectoralis & deltoids)	0	1+	2+	3+	0	1+	2+	3+	interscapular muscles	0	1+	2+	3+	0	1+	2+	3+	thigh (quadriceps)	0	1+	2+	3+					Global muscle status rating	0	1+	2+	3+					orbital fat pads	0	1+	2+	3+					triceps skin fold	0	1+	2+	3+					Global fat deficit rating	0	1+	2	3+				
Muscle Status:					Fluid Status:																																																																					
clavicles (pectoralis & deltoids)	0	1+	2+	3+	0	1+	2+	3+																																																																		
interscapular muscles	0	1+	2+	3+	0	1+	2+	3+																																																																		
thigh (quadriceps)	0	1+	2+	3+																																																																						
Global muscle status rating	0	1+	2+	3+																																																																						
orbital fat pads	0	1+	2+	3+																																																																						
triceps skin fold	0	1+	2+	3+																																																																						
Global fat deficit rating	0	1+	2	3+																																																																						
<p>Worksheet 5 - PG-SGA Global Assessment Categories</p> <table style="width:100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Status A</th> <th style="text-align: left;">Status B</th> <th style="text-align: left;">Status C</th> </tr> <tr> <td>Weight</td> <td>Well nourished</td> <td>Moderately malnourished</td> <td>Severely malnourished</td> </tr> <tr> <td></td> <td>No wt loss</td> <td><5% wt loss in 1 month (or 10% in 6 mos)</td> <td>> 5% wt loss in 1 month (or >10% in 6 mos)</td> </tr> <tr> <td></td> <td>OR Recent wt gain</td> <td>OR Progressive wt loss</td> <td>OR Progressive wt loss</td> </tr> <tr> <td>Nutrient intake</td> <td>No deficit</td> <td>Definite decrease in intake</td> <td>Severe deficit in intake</td> </tr> <tr> <td></td> <td>OR Significant recent improvement</td> <td></td> <td></td> </tr> <tr> <td>Nutrition Impact</td> <td>None</td> <td>Percent of nutrition impact symptoms (PG-SGA Box 3)</td> <td>Percent of nutrition impact symptoms (PG-SGA Box 3)</td> </tr> <tr> <td>Symptoms</td> <td>OR Significant recent improvement allowing adequate intake</td> <td>OR Recent deterioration</td> <td>OR recent significant deterioration</td> </tr> <tr> <td>Functioning</td> <td>No deficit</td> <td>Moderate functional deficit</td> <td>Severe functional deficit</td> </tr> <tr> <td></td> <td>OR Recent improvement</td> <td></td> <td></td> </tr> <tr> <td>Physical Exam</td> <td>No deficit</td> <td>Evidence of mild to moderate loss of muscle mass (SQI fat tissue, recent improvement muscle tone on palpation)</td> <td>Obvious signs of malnutrition (e.g., severe loss muscle, SQI possible edema)</td> </tr> </table>		Category	Status A	Status B	Status C	Weight	Well nourished	Moderately malnourished	Severely malnourished		No wt loss	<5% wt loss in 1 month (or 10% in 6 mos)	> 5% wt loss in 1 month (or >10% in 6 mos)		OR Recent wt gain	OR Progressive wt loss	OR Progressive wt loss	Nutrient intake	No deficit	Definite decrease in intake	Severe deficit in intake		OR Significant recent improvement			Nutrition Impact	None	Percent of nutrition impact symptoms (PG-SGA Box 3)	Percent of nutrition impact symptoms (PG-SGA Box 3)	Symptoms	OR Significant recent improvement allowing adequate intake	OR Recent deterioration	OR recent significant deterioration	Functioning	No deficit	Moderate functional deficit	Severe functional deficit		OR Recent improvement			Physical Exam	No deficit	Evidence of mild to moderate loss of muscle mass (SQI fat tissue, recent improvement muscle tone on palpation)	Obvious signs of malnutrition (e.g., severe loss muscle, SQI possible edema)																													
Category	Status A	Status B	Status C																																																																							
Weight	Well nourished	Moderately malnourished	Severely malnourished																																																																							
	No wt loss	<5% wt loss in 1 month (or 10% in 6 mos)	> 5% wt loss in 1 month (or >10% in 6 mos)																																																																							
	OR Recent wt gain	OR Progressive wt loss	OR Progressive wt loss																																																																							
Nutrient intake	No deficit	Definite decrease in intake	Severe deficit in intake																																																																							
	OR Significant recent improvement																																																																									
Nutrition Impact	None	Percent of nutrition impact symptoms (PG-SGA Box 3)	Percent of nutrition impact symptoms (PG-SGA Box 3)																																																																							
Symptoms	OR Significant recent improvement allowing adequate intake	OR Recent deterioration	OR recent significant deterioration																																																																							
Functioning	No deficit	Moderate functional deficit	Severe functional deficit																																																																							
	OR Recent improvement																																																																									
Physical Exam	No deficit	Evidence of mild to moderate loss of muscle mass (SQI fat tissue, recent improvement muscle tone on palpation)	Obvious signs of malnutrition (e.g., severe loss muscle, SQI possible edema)																																																																							
<p>Nutritional Triage Recommendations: Additive score is used to define specific nutritional interventions including patient & family education, symptom management including pharmacologic intervention, and appropriate nutrient intervention (food, nutritional supplements, enteral, or parenteral triage). <i>First line nutrition intervention includes optimal symptom management.</i></p> <p>Triage based on PG-SGA point score</p> <p>0-1 No intervention required at this time. Re-assessment on routine and regular basis during treatment. 2-3 Patient & family education by dietician, nurse, or other clinician with pharmacologic intervention as indicated by symptom survey (Box 3) and lab values as appropriate. 4-8 Requires intervention by dietician, in conjunction with nurse or physician as indicated by symptoms (Box 3). ≥ 9 Indicates a critical need for improved symptom management and/or nutrient intervention options.</p>																																																																										
<p>©FD Ottery, 2001, 2005, 2006, 2014 email: faithotterydmhd@aol.com or info@pt-global.org</p>																																																																										

Vashi et al – “Improvement in SGA correlated with a significantly decreased risk of mortality independent of sex, previous treatment history, and evidence of biological anticancer activity.”

Worksheet 5 may be helpful to circle relevant statement for each PG-SGA category to visually help identify the overall global assessment

MALNUTRITION SCREENING TOOL (MST)

STEP 1 QUESTION A & QUESTION B

Question A: Have you lost weight recently without trying?

No = 0
Unsure = 2

If **YES**, how much weight (in kg*) have you lost?

1–5 kg = 1
6–10 kg = 2
11–15 kg = 3
>15 kg = 4
Unsure = 2

Weight Loss Score:

TIPS

- Emphasize **"without trying"**
- Consider weight lost during the last **-6 months**
- If the person is unsure, query any indicators of weight loss such as:
 - » **Loose clothes or using a tighter belt notch**
 - » **Loose rings/jewellery or watches**
 - » **Ill-fitting dentures**

* See below for approximate kilogram (kg) to pounds (lbs) conversion chart.

Question B: Have you been eating poorly because of a decreased appetite?

No = 0
Yes = 1

Appetite Score:

- Emphasize **"eating poorly"**, e.g. eating less than 3/4 of usual intake.
- Is intake likely to decrease considerably for **5 days or more?**
- If re-screening, have **staff noted poor food intake** over the past week?

STEP 2 TOTAL MST SCORE

Add Weight Loss & Appetite Scores

Total MST Score:

- **Document** malnutrition risk category (even for those not at risk).
- **Record any need for special diets** and follow local policy.

MST Score 2 or more = Patient is at risk of malnutrition

STEP 3 MANAGEMENT PLAN

Score 0-1: Monitor weight and re-screen weekly or in line with local policy.

Score 2 or more: Monitor nutritional intake, use strategies to improve nutritional intake and refer to dietician or implement local policy.

- **Those who are overweight or obese MUST NOT be overlooked** in the diagnosis and prevention of malnutrition.
- **All patients should be screened** on admission to hospital and weekly (or as per local policy) thereafter.

Approximate Weight Conversion Chart

Kilograms	Pounds	Score
1–5 kg	2–11 lbs	1
6–10 kg	12–22 lbs	2
11–15kg	23–33 lbs	3
>15 kg	>33 lbs	4

Note: 14 lbs = 1 stone

Ferguson M, et al. Development of a valid and reliable malnutrition screening tool for acute care hospital patients. Nutrition. 1999;15(6):458-464. Department of Health (2020). Nutrition screening and use of oral nutrition support for adults in the acute care setting (NICE National Clinical Guideline No. 22).

Nutricia, Block 1, Deansgrange Business Park, Deansgrange, Co. Dublin.

NUTRICIA CUSTOMER SUPPORT:

Freephone: 1800 923 404 (ROI) or 0800 783 4379 (NI) Email: support.ireland@nutricia.com

This information is intended for healthcare professionals only.

www.nutricia.ie



Royal Marsden Nutrition Screening Tool (RMNST)

Question	If answer to the question is yes, then score
1. Has the patient experienced unintentional weight loss in the last 3 months? (>7 kg in men or >5.5 kg in women) If not, unintentional weight loss less than the above	10 5
2. Does the patient look underweight?	5
3. Has the patient had a reduced food intake (less than 50 % of meals) in the last 5 days (this may be due to mucositis, dysphagia, nausea, bowel obstruction, vomiting)?	5
4. Is the patient experiencing symptoms that are affecting food intake, e.g. mucositis, nausea, vomiting, diarrhoea and constipation?	3
Total score	Maximum 23

Copyright The Royal Marsden NHS Foundation Trust

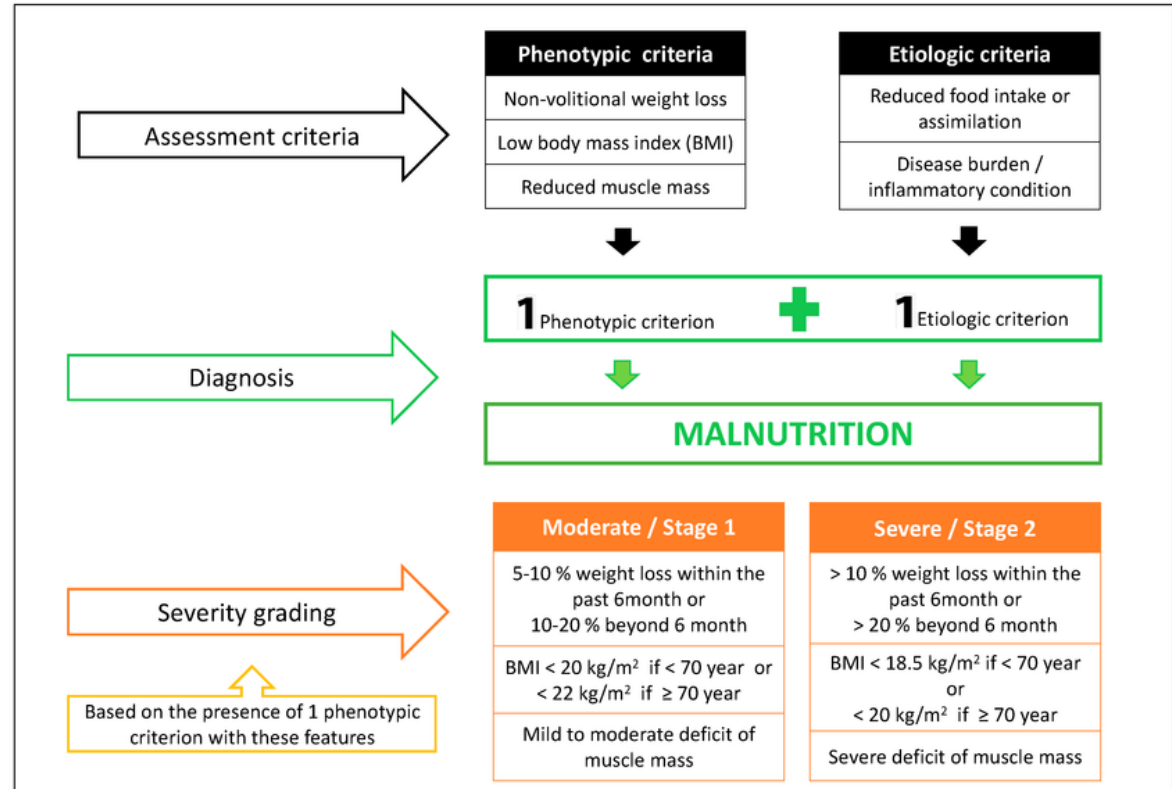
Score 0–4, well-nourished, score 5–9, moderately malnourished, score >10, severely malnourished



How do we assess cachexia?

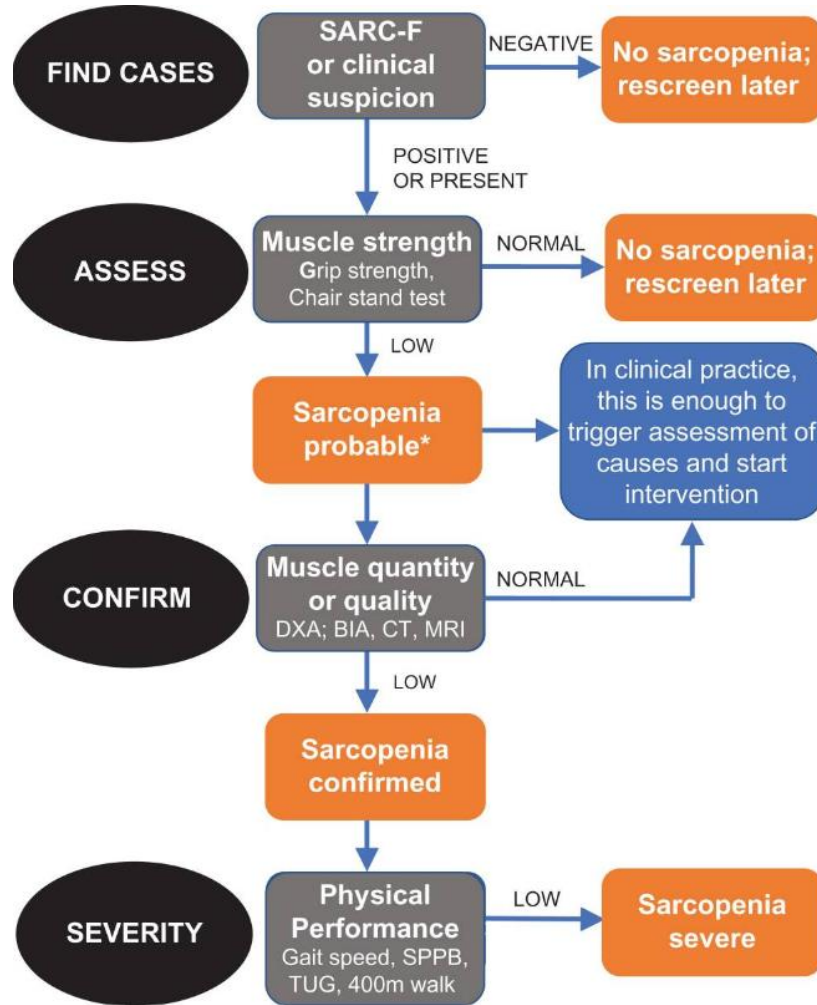
Global Leadership Initiative on Malnutrition (GLIM) criteria for malnutrition

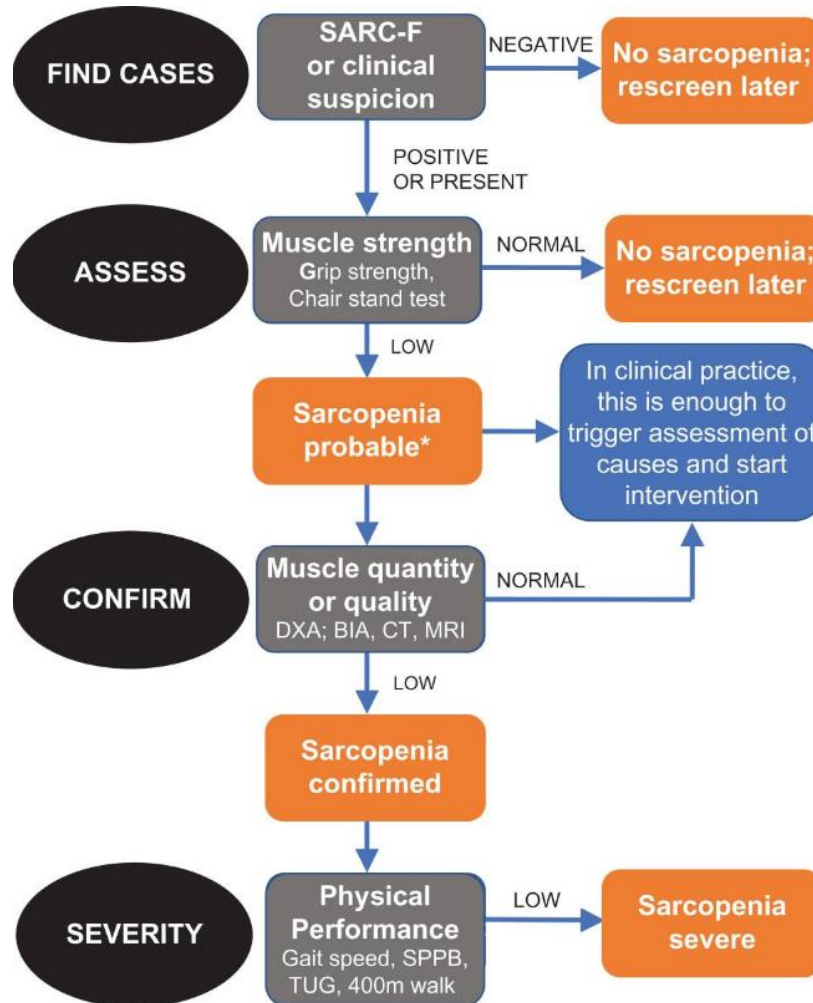
Calf circumference		
	Males	Females
Moderate	34cm	33cm
Severe	32cm	31cm





How do we assess sarcopenia?







How do we assess frailty?



- Gait speed
- Timed-up-and-go test
- PRISMA questionnaire
 - 7 questions – age, gender, health problems limiting activities/requiring patient to stay at home, support, if use aids to get about
- Self-Reported Health - ‘How would you rate your health on a scale of 0-10’.

Other assessment tools

- Faecal elastase-1
- DEXA bone mineral density scan every 2 years for patients with PEI
- Assessment of nutritional deficiencies
 - Fat soluble vitamins (A, D, E + K), Vitamin B12, Folate, Iron studies, Zinc, Selenium, Copper, Magnesium
 - HbA1c, random blood glucose every 6-12 months
 - Palliative patients – Iron studies, HbA1c, random blood glucose
- Gastrointestinal symptoms
- Quality of life
- Knowledge of PERT



Prehabilitation

- “Prehabilitation enables people with cancer to **prepare for treatment** through promoting healthy behaviours and through needs based prescribing of **exercise, nutrition and psychological interventions**. Prehabilitation is part of a continuum to rehabilitation. The aims of prehabilitation are to **empower patients to maximise resilience to treatment and improve long-term health**” (Macmillan principles and guidance for prehabilitation within the management and support of people with cancer)
- Early assessment soon after diagnosis
- Benefits include;

Personal
empowerment

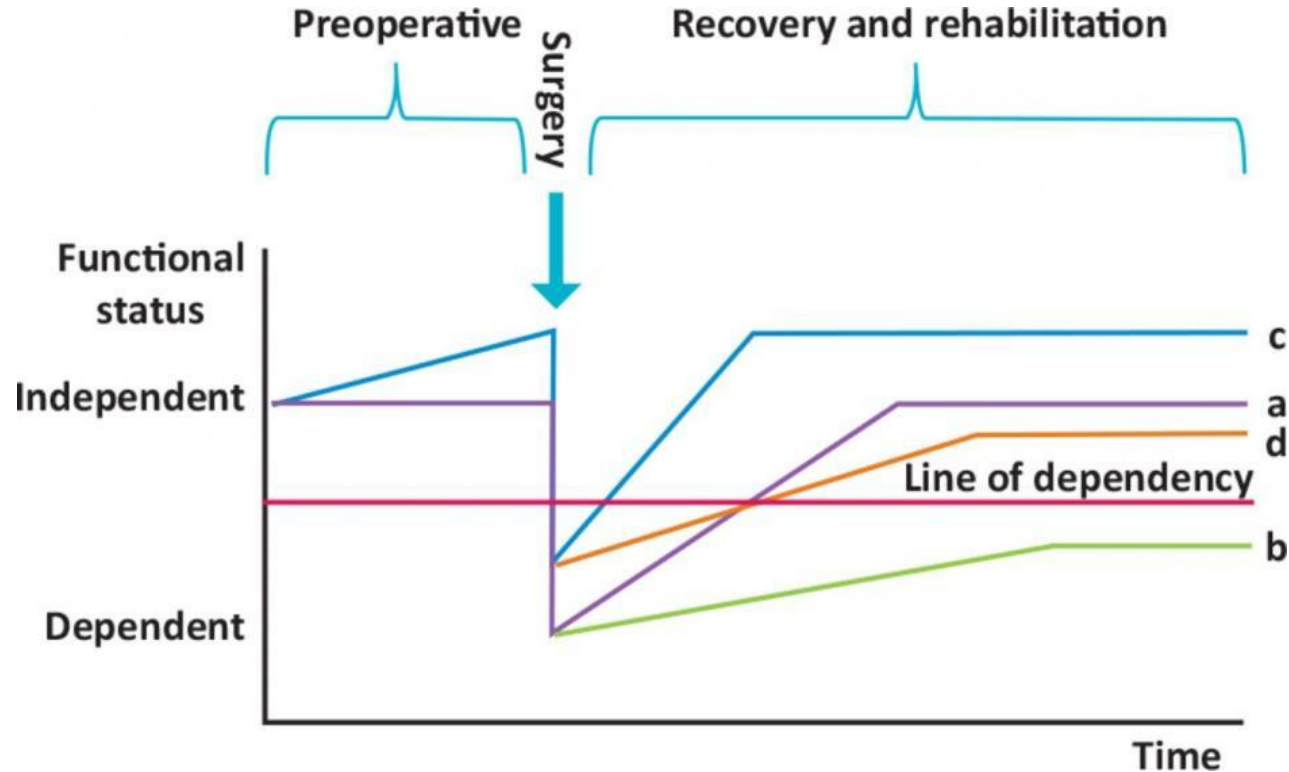
Physical and
psychological
resilience

Long term
health

Reversal of
sarcopenia

Better mental
health

Prehabilitation





Prehabilitation



ORIGINAL ARTICLE

From prehab to rehab: Nutritional support for people undergoing pancreatic cancer surgery

Neil Bibby, Azita Rajai, Derek A. O'Reilly 

First published: 23 May 2022 | <https://doi.org/10.1111/jhn.13040> | Citations: 3

- Prospective study of 150 patients
 - Baseline dietetic assessment, prehabilitation and at least one post-operative review
- High prevalence of malnutrition
 - 2/3 of patients had experienced >5% weight loss, 1/3 of patients had experienced >10% weight loss
- Gained 2% body weight and improved handgrip strength by 8.2%
- PG-SGA scores reduced by 5.9 and GI symptom rating scale by 47.7%



To conclude...

- Assessment of nutritional status in pancreatic cancer is extremely complex and multifactorial
- Early nutritional screening is important, as well as identifying cachexia and sarcopenia to allow for early dietetic intervention and/or referral to prehabilitation services
 - Early development of treatment plans can improve survival, outcomes and tolerance to treatment

References



Blausen.com staff (2014). "[Medical gallery of Blausen Medical 2014](#)". *WikiJournal of Medicine* 1 (2). DOI:10.15347/wjm/2014.010. ISSN 2002-4436.

Could a Diabetes Diagnosis Help Detect Pancreatic Cancer Early? (2021) National cancer institute. Available at: <https://www.cancer.gov/news-events/cancer-currents-blog/2021/pancreatic-cancer-diabetes-early-detection> (accessed 19 November 2024)

Yule MS, Brown LR, Waller R, Wigmore SJ. Cancer cachexia. *BMJ* 2024;387:e080040

Gärtner S, Krüger J, Aghdassi AA, et al. Nutrition in Pancreatic Cancer: A Review. *Gastrointest Tumors*. 2016;2(4):195-202. doi:10.1159/000442873

Fearon KCH, Baracos VE: Cachexia in pancreatic cancer: new treatment options and measures of success. *HPB (Oxford)* 2010;12:323–324.

Bachmann J, Heiligensetzer M, Krakowski-Roosen H, Büchler MW, Friess H, Martignoni ME: Cachexia worsens prognosis in patients with resectable pancreatic cancer. *J Gastrointest Surg* 2008;12:1193–1201.

Solheim TS, Laird BJA, Balstad TR, et al. Cancer cachexia: rationale for the MENAC (Multimodal-Exercise, Nutrition and Anti-inflammatory medication for Cachexia) trial. *BMJ Support Palliat Care* 2018;8:258-65. doi:10.1136/bmjspcare-2017-001440 pmid:29440149

Cruz-Jentoft AJ, Baeyens JP, Bauer JM, Boirie Y, Cederholm T, Landi F, Martin FC, Michel JP, Rolland Y, Schneider SM, Topinková E, Vandewoude M, Zamboni M; European Working Group on Sarcopenia in Older People. Sarcopenia: European consensus on definition and diagnosis: Report of the European Working Group on Sarcopenia in Older People. *Age Ageing*. 2010 Jul;39(4):412-23. doi: 10.1093/ageing/afq034.

Martin L, Birdsell L, Macdonald N, Reiman T, Clandinin MT, McCargar LJ, Murphy R, Ghosh S, Sawyer MB, Baracos VE. Cancer cachexia in the age of obesity: skeletal muscle depletion is a powerful prognostic factor, independent of body mass index. *J Clin Oncol*. 2013 Apr 20;31(12):1539-47. doi: 10.1200/JCO.2012.45.2722. Epub 2013 Mar 25. PMID: 23530101.

Kurita Y, Kobayashi N, Tokuhisa M, Goto A, Kubota K, Endo I, Nakajima A, Ichikawa Y. Sarcopenia is a reliable prognostic factor in patients with advanced pancreatic cancer receiving FOLFIRINOX chemotherapy. *Pancreatology*. 2019 Jan;19(1):127-135. doi: 10.1016/j.pan.2018.11.001. Epub 2018 Nov 10. PMID: 30473464.

Bundred J, Kamarajah SK, Roberts KJ. Body composition assessment and sarcopenia in patients with pancreatic cancer: a systematic review and meta-analysis. *HPB (Oxford)*. 2019 Dec;21(12):1603-1612. doi: 10.1016/j.hpb.2019.05.018. Epub 2019 Jun 29. PMID: 31266698.

Zhang F, Yan Y, Ge C. Prevalence and Impact of Frailty in Pancreatic Cancer: A Systematic Review and Meta-Analysis Based on 35,191 Patients. *Ann Surg Oncol*. 2024 Jan;31(1):535-544. doi: 10.1245/s10434-023-14426-y. Epub 2023 Oct 29. PMID: 37899415.

Vashi P, Popiel B, Lammersfeld C, Gupta D. Outcomes of systematic nutritional assessment and medical nutrition therapy in pancreatic cancer. *Pancreas*. 2015 Jul;44(5):750-5. doi: 10.1097/MPA.0000000000000336. PMID: 25872172

Tew GA, Ayyash R, Durrand J, Danjoux GR et al. Clinical guideline and recommendations on pre-operative exercise training in patients awaiting major non-cardiac surgery. *Anaesthesia* 2018;73(7):750-68

Bitby N, Rajai A, O'Reilly DA. From prehab to rehab: nutritional support for people undergoing pancreatic cancer surgery. *J Hum Nutr Diet*. 2022;1-11. <https://doi.org/10.1111/jhn.13040>