Clinical Oncology Society of Australia

CANCER-RELATED MALNUTRITION AND SARCOPENIA

POSITION STATEMENT: IMPLEMENTATION TOOLKIT

About COSA

The Clinical Oncology Society of Australia (COSA) is Australia's peak multidisciplinary society for health professionals working in cancer research, treatment, rehabilitation and palliative care. COSA is recognised as an activist organisation whose views are valued in all aspects of cancer care. We are allied with and provide high-level clinical advice to Cancer Council Australia. The overarching mission of COSA is to improve the care of Australians affected by cancer. In order to improve cancer care and control in Australia COSA seeks to (as defined in the Constitution; approved 14 November 2017):

- Promote excellence in the multidisciplinary care and research relating to cancer – from prevention, diagnosis and treatment to follow-up, palliation and survivorship;
- Encourage multidisciplinary collaboration of all professionals involved in cancer care and research;
- Foster and promote cancer research;
- Support the professional development and educational needs of cancer health professionals in the furtherance of the above objects.

The Cancer-Related Malnutrition and Sarcopenia Position Statement Implementation Toolkit was produced by a multidisciplinary Working Group of COSA members, under the guidance of the COSA Nutrition Group chaired Ms Jenelle Loeliger and project dietitian Ms Jane Stewart.

Suggested citation

Jane Stewart, Jenelle Loeliger and the Clinical Oncology Society of Australia Cancer-Related Malnutrition and Sarcopenia Implementation Toolkit Steering Committee Cancer Related Malnutrition and Sarcopenia Position Statement Implementation Toolkit. Clinical Oncology Society of Australia. April 2024.

Clinical Oncology Society of Australia

President: Associate Professor Dion Forstner
Chief Executive Officer: Marie Malica

Please direct any enquiries or comments on this publication to:
Chief Executive Officer
Clinical Oncology Society of Australia
GPO Box 4708 Sydney NSW 2001
Tel: (02) 8063 4100
Email: cosa@cancer.org.au

Published by the Clinical Oncology Society of Australia

Contents

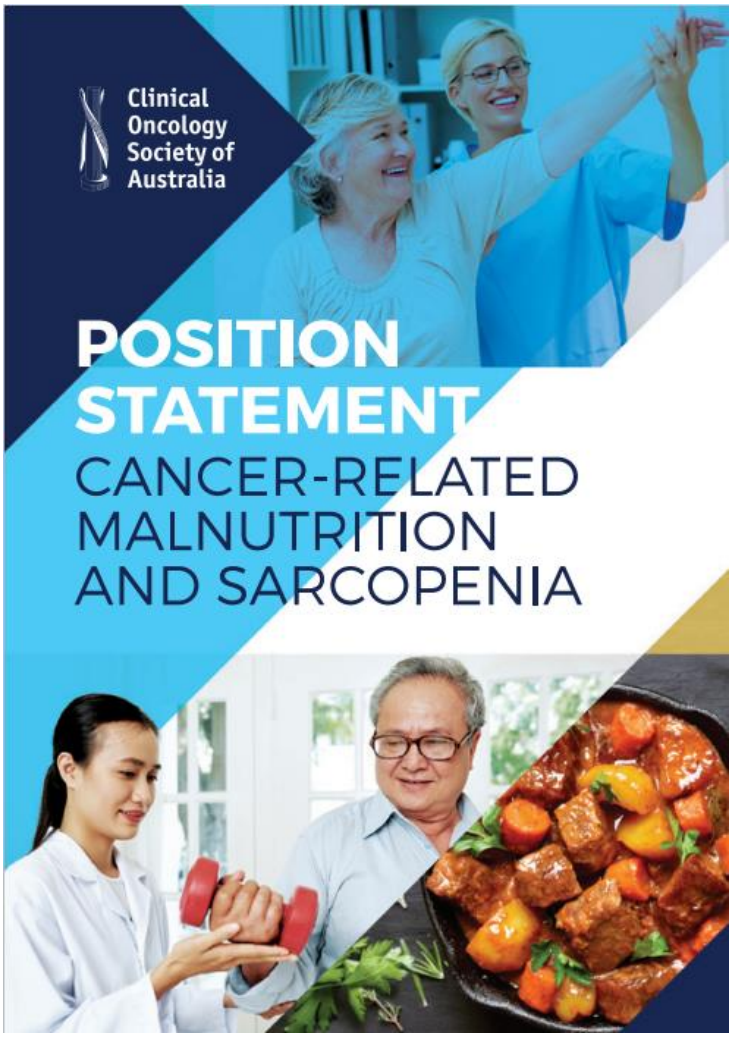
Background 4
About the toolkit 5
Toolkit purpose 5
How the toolkit was developed 5
How to use the toolkit 5
Screening 6
Position statement recommendations 6
Which screening tools to use 6
Malnutrition 6
Sarcopenia 7
Exemplars of evidence-based care in practice 9
Raising awareness of malnutrition and sarcopenia in your organisation 9
Incorporating malnutrition or sarcopenia screening into existing supportive care screening processes 10
Improving your model of care to ensure timely identification of sarcopenia 11
Implementing self-screening for malnutrition risk 12
Improving completion rates for malnutrition screening 13
Role of the oncologist and surgeon 14
Patient case studies 16
Prehabilitation 16
Haematology 18
Assessment 20
Position statement recommendations 20
Diagnostic Criteria 20
Malnutrition 20
Sarcopenia 21
How to complete assessment 23
Malnutrition 23
Muscle Mass 28
Muscle Strength 32
Muscle Function 35
Exemplars of evidence-based care in practice 46
Assessment of skeletal muscle mass via CT 46
Nutrition care pathway for upper GI cancer surgery 47
How to train clinicians in new assessment measures 48
Advocating with the MDT for a business case to establish a new clinical service 49
Prehabilitation program for patients undergoing GI cancer surgery 50

Patient case studies 52
Oral Therapy 52
Rural patient 54
Treatment 56
Position statement recommendations 56
Transition of care 57
Recommendations 57
Tools and tips for implementation 58
Implementation of the position statement recommendations 58
Audit Tool 59
AACTT Frameworks 63
Generic pathway 73
Example clinical indicators 75
Checklist to identify and address barriers to screening and assessment 77
Implementation theories, models and frameworks 81
Process models 81
Determinant frameworks 81
Evaluating Implementation 81
Frameworks to help define implementation strategies 82
Enhancements to the toolkit 83
Next steps 83
Feedback from users 83
Acknowledgements 84
Project team members 84
Project steering group members 84
Instructional video working group members 85
Generic pathway and audit tool working group members 85
Case studies and tips to overcome barriers working group members 86
Production of instructional videos: 86
Multidisciplinary end-user review 87
Editing of toolkit resources and webpage 87
Project Funding 87
References: 88

Background

In 2020 the Clinical Oncology Society of Australia (COSA) published a position statement on cancer-related malnutrition and sarcopenia. The document outlines the position of COSA on the role of health professionals and health services in recognising and treating patients with cancer-related malnutrition and sarcopenia.

This toolkit provides practical resources and guidance to support the implementation of the COSA position statement recommendations on cancer-related malnutrition and sarcopenia, into practice.



About the toolkit

Toolkit purpose

This toolkit is intended for use by clinicians and health services to educate and train clinicians, raise awareness, develop the services required and advocate for resources to support optimal management of cancer-related malnutrition and sarcopenia.

How the toolkit was developed

The toolkit was developed by members of the COSA cancer-related malnutrition and sarcopenia working group. The project was completed over 8 months and comprised 3 stages.

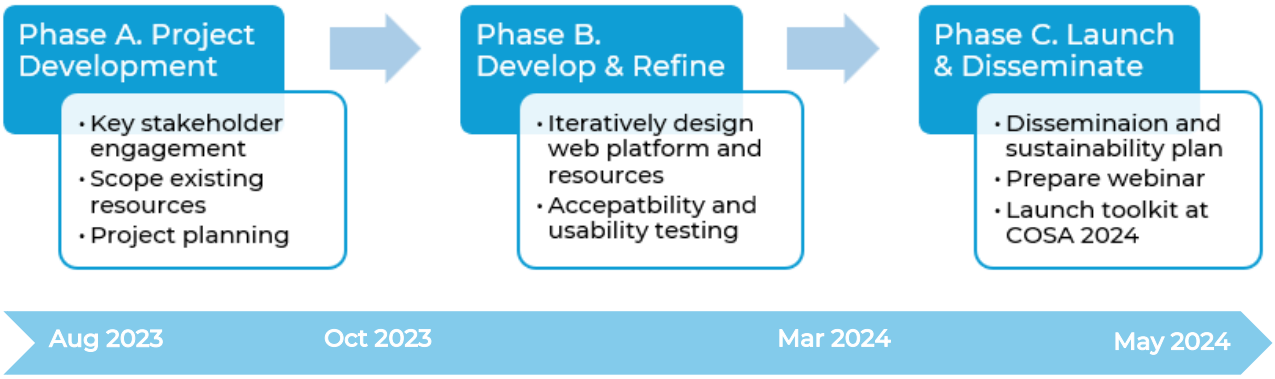


Figure 1: Summary of project phases and timelines

Resources were iteratively developed and refined over 2-3 workshops with working group members and clinicians. Once developed, the toolkit underwent usability and acceptability testing via an end-user review with multidisciplinary clinicians from across Australia. The toolkit was then further refined based on feedback from this review.

Abbott
life. to the fullest.

The toolkit was funded by an educational grant from Abbott Australasia.

How to use the toolkit

The toolkit can be downloaded as one PDF document. In addition, the toolkit is available on the Nutrition Group page of the COSA website where each section of the toolkit is available and individual resources can be accessed/downloaded directly from the webpage. This toolkit is not intended to be exhaustive and is a concise and practical collation of new and existing tools and resources. Please refer to the COSA position statement on cancer-related malnutrition and sarcopenia document for further details.

Screening

Position statement recommendations

All people with cancer should be screened for malnutrition in all health settings at diagnosis and repeated as the clinical situation changes, using a screening tool that is valid and reliable in the setting in which it is intended.

All people with cancer should be screened for sarcopenia at diagnosis and repeated as the clinical situation changes, using the validated screening tool SARC-F or SARC-F in combination with calf-circumference.

Which screening tools to use

Malnutrition

The following screening tools have been shown to be valid and reliable for identifying malnutrition in people with cancer. The MST and MUST are most commonly used in Australia and can be self-administered or completed by any health professional. Refer to the position statement for more information about which settings each tool is validated in.

Malnutrition Screening Tool (MST)

Downloadable PDF

Online interactive MST – available in 10 languages at www.petermac.org/MST

Ferguson M, Capra S, Bauer J, Banks M. Development of a valid and reliable malnutrition screening tool for adult acute hospital patients. Nutrition. 1999;15(6): 458-64. (Pub Med)

Malnutrition Universal Screening Tool (MUST)

Downloadable PDF

Online MUST calculator – available at www.bapen.org.uk/must-and-self-screening/must-calculator/

Stratton RJ, Hackston A, Longmore D, Dixon R, Price S, Stroud M, King C, Elia M. Malnutrition in hospital outpatients and inpatients: prevalence, concurrent validity and ease of use of the 'malnutrition universal screening tool' ('MUST') for adults. Br J Nutr. 2004;92(5): 799-808. (Pub Med)

Malnutrition Screening Tool for Cancer Patients (MSCT)

Kim JY, Wie GA, Cho YA, Kim SY, Kim SM, Son KH, Park SJ, Nam BH, Joung H. Development and validation of a nutrition screening tool for hospitalized cancer patients. Clin Nutr. 2011;30(6): 724-9. (Pub Med)

Patient-Generated Subjective Global Assessment short form (PG-SGA SF)

Downloadable PDF

Online PG-SGA – available in 13 languages at https://pt-global.org/pt-global-app/

Abbott J, Teleni L, McKavanagh D, Watson J, McCarthy AL, Isenring E. Patient-Generated Subjective Global Assessment Short Form (PG-SGA SF) is a valid screening tool in chemotherapy outpatients. Support Care Cancer. 2016;24(9): 3883-7. (Pub Med)

Screening for malnutrition can be bypassed for people with a cancer diagnosis or treatment plan known to lead to high risk of malnutrition (see Table 1).

Table 1: Factors indicative of high risk of malnutrition

Cancer diagnosis	*Treatment*	*Other*
Head and neck	Radiation therapy to oral cavity or gastrointestinal tract	Advanced stage disease
Upper or lower gastrointestinal	Chemotherapy, immunotherapy, or targeted therapy with risk of gastrointestinal toxicity	Older age (>65 years)
Thoracic	Stem cell transplant	
Acute leukemia (myeloid or lymphoid)	Surgery to the oral cavity or gastrointestinal tract	
	Steroid use with treatment	

Sarcopenia

The SARC-F has recently been validated for use in people with cancer, either alone or in combination with measurement of calf circumference. [1]

The sensitivity and specificity of the SARC-F plus calf circumference are not very high (55.1%, 76.4%, respectively) in people with cancer.[1] This means as a screening tool it will falsely identify around 45% of people as 'at risk' and miss about 25% of people who are 'at risk.' The SARC-F used on its own has an even lower sensitivity (22.4%) but high specificity (92.1%) meaning it will incorrectly classify a high proportion (~78%) of people as 'at risk' but is good at identifying who is not 'at risk.' [1] There are no tools currently available with both high sensitivity and specificity, therefore the SARC-F with or without calf circumference may be used but health professionals should be aware of the limitations.

Strength, Ambulation, Rising from a chair, stair Climbing and history of Falling (SARC-F)

Downloadable PDF

Malmstrom TK, Miller DK, Simonsick EM, Ferrucci L, Morley JE. SARC-F: a symptom score to predict persons with sarcopenia at risk for poor functional outcomes. J Cachexia Sarcopenia Muscle. 2016;7(1):28-36. (Pub Med)

SARC-F in combination with calf-circumference (SARC-CalF)

Downloadable PDF

Barbosa-Silva TG, Menezes AM, Bielemann RM, Malmstrom TK, Gonzalez MC; Grupo de Estudos em Composição Corporal e Nutrição (COCONUT). Enhancing SARC-F: Improving Sarcopenia Screening in the Clinical Practice. J Am Med Dir Assoc. 2016;17(12):1136-1141 (Pub Med)

Reference:

1. Fu X, Tian Z, Thapa S, Sun H, Wen S, Xiong H, Yu S. Comparing SARC-F with SARC-CalF for screening sarcopenia in advanced cancer patients. Clin Nutr. 2020;39(11):3337-3345.

Exemplars of evidence-based care in practice

The following case studies have been developed as exemplars of evidence-based care in practice. It is hoped they will help to support the implementation of the position statement recommendations into practice.

Raising awareness of malnutrition and sarcopenia in your organisation

Implementation of an innovative model of nutrition care in patients with head and neck cancer	
WHAT did the initiative involve?	**This study aimed to implement and evaluate the integration of a patient-centred, best-practice dietetic model of care into a head and neck cancer (HNC) multidisciplinary (MDT) to minimise the detrimental sequelae of malnutrition. Patients were identified via the weekly MDT meeting lists. Key interventions included:** • **A supportive care-led pre-treatment clinic providing targeted pre-treatment assessment, intervention, education and counselling to patients and caregivers.** • **A nutrition care dashboard served to highlight nutrition care processes and clinical outcomes and was integrated into the existing HNC Radiation Oncology list for discussion at weekly MDT meetings.**
WHO was involved in the initiative?	**Medical (radiation/medical oncologists, surgeons), nursing and allied health professionals (dietitians, speech pathologists, psychologists and radiation therapists).**
WHERE did the initiative occur?	**Radiotherapy outpatient setting and HNC MDT meeting at Royal Prince Alfred Hospital and Chris O'Brien Lifehouse.**
WHO was the target of the initiative?	**Adult patients (≥18 years) undergoing radiotherapy +/− other treatment modality of curative intent for HNC.**
WHEN was the initiative undertaken?	**Pre-treatment and during treatment.**
HOW was the initiative undertaken?	**The 24-month project was funded by a research grant and consisted of three phases covering pre-implementation (ten months), implementation (eight months) and analysis (six months).**
OUTCOMES	**Post-implementation data demonstrated improved processes and clinical outcomes: pre-treatment dietitian assessment; use of a validated nutrition assessment tool before, during and after treatment. Patients receiving the new model of care were significantly more likely to complete prescribed radiotherapy and systemic therapy. At the system level, the new model of care avoided 3.92 unplanned admissions and related costs of $AUD121K per annum.**
REFERENCE	**Findlay M, et al. Best Evidence to Best Practice: Implementing an Innovative Model of Nutrition Care for Patients with Head and Neck Cancer Improves Outcomes. Nutrients. 2020 May 19;12(5):1465.**

Incorporating malnutrition or sarcopenia screening into existing supportive care screening processes

Monitoring malnutrition risk utilising the Malnutrition Screening Tool embedded into an electronic health record	
WHAT did the initiative involve?	**The project aimed to test the feasibility of:** **1. Operationalising and standardising malnutrition risk assessment across 2 large ambulatory cancer centres by embedding the MST into the electronic health record (EHR)** **2. Utilising MST aggregate data reports to identify and quantify the prevalence of patients at risk of malnutrition**
WHO was involved in the initiative?	**MST work standards were developed by the oncology dietitians and approved by nursing and medical staff for MST administration at every oncology provider visit with a medical doctor or nurse practitioner. Registered nurses or medical assistants verbally administered the MST to patients during their intake assessment in the examination room at each clinic visit.**
WHERE did the initiative occur?	**Two large adult ambulatory community cancer centres in the Health Partners health system in the upper Midwest of the United States.**
WHO was the target of the initiative?	**Adult outpatients (≥ 18 years) being treated for cancer by either the medical or radiation oncology departments.**
WHEN was the initiative undertaken?	**April 2017 to December 2018**
HOW was the initiative undertaken?	**This was conducted as a quality assurance performance improvement project.**
OUTCOMES	**Incorporating the MST into the EHRs to standardise malnutrition screening is feasible in two large outpatient cancer centres. An average 74% of patients were screened for malnutrition each month using the Malnutrition Screening Tool (MST) embedded into the EHR. An average of 5% and 12% of patients with cancer being treated medically and with radiation, respectively, were identified to be at nutritional risk with an MST score of ≥2.**
REFERENCE	**Trujillo EB, Shapiro AC, Stephens N, Johnson SJ, Mills JB, Zimmerman AR, Spees CK. Monitoring Rates of Malnutrition Risk in Outpatient Cancer Centers Utilizing the Malnutrition Screening Tool Embedded into the Electronic Health Record. J Acad Nutr Diet. 2021 May;121(5):925-930.**

Improving your model of care to ensure timely identification of sarcopenia

Development and feasibility of an inpatient cancer-related sarcopenia pathway	
WHAT did the initiative involve?	**The project aimed to:** 1. **Develop an evidence-based care pathway for the identification and management of cancer-related sarcopenia.** 2. **Test feasibility of the pathway in an inpatient cancer ward.** • **Screening was completed by nutrition assistants using the SARC-F in combination with calf circumference.** • **Clinical assessment measures were completed by both dietitians (Patient Generated-Subjective Global Assessment, bioelectric impedance spectroscopy (BIS)) and physiotherapists (chair stand test (CST), Australia-modified Karnofsky Performance Scale (AKPS)).** • **Diagnosis using EWGSOP2 criteria.**
WHO was involved in the initiative?	**Nutrition, physiotherapy, allied health assistant clinicians and research clinicians from Peter MacCallum Cancer Centre. Experts in cancer nutrition and exercise oncology/sarcopenia from Deakin university.**
WHERE did the initiative occur?	**Inpatient ward setting (medical oncology)** **Peter MacCallum Cancer Centre**
WHO was the target of the initiative?	**Adult patients (≥18 years) with cancer admitted to a medical oncology ward.**
WHEN was the initiative undertaken?	**During inpatient admission. Patients could be pre, during or post treatment.**
HOW was the initiative undertaken?	**Local quality improvement project conducted over 4 months.**
OUTCOMES	**n=159** **99.4% patients approached consented.** **30.2% were at risk/had sarcopenia.** **The screening and assessment components were delivered as intended, however low completion of assessment measures was observed for muscle mass (BIS, 20.5% and CST, 50%). The sarc-pathway was acceptable to patients and health professionals.**
REFERENCE	**Loeliger J, Edbrooke L, Daly RM, Stewart J, Bucci L, Puskas C, Fitzgerald M, Baguley BJ, Kiss N. Development and Feasibility of an Inpatient Cancer-Related Sarcopenia Pathway at a Major Cancer Centre. Int J Environ Res Public Health. 2022 Mar 29;19(7):4038.**

Implementing self-screening for malnutrition risk

Patient-led screening using the Malnutrition Screening Tool	
WHAT did the initiative involve?	Two studies were conducted to assess: • The reliability of patient-led Malnutrition Screening Tool (MST) screening through assessment of inter-rater reliability between patient-led and dietitian-researcher–led screening and intra-rater reliability between an initial and a repeat patient screening. • The concurrent validity of patient-led MST against the Subjective Global Assessment (SGA) and the inter-rater reliability of patient-led MST against dietitian-led MST.
WHO was involved in the initiative?	Dietitians
WHERE did the initiative occur?	Ambulatory cancer care services at a metropolitan tertiary hospital in Queensland.
WHO was the target of the initiative?	Adult patients (≥ 18 years) attending ambulatory cancer care services for chemotherapy, radiotherapy or supportive treatments.
WHEN was the initiative undertaken?	October 2016 May - June 2017
HOW was the initiative undertaken?	Two single-site cross-sectional studies undertaken with a convenience sample of patients (n=208, and n=201)
OUTCOMES	High inter-rater reliability and intra-rater reliability were observed. Agreement between patient-MST and dietitian-MST was 96%, with "almost perfect" chance-adjusted agreement. Agreement between repeated patient-MSTA and patient-MSTB was 94%, with "almost perfect" chance-adjusted agreement. Patient-led screening with the MST is reliable and well accepted by patients. The ability of the patient-led MST scores (0 to 1 vs 2 to 5) to indicate nutrition status was found to have a sensitivity of 94%, and a specificity of 86%. Patient-led MST screening is a reliable and valid measure that can accurately identify ambulatory cancer care patients as at risk or not at risk of malnutrition.
REFERENCES	Di Bella A, Croisier E, Blake C, Pelecanos A, Bauer J, Brown T. Assessing the Concurrent Validity and Interrater Reliability of Patient-Led Screening Using the Malnutrition Screening Tool in the Ambulatory Cancer Care Outpatient Setting. J Acad Nutr Diet. 2020 Jul;120(7):1210-1215. Di Bella A, Blake C, Young A, Pelecanos A, Brown T. Reliability of Patient-Led Screening with the Malnutrition Screening Tool: Agreement between Patient and Health Care Professional Scores in the Cancer Care Ambulatory Setting. J Acad Nutr Diet. 2018 Jun;118(6):1065-1071.

Improving completion rates for malnutrition screening

Improving the performance of nutrition screening through a series of quality improvement initiatives	
WHAT did the initiative involve?	**The study aimed to assess the effect of a series of quality improvement initiatives in improving the referral process and the overall performance of the 3-Minute Nutrition Screening (3-MinNS) tool.** **Annual audits were carried out on 4,467 patients. Performance gaps were identified and addressed through interventions, including (1) implementing a nutrition screening protocol, (2) nutrition screening training, (3) nurse empowerment for online dietetics referral of at-risk cases, (4) a closed-loop feedback system.**
WHO was involved in the initiative?	**Members of the dietetic and nursing teams.**
WHERE did the initiative occur?	**The inpatient setting at National University Hospital, Singapore.**
WHO was the target of the initiative?	**Adult patients (≥18 years) with cancer.**
WHEN was the initiative undertaken?	**2008-2013**
HOW was the initiative undertaken?	**This study was conducted as a series of quality improvement initiatives.**
OUTCOMES	**In 2008 and 2009, nutrition screening error rates were 33% and 31%, with 5% and 8% blank or missing forms. For patients at risk of malnutrition, referral to dietetics took up to 7.5 days, with 10% not referred at all.** **After the interventions, non-referrals decreased to 7% (2010), 4% (2011), and 3% (2012 and 2013), and the mean turnaround time from screening to referral was reduced significantly from 4.3 +/- 1.8 days to 0.3 +/- 0.4 days ($p < .001$). Error rates were reduced to 25% (2010), 15% (2011), 7% (2012), and 5% (2013), and the percentage of blank or missing forms was reduced to and remained at 1%.** **Quality improvement initiatives were effective in reducing the incompletion and error rates of nutrition screening and led to sustainable improvements in the referral process of patients at nutritional risk.**
REFERENCE	**Lim SL, Ng SC, Lye J, Loke WC, Ferguson M, Daniels L. Improving the performance of nutrition screening through a series of quality improvement initiatives. Jt Comm J Qual Patient Saf. 2014 Apr;40(4):178-86.**

Role of the oncologist and surgeon

What is the role of the Oncologist and Surgeon?	
SITUATION	**For medical clinicians, including oncologists and surgeons, it is important to consider appropriate care on an individual basis, even when it may not be immediately obvious a patient may be either at risk of, or already presenting with, cancer-related malnutrition and/or sarcopenia. Consider the following clinical scenarios:** **A patient with a diagnosis of...** **1. ...Colorectal cancer, initially presenting with bowel obstruction prior to undergoing adjuvant chemotherapy. The patient reports increased bowel frequency (x4 per day for 3-5 days) post chemotherapy and a prolonged period of poor oral intake (2-3 weeks), fasting for tests/surgery and is now struggling with fatigue. An oncologist might recommend referral to dietetics for review and nutritional counselling and referral to rehabilitation services to address fatigue and likely muscle wasting.** **2. ...Breast cancer, undergoing neoadjuvant chemotherapy prior to surgery with major reconstruction planned. The patient indicates low energy levels despite a slight gain in weight. Their performance status is decreasing with chemotherapy resulting in their oncologist deciding to reduce their chemotherapy dose. An oncologist might recommend referral for rehabilitation to address fatigue and declines in performance status.** **3. ...Lung cancer, who has undergone a lobectomy and is reporting fatigue, loss of strength and declining function. An oncologist might recommend a period of rehabilitation due to possible reduced cardiovascular fitness, loss of muscle mass and decreasing motivation prior to commencing chemotherapy.**
WHAT care should be provided?	**As a clinical lead within the multidisciplinary team, an oncologist or surgeon has an important role in facilitating the identification and management of malnutrition and sarcopenia. Depending on your role, here are some suggestions for what action you can take:** **Individual Level** ☐ **Gather enough information to determine if a patient may be at risk, particularly paying attention to any recent changes in their status/symptoms.** ☐ **Be aware of local services and refer at-risk patients early eg. dietitian, exercise physiologist, physiotherapist.** ☐ **Be able to give evidence-based, basic advice to at-risk patients whilst they are awaiting further assessment.**

	Team Level ☐ **Consider where the opportunities are for an oncologist to raise awareness amongst their peers/other multidisciplinary team members e.g. team meetings, journal clubs, conferences, research collaborations.** ☐ **Lead and facilitate structured multidisciplinary care pathways and referral processes that support behaviour change and adherence to evidence-based recommendations.** **Organisational/System Level** **To support uptake of the position statement in practice and policy:** ☐ **Support development of systems to identify barriers and facilitators.** ☐ **Promote and advocate for adequate resources to deliver evidence-based care. Consider how, where and by whom services will be provided when new services are planned, or existing services are expanded etc. This is particularly relevant for those in clinical/organisational and professional leadership roles.**
WHO should deliver care?	**An oncologist or surgeon plays a key role in early referral to relevant multidisciplinary team members (e.g. dietitian, exercise physiologist, nurse, physiotherapist, psychologist, social work) for further assessment and treatment.**
WHERE should care be delivered?	**An oncologist or surgeon should be aware of referral processes for local services according to the stage of patient care e.g. inpatient, outpatient, community etc.**
WHO should receive care?	**All people with cancer should be screened for malnutrition and sarcopenia in all health settings at diagnosis and as the clinical situation changes throughout treatment and recovery.**
WHEN should care be provided?	**At diagnosis, before treatment, during treatment, post treatment and surveillance.**
OUTCOMES	**Any patient consult is an opportunity for all members of the multidisciplinary team to consider whether a patient may be at risk of cancer-related malnutrition and/or sarcopenia and take appropriate action to facilitate early identification and treatment.**
REFERENCE	**Kiss, N., et al., Clinical Oncology Society of Australia: Position statement on cancer-related malnutrition and sarcopenia. Nutr Diet, 2020. 77(4): p. 416-425.**

Patient case studies

Prehabilitation

Prehabilitation case study	
SITUATION	**39M refugee "John Smith" with upper gastrointestinal cancer presenting to hospital with oesophageal dysphagia and suspected malnutrition, for feeding tube insertion and treatment planning. Requiring neo-adjuvant treatment at tertiary referral hospital for a period of 5 weeks and surgical prehabilitation in his local community prior to surgery. Recently moved to rural NSW with no English language skills (all interactions required interpreter).**
WHAT care was provided? **(Action)**	▪ **Initial malnutrition screening:** - **45kg on admission with history of 20kg weight loss (33%) in 3-6 months. MST= 4 (at risk of malnutrition). SARC-CalF = 16 (at risk of sarcopenia).** - **Referral to dietitian, speech pathologist and physiotherapist** ▪ **Initial nutrition assessment:** - **Weight 45.2kg** - **PG-SGA 16 severely malnourished (C)** - **Muscle mass assessed. ALM/height $(m)^2$= 6 kg/m^2** - **Identified at risk of refeeding syndrome** ▪ **Initial physio assessment:** - **Muscle strength assessed. Hand grip strength = 23 kg** - **Muscle function assessed. Gait speed = 0.6 m/sec** - **Sarcopenia diagnosed using EWGSOP 2 diagnostic criteria** ▪ **Repeat malnutrition screening:** - **Weekly MST during admission performed by nursing staff.** ▪ **Nutrition reviews:** - **Regular review during inpatient admissions (at both tertiary referral hospital and rural hospital after transferring closer to home) prior to neoadjuvant treatment.** - **Regular review by oncology dietitian (2x/week) during neo-adjuvant chemotherapy and radiation at tertiary referral cancer service.** - **PG-SGA repeated at end of treatment (PG-SGA 12 B moderate/ suspected malnutrition) and 3 months post treatment (PG-SGA 8 A moderate/suspected malnutrition) indicating improvement in nutritional status.** - **Support from local community dietitian following handover of nutrition plan by oncology dietitian on return home to rural setting post treatment.** ▪ **Nutrition interventions:** - **Education of soft HEHP diet.** - **Food from home allowed as hospital food not culturally appropriate.** - **Recommended nasogastric tube (NGT) insertion due to inadequate oral intake and regurgitation of food.**

	- Monitoring for refeeding syndrome on commencement of feeds. - Ongoing review post treatment for weaning of NGT feeds and optimisation of oral intake prior to surgery. ▪ Physiotherapy reviews: - Regular review during inpatient admission and prescription of individualised exercises. - Regular review by prehabilitation physiotherapist to supervise exercise completion and to review and update home exercise program. - Muscle mass and function tests repeated 6 weekly. ▪ Multidisciplinary care: - Clear communication required between surgical and oncology multidisciplinary teams and rural health care professionals. - Referral to social work and refugee service. - Ongoing nutrition and physiotherapy for multimodal prehabilitation prior to surgery. Screened for psychological distress, anxiety and depression.
WHO delivered the care? **(Actor)**	• Malnutrition screening – *nursing staff* • Nutrition assessment and review – *hospital dietitian, specialist oncology and community dietitian* • Functional mobility strength assessment and review – *inpatient and prehabilitation physiotherapist* • Symptom management – *medical staff* • Multidisciplinary care - *social work, speech pathologist, interpreter service and refugee service*
WHERE was care delivered? **(Context)**	Inpatient and outpatient setting Metropolitan tertiary referral hospital, rural NSW hospital and home-based care.
WHO received care? **(Target)**	Adult patient (≥ 18 years) undergoing neo-adjuvant treatment and prehabilitation.
WHEN was care provided? **(Time)**	• Initial nutrition screening – *day 1 of inpatient admission* • Initial nutrition/physiotherapy assessment – *day 2 of inpatient admission* • Rescreening – *weekly during admission and neo-adjuvant treatment* • Nutrition/physiotherapy review – *at regular intervals during the diagnostic, neo-adjuvant treatment and prehabilitation period of care* • Repeat nutrition/physiotherapy assessment - *post neo-adjuvant treatment and prior to surgical intervention to continue to optimise nutritional status*
OUTCOMES	John was able to optimise nutritional intake with the use of early intervention NGT feeding and therefore proceeded with curative intent chemo-radiation. The prehabilitation prior to surgery allowed John to improve his nutritional status and physical function.

Haematology

Haematology case study	
SITUATION	**60F "Mary Smith" electively admitted for a Melphalan Autologous Stem Cell Transplant (AutoSCT) on b/g of IgG kappa Multiple Myeloma.**
WHAT care was delivered? **(Action)**	• **Initial malnutrition screening:** - **Malnutrition universal screening tool (MUST) completed by nursing staff within 8hrs of admission.** - **Unintentional loss of weight (LOW) 5-10% within the past 3-6 months. MUST = 2.** - **Referred to dietitian.** • **Initial nutrition assessment:** - **PG-SGA 15 moderate/suspected malnutrition (B)** - **Mary had been weight stable for the past 1/12 however had a gradual 5% LOW within the 5/12 prior with signs of mild lean muscle and subcutaneous fat depletion.** - **Mary was eating well at the time of assessment and meeting her nutritional requirements with only a mild reduction in appetite and no other nutrition impact symptoms.** • **Repeat malnutrition screening:** - **MUST repeated by nursing staff weekly on 'Wednesday weight day'.** • **Nutrition reviews:** - **Mary was reviewed regularly by nutrition. This included a Nutrition Assistant (NA) review as part of a lunchtime 'meal round' which involved documenting how much of her meal (incl. any oral nutrition supplements) she consumed.** • **Repeat nutrition assessment:** - **PG-SGA repeated by the dietitian and included a physical assessment ensuring oedema was checked given the high occurrence of fluid retention in haematology patients which can mask LOW and detection of muscle wastage.** - **Mary's oral intake gradually declined during her neutropenic phase with nutrition impact symptoms including reduced appetite, nausea, vomiting, mucositis, dysgeusia, and diarrhoea. This resulted in a gradual 3kg (3.5%) LOW prior to the initiation of supplemental nutrition.** • **Interventions:** - **Tailoring of hospital meals and assistance with texture modification due to mucositis with the help of the dietitian and nutrition assistant.** - **Addition of HEHP items from the supplemental menu.** - **Trial and consumption of oral nutrition supplement drinks.**

	- **Initiation of parenteral nutrition (PN) to supplement nutrition. Mary was unable to tolerate enteral nutrition due to severe neutropenic colitis.** - **Education was provided on the importance of optimal nutrition, the presence of increased requirements during transplant, and the recommendation for strict food safety practices while immunocompromised.** • **Multidisciplinary Care:** - **Symptom management by medical staff.**
WHO delivered the care? **(Actor)**	• **Malnutrition screening - *nursing staff*** • **Nutrition assessment and review - *dietitian & nutrition assistant*** • **Symptom management - *medical staff*** • **Food service - *menu monitors***
WHERE was care delivered? **(Context)**	**Acute inpatient setting** **Major tertiary metropolitan hospital**
WHO received care? **(Target)**	**Adult inpatient (≥18 years) admitted for a Stem Cell Transplant**
WHEN was care provided? **(Time)**	• **Initial screening - *completed by within 8hrs of admission*** • **Initial nutrition assessment - *completed prior to stem cell transplant (D-5)*** • **Rescreening - *weekly*** • **Nutrition review - *every 1-4 days from D0 onwards*** • **Repeat nutrition assessment (PG-SGA) – *weekly***
OUTCOMES	**By ensuring appropriate protocols and initiatives are in place to support regular screening as part of usual care, changes in nutritional status can be detected early. In this case, the dietitian was able to confidently advocate for nutrition escalation with the multidisciplinary team, resulting in better outcomes for the patient.** **On reflection, initiation of malnutrition and sarcopenia screening pre-treatment and referral for multi-modal prehabilitation may have optimised Mary's nutritional status and physical performance prior to transplant.**

Assessment

Position statement recommendations

All people with cancer identified as being 'at risk' of malnutrition following appropriate screening or with a cancer diagnosis or treatment plan known to lead to high risk of malnutrition should have comprehensive nutrition assessment using a tool validated in the oncology population.

All people with cancer identified as being 'at risk' of sarcopenia following appropriate screening should have a comprehensive evaluation of muscle status using a combination of assessments for muscle mass, muscle strength and function.

Interpretation of diagnostic criteria for sarcopenia should be applied recognising that:

a. **Threshold values for assessing muscle mass, muscle strength and physical performance are variable.**
b. **Care should be taken to determine the appropriate cut-off values in the population in which they are being applied.**
c. **Most data regarding muscle strength and performance comes from older populations.**

Diagnostic Criteria

Malnutrition

Global Leadership initiative on Malnutrition (GLIM)

The Global Leadership Initiative on Malnutrition (GLIM) produced a consensus statement in 2019 outlining the recommended assessment domains for a diagnosis of malnutrition. For a diagnosis of malnutrition, at least 1 phenotypic and 1 etiologic criteria must be present.

Table 2: GLIM diagnostic criteria for malnutrition

	Etiologic	*Phenotypic*
GLIM criteria: Presence of at least one phenotypic criteria and one etiologic criteria	Reduced food intake or assimilation	Weight loss
	Inflammation	Low body mass index
		Reduced muscle mass

Cederholm T, Jensen GL, Correia MITD, et al. GLIM Core Leadership Committee; GLIM Working Group. GLIM criteria for the diagnosis of malnutrition - A consensus report from the global clinical nutrition community. Clin Nutr. 2019;38(1):1-9. (Pub Med)

The Patient-Generated Subjective Global Assessment (PG-SGA) and Subjective Global Assessment (SGA) are validated assessment tools that align with GLIM criteria for diagnosing malnutrition and can be used to assess and diagnose malnutrition in people with cancer.

Patient-Generated Subjective Global Assessment (PG-SGA)

Ottery FD. Definition of standardized nutritional assessment and interventional pathways in oncology. Nutrition. 1996;12(1 Suppl):S15-9. (Pub Med)

Subjective Global Assessment (SGA)

Detsky AS, McLaughlin JR, Baker JP, Johnston N, Whittaker S, Mendelson RA, Jeejeebhoy KN. What is subjective global assessment of nutritional status? JPEN J Parenter Enteral Nutr. 1987;11(1): 8-13. (Pub Med)

Sarcopenia

There is no global consensus on the diagnostic criteria for sarcopenia. Commonly used definitions are included below:

European Working Group on Sarcopenia in Older People (EWGSOP1)

Table 3: EWGSOP1 diagnostic criteria for sarcopenia

Low muscle strength	*Low muscle mass*	*Poor muscle function*
Grip Strength <30 kg men <20 kg women	**ALM/height (m)2** <7.26 kg/m2 men <5.50 kg/m2 women	**Gait Speed (4m walk test)** ≤0.8 m/sec

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. Sarcopenia: European consensus on definition and diagnosis: Report of the European Working Group on Sarcopenia in Older People. Age Ageing. 2010;39(4):412-23. (Pub Med)

Foundation for the National Institutes of Health biomarkers consortium sarcopenia project (FNIH)

Table 4: FNIH diagnostic criteria for sarcopenia

Low muscle strength	*Low muscle mass*	*Poor muscle function*
Grip Strength <26 kg men <16 kg women	**ALM/BMI** <0.789 kg/BMI men <0.512 kg/BMI women	**N/A**

Studenski SA, Peters KW, Alley DE, Cawthon PM, McLean RR, Harris TB, Ferrucci L, Guralnik JM, Fragala MS, Kenny AM, Kiel DP, Kritchevsky SB, Shardell MD, Dam TT, Vassileva MT. The FNIH sarcopenia project: rationale, study description, conference recommendations, and final estimates. J Gerontol A Biol Sci Med Sci. 2014;69(5):547-58. (Pub Med)

European Working Group on Sarcopenia in Older People updated definition (EWGSOP2)

Table 5: EWGSOP2 diagnostic criteria for sarcopenia

Low muscle strength	*Low muscle mass*	*Poor muscle function*
Grip strength <27 kg men <16 kg women **or** **Chair Stands** >15 sec five rises	**ALM/height (m)2** <7.00 kg/m2 men <5.50 kg/m2 women **or** **ALM** <20kg men <15kg women	**Gait Speed (4m walk test)** ≤0.8 m/sec **or** **SPPB Score** ≤8 points **or** **TUG** ≥20 sec **or** **400m walk** ≥6 minutes or non-completion (used to classify severity)

Cruz-Jentoft AJ, Bahat G, Bauer J, Boirie Y, Bruyère O, Cederholm T, Cooper C, Landi F, Rolland Y, Sayer AA, Schneider SM, Sieber CC, Topinkova E, Vandewoude M, Visser M, Zamboni M. Sarcopenia: revised European consensus on definition and diagnosis. Age Ageing. 2019;48(1):16-31. (Pub Med)

Cancer specific CT image analysis

Table 6: Cancer-specific CT image analysis research diagnostic criteria for sarcopenia

Low muscle strength	*Low muscle mass*	*Poor muscle function*
N/A	**SMI [SMA/height (m)2] at L3** <52.4 cm2/m2 men <38.5 cm2/m2 women	**N/A**

Prado CM, Lieffers JR, McCargar LJ, Reiman T, Sawyer MB, Martin L, Baracos VE. Prevalence and clinical implications of sarcopenic obesity in patients with solid tumours of the respiratory and gastrointestinal tracts: a population-based study. Lancet Oncol. 2008;9(7):629-35. (Pub Med)

Table 7: Cancer-specific CT image analysis research diagnostic criteria for sarcopenia

Low muscle strength	*Low muscle mass*	*Poor muscle function*
N/A	**SMI [SMA/height (m)2] at L3** <43 cm2/m2 (men with BMI <24.9) <53 cm2/m2 (men with BMI >25) <41 cm2/m2 (women of any BMI)	**N/A**

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;31(12): 1539-47. (Pub Med)

How to complete assessment

Provided below are a battery of assessment tools/measures. Please choose the assessment tools/measures appropriate to your local context.

Malnutrition

The Patient-Generated Subjective Global Assessment (PG-SGA) and Subjective Global Assessment (SGA) are validated assessment tools that can be used to assess and diagnose malnutrition in people with cancer.

SGA

SGA Instructional Video
SGA Malnutrition Assessment training videos | Queensland Health **www.health.qld.gov.au/nutrition/clinicians/sga-videos**

PG-SGA

The PG-SGA is a 4 in 1 tool that can be used for nutrition screening, assessment, triaging and monitoring.

PG-SGA How to Guide

Materials required:

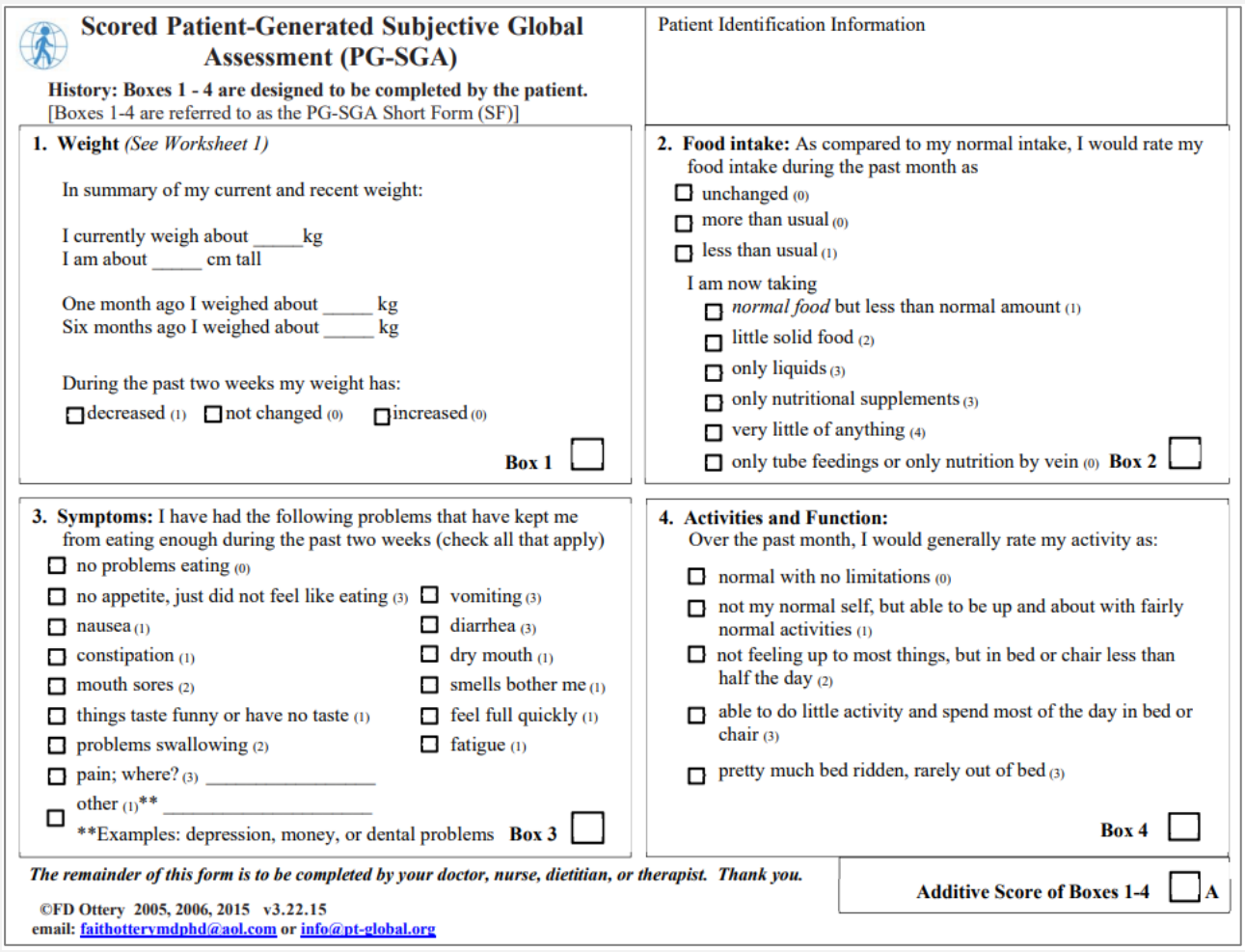
- **PG-SGA worksheet**

Procedure:

The PG-SGA consists of 2 main components. The patient generated component, (also known as the PG-SGA short form) and then worksheets 1 to 5.

The patient generated component:

Consists of boxes 1-4 and can be completed by the patient prior to dietitian assessment.



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

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)]

Patient Identification Information

1. Weight *(See Worksheet 1)*

In summary of my current and recent weight:

I currently weigh about _____kg
I am about _____ cm tall

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

During the past two weeks my weight has:
☐ decreased (1) ☐ not changed (0) ☐ increased (0)

Box 1 ☐

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 (0) **Box 2** ☐

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 (3)
☐ nausea (1)
☐ constipation (1)
☐ mouth sores (2)
☐ things taste funny or have no taste (1)
☐ problems swallowing (2)
☐ vomiting (3)
☐ diarrhea (3)
☐ dry mouth (1)
☐ smells bother me (1)
☐ feel full quickly (1)
☐ fatigue (1)
☐ pain; where? (3) _____
☐ other (1)** _____
Examples: depression, money, or dental problems **Box 3 ☐

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 (3)
☐ pretty much bed ridden, rarely out of bed (3)

Box 4 ☐

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

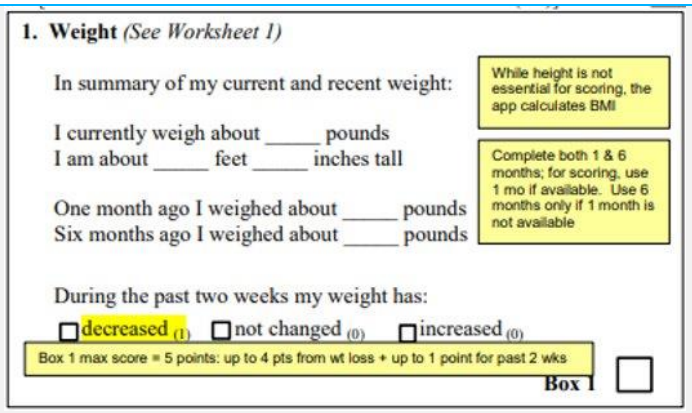
Additive Score of Boxes 1-4 ☐ **A**

email: faithotterymdphd@aol.com or info@pt-global.org

Box 1 **- Assesses chronic, intermediate, or acute weight change.**

Complete for both 1 and 6 months. Use 6-month history only if 1 month is not available. Refer to worksheet 1 for weight loss scoring.

The maximum score is 5 points for this box. Up to 4 points for weight loss and up to one point for the past 2 weeks


1. **Weight** *(See Worksheet 1)*

In summary of my current and recent weight:

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

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

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

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)

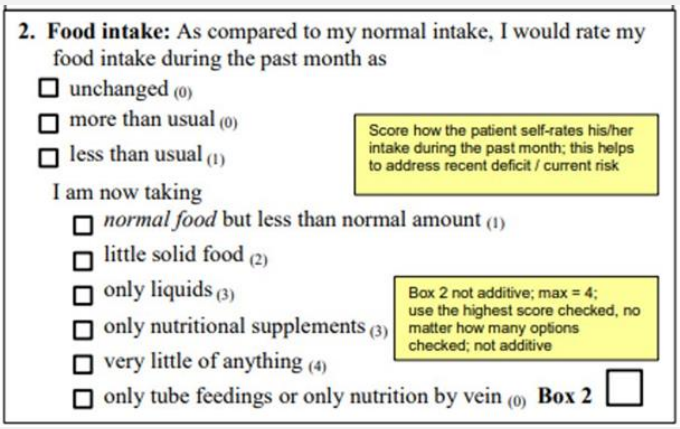
Box 1 max score = 5 points: up to 4 pts from wt loss + up to 1 point for past 2 wks

Box 1 ☐

Box 2 **- Assesses changes in the amount, type and consistency of food intake during the past 2 months.**

Score how the patient self-rates his/her intake.

Note: The score is not additive for this box. Use the highest score checked i.e. max score = 4.


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)

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

I am now taking

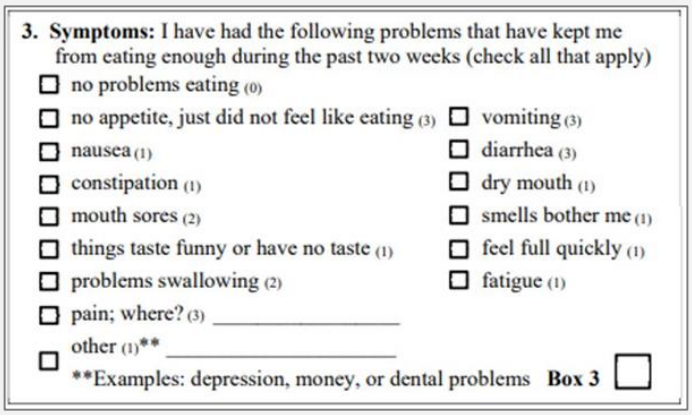
☐ *normal food* but less than normal amount (1)
☐ little solid food (2)
☐ only liquids (3)
☐ only nutritional supplements (3)
☐ very little of anything (4)

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

☐ only tube feedings or only nutrition by vein (0) **Box 2** ☐

Box 3 **- Assesses symptoms that have negatively influenced food intake/absorption or utilisation of nutrients during the past 2 weeks.**

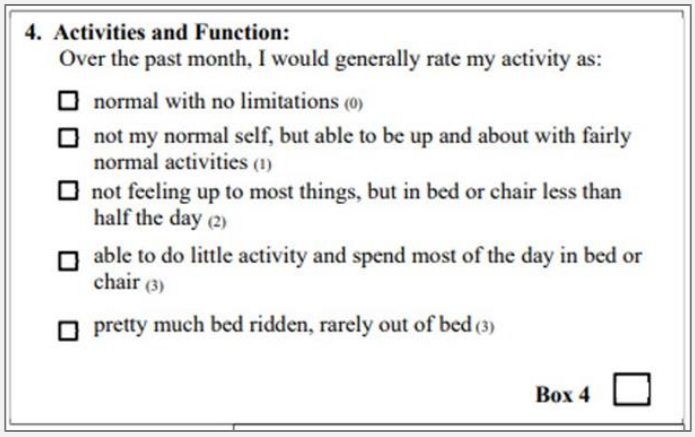
Note: Only score symptoms impacting on nutritional intake. Add all points for box 3 total score.


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 (3)
☐ nausea (1)
☐ constipation (1)
☐ mouth sores (2)
☐ things taste funny or have no taste (1)
☐ problems swallowing (2)
☐ pain; where? (3) _____
☐ other (1)** _____
☐ vomiting (3)
☐ diarrhea (3)
☐ dry mouth (1)
☐ smells bother me (1)
☐ feel full quickly (1)
☐ fatigue (1)

Examples: depression, money, or dental problems **Box 3 ☐

Box 4 **- Assesses the patients' activities and function over the past month and is based on the Eastern Cooperative Oncology Group (ECOG) performance status.**


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 (3)
☐ pretty much bed ridden, rarely out of bed (3)

Box 4 ☐

Worksheet 1 **– Provides guidance on scoring weight loss**

Use 1 month data if available.

Use points to score weight change and add one extra point if patient has lost weight during the past 2 weeks.

Worksheet 1 – Scoring Weight 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 score in Box 1 of PG-SGA.

Weight loss in 1 month	Points	Weight 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%

Numerical score from Worksheet 1 ☐

Worksheet 2 **– Identifies conditions that may increase nutritional risk or requirements**

Add one point for each of these conditions identified.

5. Worksheet 2 – Disease and its relation to nutritional requirements:

Score is derived by adding 1 point for each of the following conditions:

☐ Cancer
☐ Presence of decubitus, open wound or fistula
☐ AIDS
☐ Presence of trauma
☐ Pulmonary or cardiac cachexia
☐ Age greater than 65
☐ Chronic renal insufficiency

Other relevant diagnoses (specify) _____

Primary disease staging (circle if known or appropriate) I II III IV Other ____

Numerical score from Worksheet 2 ☐ **B**

Worksheet 3 **– Assesses metabolic demand considering fever (how high and for how long) and corticosteroid use**

6. Worksheet 3 – Metabolic Demand

Score for metabolic stress is determined by a number of variables known to increase protein & caloric needs. **Note:** Score fever intensity or duration, whichever is greater. The score is additive so that a patient who has a fever of 38.8 °C (3 points) for < 72 hrs (1 point) and who is on 10 mg of prednisone chronically (2 points) would have an additive score for this section of 5 points.

Stress	none (0)	low (1)	moderate (2)	high (3)
Fever	no fever	> 37.2 and < 38.3	≥ 38.3 and < 38.8	≥ 38.8 °C
Fever duration	no fever	< 72 hours	72 hours	> 72 hours
Corticosteroids	no corticosteroids	low dose (< 10 mg prednisone equivalents/day)	moderate dose (≥ 10 and < 30 mg prednisone equivalents/day)	high dose (≥ 30 mg prednisone equivalents/day)

Numerical score from Worksheet 3 ☐ **C**

Worksheet 4 **– Captures the results of a nutrition focused physical exam**

7. Worksheet 4 – Physical Exam

Exam includes a subjective evaluation of 3 aspects of body composition: fat, muscle, & fluid. Since this is subjective, each aspect of the exam is rated for degree. Muscle deficit/loss impacts point score more than fat deficit/loss. Definition of categories: 0 = no abnormality, 1+ = mild, 2+ = moderate, 3+ = severe. Rating in these categories is *not* additive but are used to clinically assess the degree of deficit (or presence of excess fluid).

Muscle Status		Fat Stores	
temples (temporalis muscle)	0 1+ 2+ 3+	orbital fat pads	0 1+ 2+ 3+
clavicles (pectoralis & deltoids)	0 1+ 2+ 3+	triceps skin fold	0 1+ 2+ 3+
shoulders (deltoids)	0 1+ 2+ 3+	fat overlying lower ribs	0 1+ 2+ 3+
interosseous muscles	0 1+ 2+ 3+	**Global fat deficit rating**	**0 1+ 2+ 3+**
scapula (latissimus dorsi, trapezius, deltoids)	0 1+ 2+ 3+	**Fluid status**	
thigh (quadriceps)	0 1+ 2+ 3+	ankle edema	0 1+ 2+ 3+
calf (gastrocnemius)	0 1+ 2+ 3+	sacral edema	0 1+ 2+ 3+
Global muscle status rating	**0 1+ 2+ 3+**	ascites	0 1+ 2+ 3+
		Global fluid status rating	**0 1+ 2+ 3+**

Point score for the physical exam is determined by the overall subjective rating of the total body deficit.
No deficit score = 0 points
Mild deficit score = 1 point
Moderate deficit score = 2 points
Severe deficit score = 3 points
Again, muscle deficit/loss takes precedence over fat loss or fluid excess.

Numerical Score for Worksheet 4 ☐ **D**

Total PG-SGA Score (Total numerical score of A+B+C+D) ☐

Clinician Signature _____ RD RN PA MD DO Other _____ Date _____

Global PG-SGA Category Rating (Stage A, Stage B or Stage C) ☐

Scoring of physical exam:

A score of 0-3 points for each site is given.
No deficit = 0 points
Mild deficit = 1 point
Moderate deficit = 2 points
Severe deficit = 3 points

Point score for the physical exam is determined by the overall subjective rating of the total body deficit.
No deficit score = 0 points
Mild deficit score = 1 point
Moderate deficit score = 2 points
Severe deficit score = 3 points
Again, muscle deficit/loss takes precedence over fat loss or fluid excess.

Determine global rating for muscle, fat and fluid stores, noting that muscle loss takes precedence.
Determine overall rating and record in Box D

Note: You do not have to complete assessment at all sites to have a global sense for loss or deficit of muscle or fat. Remember the maximum point score for the physical exam is only 3 points – and you are not likely to be off by more than 1 point.

Scoring:

TOTAL PG-SGA SCORE = A + B + C + D

Total PG-SGA Score (Total numerical score of A+B+C+D) ☐

Global PG-SGA Category Rating (Stage A, Stage B or Stage C) ☐

Worksheet 5 **– Global rating of nutritional status**

A = well nourished,
B = moderate or suspected malnutrition,
C = severely malnourished.

You may find it easiest to circle A, B or C for each category as you work down the list. The global status will be determined by the column with the most circles.

Worksheet 5 – PG-SGA Global Assessment Categories

	Stage A	Stage B	Stage C
Category	**Well-nourished**	**Moderate/suspected malnutrition**	**Severely malnourished**
Weight	No weight loss OR recent non-fluid wt gain	≤ 5% loss in 1 month (≤10% in 6 months) OR Progressive weight loss	> 5% loss in 1 month (>10% in 6 months) OR Progressive weight loss
Nutrient intake	No deficit OR Significant recent improvement	Definite decrease in intake	Severe deficit in intake
Nutrition Impact Symptoms (NIS)	None OR significant recent improvement allowing adequate intake	Presence of NIS (Box 3 of PG-SGA)	Presence of NIS (Box 3 of PG-SGA)
Functioning	No deficit OR Significant recent improvement	Moderate functional deficit OR Recent deterioration	Severe functional deficit OR Recent significant deterioration
Physical Exam	No deficit OR chronic deficit but with recent clinical improvement	Evidence of mild to moderate loss of muscle mass &/or muscle tone on palpation &/or loss of SQ fat	Obvious signs of malnutrition (e.g., severe loss muscle, fat, possible edema)

Total PG-SGA Score:

The PG-SGA provides a score, which is a continuous measure (from 0-16) with the higher the score, the higher the malnutrition risk.

The score can be used to triage nutrition intervention.

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).

First line nutrition intervention includes optimal symptom management.

Triage based on PG-SGA point score

0-1	No intervention required at this time. Re-assessment on routine and regular basis during treatment.
2-3	Patient & family education by dietitian, nurse, or other clinician with pharmacologic intervention as indicated by symptom survey (Box 3) and lab values as appropriate.
4-8	Requires intervention by dietitian, 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.

email: faithottervmdphd@aol.com or info@pt-global.org

Frequently asked questions:

Q: Should we score all symptoms present, or only those impacting nutritional intake?
A: Only score those that affect nutritional intake.

Q: If a symptom was affecting intake withing the past 2 weeks but has resolved on the day of assessment, should it still be scored?
A: Yes

Q. Do we score for reduced activity levels even if this is not due to nutrition status (e.g. trauma)?
A: Yes, one week of complete bed rest can be associated with up to 4% loss in lean body mass.

Q: Should I use loss of weight over 1 month or 6 months?
A: Use 1 month if available, this gives a more recent idea of metabolic status (anabolic or catabolic)

Q: If a patient is receiving 100% nutrition requirements via enteral/parenteral nutrition but still has nutrition impact symptoms, do we still score them?
A: Yes. This box helps to determine what symptoms are stopping the patient meeting requirements orally and what nutrition interventions are required.

Key references:

Ottery FD. Patient-Generated Subjective Global Assessment In: The Clinical Guide to Oncology Nutrition ed. PD McCallum & CG Polisena, 2000; pp 11–23 Chicago: The American Dietetic Association

Bauer J, Capra S, Ferguson M. Use of the scored Patient-Generated Subjective Global Assessment (PG-SGA) as a nutrition assessment tool in patients with cancer. Eur J Clin Nutr. 2002 Aug;56(8):779-85. doi: 10.1038/sj.ejcn.1601412.

Also available on the patient global platform in 20 different languages. Each language has undergone translation and cross-cultural adaptation. https://pt-global.org/pt-global/

Muscle Mass

PG-SGA physical exam

The PG-SGA physical exam can be used to assess muscle mass. Please refer to the PG-SGA how to guide and the SGA instructional video for details on how to complete.

Calf Circumference

Calf circumference can be used as a marker of muscle mass in clinical practice.

Calf Circumference Instructional Video

Calf circumference instructional video (youtube.com)

https://youtu.be/XNnRH4T0wM8

Calf Circumference How to Guide

Materials required:

Flexible tape measure (or piece of string and ruler if you do not have access to a tape measure).

Procedure:

- **Have the participant seated with knees at a 90° angle and feet flat to the floor OR standing with feet flat on the ground.**
- **Legs apart and relaxed.**
- **Take the measure to the nearest 1 mm. If using a string and ruler, measure the length of the string along the ruler to get the measurement.**
- **Complete 3 measurements on each side. The largest measurement is used for the assessment.**
- **Calf exposed.**

How to measure:

- **Place tape measure/string around the calf and move up and down without compressing subcutaneous tissue to locate the maximum circumference.**
- **Take the measure to the nearest 1mm. If using a string and ruler, measure the length of the string along the ruler to get the measurement.**
- **Complete 3 measurements on each side. The largest measurement is used for the assessment.**

Example Cut Points:

At risk of sarcopenia/malnutrition:

Female	**≤ 33 cm**
Male	**≤ 34 cm**

Adjustments for BMI:

BMI	Adjustment
18.5-24.9 kg/m2	0 cm
25-29 kg/m2	-3 cm
30-39 kg/m2	-7 cm
>39 kg/m2	-12 cm

Note: BMI-adjustment should not be applied to individuals with a BMI <18.5kg/m2 who are suspected to have weight or muscle losses, as low muscle mass could be hidden if the adjustment factor is applied.

Frequently asked questions:

Q: Should calf circumference be measured sitting or standing?
A: Calf circumference can be measured either sitting or standing.

Q: Should the participant take their shoes off?
A: Flat soled shoes can remain on.

Key references:

Centers for Disease Control and Prevention. National Center for Health Statistics (NCHS). National Health and Nutrition Examination Survey questionnaire (or examination protocol, or laboratory protocol). 2006. Available from: https://wwwn.cdc .gov/nchs/data/nhanes/1999-2000/manuals/bm.pdf

Gonzalez, M. C., Mehrnezhad, A., Razaviarab, N., Barbosa-Silva, T. G., & Heymsfield, S. B. (2021). Calf circumference: cutoff values from the NHANES 1999–2006. The American Journal of Clinical Nutrition, 113(6), 1679-1687

Prado CM, Landi F, Chew STH, Atherton PJ, Molinger J, Ruck T, Gonzalez MC. Advances in muscle health and nutrition: A toolkit for healthcare professionals. Clin Nutr. 2022 Oct;41(10):2244-2263.

Bioelectric impedance analysis (BIA)

BIA uses the resistance to a single frequency electrical current (impedance) to estimate fat-free mass.

BIA Instructional Videos
Bioelectrical Impedance Analysis (youtube.com) **www.youtube.com/watch?v=v-vtytwqbii**
Bioelectrical Impedance Analysis (youtube.com) **www.youtube.com/watch?v=vcus3qclsu**

BIA How to Guide

Materials required:

- Bioelectrical impedance analysis scale or device (+ electrodes)
- Alcohol swabs
- Exam table

Procedure:

- Ask participant to remove all jewellery/watch.
- For accurate measurements, participants should refrain from moving or talking during the measurement.

Foot-to-foot

- Measure height and weight.
- Enter participants characteristics into the scale.
- Participant should stand on the scale with hands and feet on the corresponding electrode pads ensuring that arms are not in contact with the torso.

Hand-to-foot

- Measure height.
- Participant should lie on exam table with legs straight and arms by side but no body parts touching.
- Prepare skin to receive electrodes by cleaning it with an alcohol swab.
- Place electrodes on wrist, hand, ankle and foot (on same side of body) and connect clips to electrodes.
- Take resistance measurement (in Ohms) and plug into appropriate equation.

Example Cut Points:

	Males	Females
Appendicular skeletal muscle index (ASMI)* for BIA	< 7 kg/m2	< 5.7 kg/m2
Fat-free mass index (FFMI)	< 17 kg/m2	< 15 kg/m2
Appendicular lean mass adjusted for BMI* (ALM/BMI)	< 0.725	< 0.591

* These cut points are examples of currently published cut points; however, it is important to consider the cut point most appropriate for the population you are assessing.

Frequently asked questions:

Q: Do I need to ask participants to empty their bladder prior to taking the measurement?
A: No. The amount of fluid held in the bladder is relatively small and will have an insignificant effect on the measurement output.

Q: Should I take repeat measurements at the same time of day as previous measurements?
A: Yes, it is good practice where feasible to take repeated measurements at a similar time of day, particularly if you want to compare measurements over time.

Key references:

Sheean P et al., American Society for Parenteral and Enteral Nutrition Clinical Guidelines: The Validity of Body Composition Assessment in Clinical Populations. Journal of Parenteral and Enteral Nutrition 2020; 44(1): 12 – 43.

Price K, Earthman C. Update on body composition tools in clinical settings: computed tomography, ultrasound, and bioimpedance applications for assessment and monitoring. European Journal of Clinical Nutrition 2019; 73: 187 – 193.

Cederholm T, et al. GLIM criteria for the diagnosis of malnutrition - A consensus report from the global clinical nutrition community. Clin Nutr. 2019; 38(1): 1 – 9.

Bioelectric spectroscopy analysis (BIS)

BIS uses the resistance to a multiple frequency electrical current (impedance) to estimate fat-free mass.

BIS Instructional Video

[What is BIS? - SOZO® Digital Health Platform (youtube.com)]

www.youtube.com/watch?v=bppbood1spg

BIS How to Guide

Materials required:

- **Bioelectrical impedance spectroscopy scale or device (+ electrodes)**
- **Disinfectant wipes to clean the electrode pads between use**

Procedure:

- **Ask participant to remove all jewellery/watch.**
- **Participants should stand on the scale with hands and feet on the corresponding electrode pads ensuring that arms are not in contact with the torso.**
- **For accurate measurements, participants should refrain from moving or talking during the measurement.**

Example Cut Points:

	Males	Females
Appendicular skeletal muscle index (ASMI)* for BIA	< 7 kg/m2	< 5.7 kg/m2
Fat-free mass index (FFMI)	< 17 kg/m2	< 15 kg/m2
Appendicular lean mass adjusted for BMI* (ALM/BMI)	< 0.725	< 0.591

*** Assumes BIS device provides output on appendicular skeletal muscle or appendicular lean mass. These cut points are examples of currently published cut points; however, it is important to consider the cut point most appropriate for the population you are assessing.**

Frequently asked questions:

Q: Do I need to ask participants to empty their bladder prior to taking the measurement?
A: No. The amount of fluid held in the bladder is relatively small and will have an insignificant effect on the measurement output.

Q: Should I take repeat measurements at the same time of day as previous measurements?
A: Yes, it is good practice where feasible to take repeated measurements at a similar time of day, particularly if you want to compare measurements over time.

Key references:

Sheean P et al., American Society for Parenteral and Enteral Nutrition Clinical Guidelines: The Validity of Body Composition Assessment in Clinical Populations. Journal of Parenteral and Enteral Nutrition 2020; 44(1): 12 – 43.

Price K, Earthman C. Update on body composition tools in clinical settings: computed tomography, ultrasound, and bioimpedance applications for assessment and monitoring. European Journal of Clinical Nutrition 2019; 73: 187 – 193.

Cederholm T, et al. GLIM criteria for the diagnosis of malnutrition - A consensus report from the global clinical nutrition community. Clin Nutr. 2019; 38(1): 1 - 9.

Muscle Strength

Handgrip Strength

Hand grip strength is used as a measure of muscle strength.

Handgrip Strength Instructional Videos
Handgrip strength - YouTube **www.youtube.com/watch?v=82zseimmne0**
Jamar Hand Dynamometer Demo (youtube.com) **www.youtube.com/watch?v=9-e0dcxia5m**

Handgrip Strength How to Guide

Materials required:

- **Hand Grip Dynamometer**
- **Chair with back rest**

Procedure:

- **Patient position: subject seated, shoulders adducted and neutrally rotated, elbow flexed at 90°, forearm in neutral position and wrist between 0 and 30° of extension. The arm is not supported by examiner or armrest and the dynamometer is presented vertically and in line with the forearm.**

Instruction to participant:

"I want you to hold the handle like this and squeeze as hard as you can." The examiner demonstrates and then gives the dynamometer to the subject. "Are you ready? Squeeze as hard as you can." As the subject begins to squeeze, the examiner says, "Harder!... Harder!... Relax"

How to measure:

- **It is recommended that the test is repeated a total of six times, three on each side.**
- **A rest of 60 seconds is recommended between each trial to prevent fatigue.**
- **The maximum measurement on each side is recorded. Read grip strength in kilograms and record the result to the nearest 1 kg.**
- **Also record hand dominance, i.e. right, left or ambidextrous.**

Example Cut Points:

At risk if max score:

Female	**< 16 kg**
Male	**< 27 kg**

*** Select the most appropriate cut point for the population you are working with**

Frequently asked questions:

Q: Which hand grip dynamometer should I use?
A: There is a wide range of hand grip dynamometers. The Jamar hand dynamometer (Lafayette Instrument Company, USA) is the most widely cited in the literature and accepted as the gold standard by which other dynamometers are evaluated. It is recommended if comparing pre and post intervention measures that the same instrument is used to improve accuracy.

Q: How long should the patient grip for?
A: It is suggested that 3 seconds is sufficient for a patient to exert maximal strength during a hand grip strength assessment.

Key references:

Roberts HC, Denison HJ, Martin HJ, Patel HP, Syddall H, Cooper C, Sayer AA. A review of the measurement of grip strength in clinical and epidemiological studies: towards a standardised approach. Age Ageing. 2011;40(4):423-9.

Dodds RM, Syddall HE, Cooper R et al. Grip strength across the life course: normative data from twelve British studies. PLoS One. 2014; 9: e113637.

Massy-Westropp, N.M., et al., Hand Grip Strength: age and gender stratified normative data in a population-based study. BMC research notes. 2011;4(1):1-5.

Núñez-Cortés R, Cruz BDP, Gallardo-Gómez D, Calatayud J, Cruz-Montecinos C, López-Gil JF, López-Bueno R. Handgrip strength measurement protocols for all-cause and cause-specific mortality outcomes in more than 3 million participants: A systematic review and meta-regression analysis. Clin Nutr. 2022;41(11):2473-2489. doi: 10.1016/j.clnu.2022.09.006.

Chair Stand Test (5 times sit to stand)

The chair stand test, also known as the 5 times sit to stand, can be used as a measure of muscle strength.

Chair Stand Test Instructional Video
Five Time Sit to Stand Test (FTSST) (youtube.com)
www.youtube.com/watch?v=_jpl-iurj5a

Chair Stand Test How to Guide

Materials required:

- Stopwatch
- Chair with backrest

Procedure:

- Patient position: Sitting in the middle of the chair with their back straight and feet flat on the floor and hip width apart. Patients should have their hands placed on opposite shoulders crossed at the wrists.
- The patient should be offered one practice trial before measurements are recorded. If the clinician is worried about patient fatigue, they should demonstrate one stand and then encourage two repetitions.

Instruction to participant:

"I want you to stand up and sit down 5 times as quickly as you can when I say 'Go'."

How to measure:

- Record the total time from saying "go" to when the patients bottom hits the chair after the 5th stand.
  Patient use of upper limb or need for assistance indicates test failure. This should be recorded along with the type of support required.

Cut Points/Scoring:

Low strength	> 15 seconds for 5 rises

* Select the most appropriate cut point for the population you are working with

Frequently asked questions:

Q: What is the recommended chair height?
A: Recommended chair height varies in the literature, most commonly between 43 – 45cm.

Q: Can this test be done remotely via telehealth?
A: A safety and feasibility study published in 2023 demonstrated that for people with an AKPS > 60 'Able to care for most needs; but requires occasional assistance' can safely do the 30 second sit to stand test via telehealth. This can be extrapolated to the 5 times sit to stand.

Q: What is the minimum clinically important difference (MCID)?
A: Research in an oncology population is not currently available, however, in a population of people undergoing vestibular rehab the MCID was reported to be 2.3 seconds.

Key references:

Mehmet, H., A.W.H. Yang, and S.R. Robinson, What is the optimal chair stand test protocol for older adults? A systematic review. Disabil Rehabil, 2020. 42(20):2828-2835.

Cesari M, Kritchevsky SB, Newman AB et al. Added value of physical performance measures in predicting adverse health-related events: results from the Health, Aging and Body Composition Study. J Am Geriatr Soc 2009; 57: 251–259.

Klukowska, A.M., et al., Five-repetition sit-to-stand test performance in healthy individuals: reference values and predictors from 2 prospective cohorts. Neurospine, 2021. 18(4):760.

Bohannon, R.W., Reference values for the five-repetition sit-to-stand test: a descriptive meta-analysis of data from elders. Perceptual and motor skills, 2006. 103(1):215-222.

Buatois, S., et al., Five times sit to stand test is a predictor of recurrent falls in healthy community-living subjects aged 65 and older. Journal of the American Geriatrics Society, 2008. 56(8):1575-1577.

Muscle Function

Short Physical Performance Battery (SPPB)

The SPPB is an objective measure of balance, lower extremity strength and functional capacity in older adults.

SPPB Instructional Videos
Short Physical Performance Battery (SPPB) (youtube.com) **www.youtube.com/watch?v=n_rjoghqqz4&t=520s**
EWDSOP2 Clinical Algorithm - Severity Chair Stand Test | ANHI **https://anhi.org/resources/podcasts-and-videos/finding-and-diagnosing-sarcopenia-series/severity-chair-stand-test**
EWDSOP2 Clinical Algorithm - Severity Gait Speed Test | ANHI **https://anhi.org/resources/podcasts-and-videos/finding-and-diagnosing-sarcopenia-series/severity-gait-speed-test**
EWDSOP2 Clinical Algorithm - Severity Balance Test | ANHI **https://anhi.org/resources/podcasts-and-videos/finding-and-diagnosing-sarcopenia-series/severity-balance-test**

SPPB How to Guide

Materials required:

- **Stopwatch**
- **Chair with back rest**
- **Tape measure**
- **Pen and paper to record activity**

Procedure:

The Short Physical Performance Battery consists of 3 tests (Balance, Gait speed, Chair stand) and all tests should be performed in the same order as presented in this protocol.

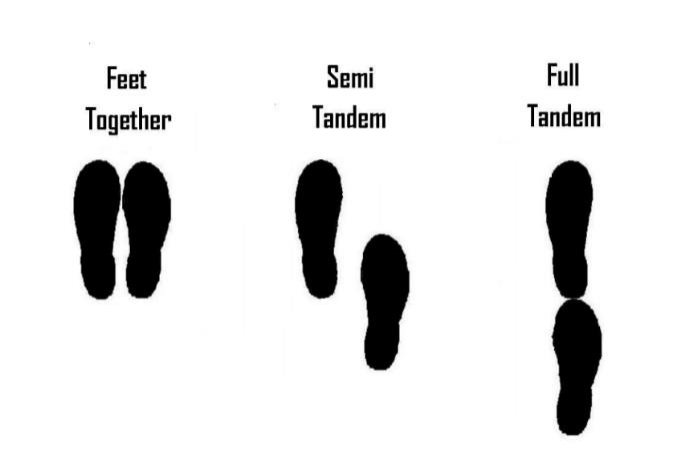
Balance Test

- **The participant must be able to stand unassisted without the use of a cane or walker. You may help the participant to get up.**

Instruction to participant:

"Let's begin the evaluation. I would like you to stand in different positions to test your balance. If you cannot do a particular stance, or if you feel it would be unsafe to try to do it, tell me and we'll move on to the next one. Please don't do anything you feel unsafe in attempting."

The balance test stances are shown in the figure below:



Source: https://www.physio-pedia.com/Short_Physical_Performance_Battery#/media/File:___Screenshot 2022-11-30_at_09.31.30.png

- **Side by Side Stand**

  (Demonstrate) "I want you to try to stand with your feet together, side-by-side, for about 10 seconds. You may use your arms or bend your knees but try not to move your feet. Please hold the position until we tell you to stop."

  Stand next to the participant to help him/her into the side-by-side position.

  Supply just enough support to the participant's arm to prevent loss of balance.

  When the participant has his/her feet together, ask "Are you ready?"

  Then let go and begin timing as you say, "Ready, begin."

  Stop the stopwatch and say "Stop" after 10 seconds or when the participant steps out of position or grabs your arm.

- **Semi-Tandem Stand**

  (Demonstrate) "Now I want you to try to stand with the side of the heel of one foot touching the big toe of the other foot for about 10 seconds. You may put either foot in front, whichever is more comfortable for you."

  Repeat instructions above.

- **Tandem Stand**

  (Demonstrate) "Now I want you to try to stand with the heel of one foot in front of and touching the toes of the other foot for about 10 seconds. You may put either foot in front, whichever is more comfortable for you."

  Repeat instructions above.

Gait Speed Test

- **Mark a 4m course on a flat surface.**

Instructions to participant:

"Now I am going to observe how you normally walk. If you use a cane or other walking aid and you feel you need it to walk a short distance, then you may use it."

- **First Gait Speed test**

  "This is our walking course. I want you to walk to the other end of the course at your usual speed, just as if you were walking down the street to go to the store."

Demonstrate

"Walk all the way past the other end of the tape before you stop. I will walk with you. Do you feel this would be safe?"

Have the participant stand with both feet touching the starting line.

"When I want you to start, I will say: Ready, begin."

When the participant acknowledges this instruction say: "Ready, begin."

Press the start/stop button to start the stopwatch as the participant begins walking. Walk behind and to the side of the participant.

Stop timing when one of the participant's feet is completely across the end line.

- **Second Gait Speed test**

"Now I want you to repeat the walk. Remember to walk at your usual pace and go all the way past the other end of the course."

Repeat instructions above.

Chair Stand Test

- **Patient position: Sitting in the middle of the chair (against wall) with back straight and feet flat on the floor and hip width apart. Patients should have their hands placed on opposite shoulders crossed at the wrists.**
- **Prior to test completion the clinician should demonstrate the sit to stand procedure.**

Instruction to participant:

"Do you think it would be safe for you to try to stand up from a chair without using your arms?"

If yes, then explain and demonstrate the procedure.

"First, fold your arms across your chest and sit so that your feet are on the floor; then stand up keeping your arms folded across your chest."

"When I say 1, 2, 3, GO begin standing up and sitting down again as quickly as you can. I will count each full sit to stand out loud and you should complete 5 as quickly as you can. Are you ready to start?" Once the patient says yes, start the test by saying "1, 2, 3, GO".

Stop the stopwatch when participant has straightened up completely for the fifth time.

How to measure:

- **The clinician times 5 completed sit to stands.**
- **If the patient has to use their arms to stand stop the test.**
- **Incorrectly executed stands i.e., not standing fully, are not counted.**

Scoring:

Scoring balance test:

Side-Side	Points	Semi-Tandem	Points	Tandem	Points
Held for 10 sec	1 point	Held for 10 sec	1 point	Held for 10 sec	2 points
Not held for 10 sec	0 points	Not held for 10 sec	0 points	Held for 3 - 9.99 sec	1 point
Not attempted	0 points	Not attempted	0 points	Held for < 3 sec	0 points
				Not attempted	0 points

Balance test scores:

Side by side Test Score _____
Semi-tandem Test Score _____
Tandem Test Score _____
Total _____

Scoring Gait speed test:

1. Time for 4 meters. _____sec (measure to two decimal places)
2. If participant did not attempt test or failed, circle why in table below. Otherwise allocate a score using the table below

Tried but unable to complete	1
Participant could not walk unassisted	2
Not attempted, you felt unsafe	3
Not attempted, participant felt unsafe	4
Participant unable to understand instructions	5
Other (Specify)	6
Participant refused	7
Aids for walk (None, Cane other)	

Scoring:

Completion time (4m)	Points
> 8.70 sec	1
6.21-8.70 sec	2
4.82-6.20 sec	3
< 4.82 sec	4
≥ 60 sec	0

Comments: _____
_____

Scoring for chair stand test:

Completion time (4m)	Points
Participant unable to complete 5 chair stands or completes stands in >60 sec	0
If chair stand time is 16.70 sec or more	1
If chair stand time is 13.70 to 16.69 sec	2
If chair stand time is 11.20 to 13.69 sec	3
If chair stand time is 11.19 sec or less	4

Scoring for Complete Short Physical Performance Battery Test scores

Total Balance Test Score _____
Gait Speed Test Score _____
Chair Stand Test Score _____
Total _____

Classification of limitations based on SPPB score:

Score	Classification
0-3	Severe limitations
4-6	Moderate limitations
7-9	Mild limitations
10-12	Minimal limitations

Example Cut Point:

Low physical performance	**≤ 8 points**

*** Select the most appropriate cut point for the population you are working with**

Scoring:

Scoring balance test:

Side-Side	Points	Semi-Tandem	Points	Tandem	Points
Held for 10 sec	1 point	Held for 10 sec	1 point	Held for 10 sec	2 points
Not held for 10 sec	0 points	Not held for 10 sec	0 points	Held for 3 - 9.99 sec	1 point
Not attempted	0 points	Not attempted	0 points	Held for < 3 sec	0 points
				Not attempted	0 points

Balance test scores:

Side by side Test Score _____
Semi-tandem Test Score _____
Tandem Test Score _____
Total _____

Scoring Gait speed test:

3. Time for 4 meters. _____sec (measure to two decimal places)
4. If participant did not attempt test or failed, circle why in table below. Otherwise allocate a score using the table below

Tried but unable to complete	1
Participant could not walk unassisted	2
Not attempted, you felt unsafe	3
Not attempted, participant felt unsafe	4
Participant unable to understand instructions	5
Other (Specify)	6
Participant refused	7
Aids for walk (None, Cane other)	

Scoring:

Completion time (4m)	Points
> 8.70 sec	1
6.21-8.70 sec	2
4.82-6.20 sec	3
< 4.82 sec	4
≥ 60 sec	0

Comments: _____
_____
_____

Scoring for chair stand test:

Completion time (4m)	Points
Participant unable to complete 5 chair stands or completes stands in >60 sec	0
If chair stand time is 16.70 sec or more	1
If chair stand time is 13.70 to 16.69 sec	2
If chair stand time is 11.20 to 13.69 sec	3
If chair stand time is 11.19 sec or less	4

Scoring for Complete Short Physical Performance Battery Test scores

Total Balance Test Score _____
Gait Speed Test Score _____
Chair Stand Test Score _____
Total _____

Classification of limitations based on SPPB score:

Score	Classification
0-3	Severe limitations
4-6	Moderate limitations
7-9	Mild limitations
10-12	Minimal limitations

Example Cut Point:

Low physical performance	**≤ 8 points**

*** Select the most appropriate cut point for the population you are working with**

Key references:

Cruz-Jentoft AJ, Bauer, J, Bahat, G, et al., Writing Group for the European Working Group on Sarcopenia in Older People 2 (EWGSOP2), and the Extended Group for EWGSOP2, Sarcopenia: revised European consensus on definition and diagnosis, Age and Ageing. 2018, 48:16–31, https://doi.org/10.1093/ageing/afz046

Guralnik JM, Ferrucci L, Simonsick EM, Salive ME, Wallace RB. Lower-extremity function in persons over the age of 70 years as a predictor of subsequent disability. N Engl J Med. 1995 2;332(9):556-61. doi: 10.1056/NEJM199503023320902.

Pavasini R., Guralnik J., Brown J.C., di Bari M., Cesari M., Landi F., Vaes B., Legrand D., Verghese J., Wang C., et al. Short physical performance battery and all-cause mortality: Systematic review and meta-analysis. BMC Med. 2016;14:215. doi: 10.1186/s12916-016-0763-7

Short physical performance battery (SPPB) guide [Internet]. sppbguide.com.

Timed Up & Go

The timed up and go is used to assess mobility, balance, walking ability and fall risk in adults 65 years and over.

TUG Instructional Videos
The Timed Up and Go (TUG) Test (youtube.com) **www.youtube.com/watch?v=tnay64mab78**
The timed up and go test - YouTube **www.youtube.com/watch?v=lakvr517vos**

TUG How to Guide

Materials required:

- **Measure and mark a 3-metre walkway either with tape or traffic cone**
- **Standard height chair (seat height 44-47cm, arm height 67cm) at the beginning of the walkway**
- **Stopwatch**
- **Pen and paper to record activity**

Procedure:

- **Regular footwear and usual assistive walking aids should be used if normally used.**
- **To begin the test, the patient should sit on the chair, feet flat on the floor, one foot slightly in front of the other and hands on the arm of the chair.**
- **When the patient is ready, say "Go".**
- **The patient should stand up, walk to a line (or traffic cone) that is 3 meters away, turn around at the line, walk back to the chair, and sit down.**
- **The participant should be instructed to use a comfortable and safe walking speed.**

Instruction to participant:

"When you are ready, stand up, walk to the line on the floor at your normal pace, turn around, walk back and sit down."

How to measure:

- **A stopwatch should be used to time the test (in seconds).**
- **The stopwatch should start when you say go, and should be stopped when the patient's buttocks touch the seat.**

Example Cut Points:

low physical performance	**≥ 20 seconds**

*** Select the most appropriate cut point for the population you are working with**

Frequently asked questions:

Q: Should a practice run be completed first?
A: Yes, the patient should be able to do one practice that is not timed.

Q: Can walking assistive devices be used?
A: Yes, if an assistive device is required for walking, the device should be nearby, but the upper extremities should be on the chair arms and not on the assistive device.

Q: Should the patient be instructed to walk as fast as they can?
A: No, it should be a normal comfortable and safe walking speed.

Key references:

Ishii S, Tanaka T, Shibasaki K et al. Development of a simple screening test for sarcopenia in older adults. Geriatr Gerontol Int. 2014;14(Suppl 1): 93–101.

Bahat G, Tufan A, Tufan F, Kilic C, Akpinar TS, Kose M, Erten N, Karan MA, Cruz-Jentoft AJ. Cut-off points to identify sarcopenia according to European Working Group on Sarcopenia in Older People (EWGSOP) definition. Clin Nutr. 2016;35(6):1557-1563. doi: 10.1016/j.clnu.2016.02.002.

Podsiadlo, D. and Richardson, S. "The timed "Up & Go": a test of basic functional mobility for frail elderly persons." J Am Geriatr Soc. 1991;39(2): 142-148.

Martinez BP, Gomes IB, Oliveira CS, Ramos IR, Rocha MD, Forgiarini Júnior LA, Camelier FW, Camelier AA. Accuracy of the Timed Up and Go test for predicting sarcopenia in elderly hospitalized patients. Clinics (Sao Paulo). 2015;70(5):369-72. doi: 10.6061/clinics/2015(05)11.

Gait Speed Test (4m walk test)

The gait speed test, also known as the 4m walk test, assesses an individual's functional mobility.

Gait Speed Instructional Video
NIH Toolbox 4 Meter Walk Gait Speed Test (youtube.com) **www.youtube.com/watch?v=iz3aqytxnb8**

Gait Speed Test How to Guide

Materials required:

- 2 traffic cones, placed 4m apart
- Measuring tape
- Tape to mark start line
- Stopwatch

Procedure:

- 4 meters is measured over a level surface, with 2 meters for acceleration and 2 meters for deceleration.
- Patient starts from standing wearing outdoor shoes.
- They should walk at their comfortable speed over the entire distance.

Instruction to participant:

"This activity involves walking from one place to another. I want you to walk to the other end of the course at your usual speed, as if you were walking down the street to go to the shops. 3,2,1 Go".

How to measure:

- The patient should be timed once the first foot passes the start line; the time is stopped once the first foot crosses the finish line.
- Two trials are given, with the average comfortable speed calculated.
- Gait speed is measured by the distance/time to walk that distance (e.g., 4m/__sec)

Cut Points/Scoring:

Low gait speed	**<0.8m / second**

*** Select the most appropriate cut point for the population you are working with**

Frequently asked questions:

Q: What is a comfortable walking speed?
A: The participants normal or natural walking speed.

Key references:

Cruz-Jentoft AJ, Bahat G, Bauer J, et al. Writing Group for the European Working Group on Sarcopenia in Older People 2 (EWGSOP2), and the Extended Group for EWGSOP2. Sarcopenia: revised European consensus on definition and diagnosis. Age Ageing. 2019;48(1):16-31. doi: 10.1093/ageing/afy169. Erratum in: Age Ageing. 2019 Jul 1;48(4):601.

Montero-Odasso, M., Schapira, M., Soriano, E. R., Varela, M., Kaplan, R., Camera, L. A., Mayorga, L. M. Gait velocity as a single predictor of adverse events in healthy seniors aged 75 years and older. Journal of Gerontology: Biological Sciences. 2005;60:1304-1309.

Bohannon, R. W. Population representative gait speed and its determinants. Journal of Geriatric Physical Therapy. 2008;31:49-52.

400m Walk Test

The 400m walk test can be used to classify the severity of sarcopenia in the context of physical function and mobility.

400m Walk Test Instructional Video

[400m walk test instructional video (youtube.com)]

https://youtube.com/watch?v=hvg9K-Pk80Y

400m Walk Test How to Guide

Materials required:

- **2 traffic cones, placed 18.5m apart**
- **Tape to mark start line**
- **Stopwatch**
- **Tape measure**
- **(Optional) A chair may be placed at the starting/finishing area as patient may wish to rest after the test**

Procedure:

- **Set-up test environment: set-up 2 cones in a straight line, 18.5m apart (assuming a 1.5m turning circle making it a 40m circuit up and back).**
- **Position patient: Patients begin the test at the start line from a standing position. They should walk down the corridor, turn around the cone in a continuous loop, passing the course twice in each lap.**
- **Explain the test, including safety instructions (included below).**
- **Collect pre and post-test outcomes measures (heart rate and BORG dyspnoea scale at a minimum).**

Instruction to participant:

Prior to the test

> **"This is not a fitness test. Please walk at a speed as if you were taking a stroll in the park, knowing that you have a longer distance to cover. This circuit, around both cones is 40 meters, we would like you to repeat the course 10 times to complete a 400m distance walk at a steady pace, without overexertion.**
>
> **I will stand at the side of the circuit. When I say go, start walking at a comfortable pace you can maintain.**
>
> **You are permitted to stop, and to have a standing rest for up to 60 seconds at a time as necessary, but please resume walking as soon as you are able. If you experience new or increasing chest pain, feel light-headed, a bit confused, unbalanced, become very short of breath or have very sore or very tired legs please stop walking and let me know right away.**
>
> **I will now measure your heart rate. I will also ask you to rate the difficulty of your breathing. It starts at number 0 where your breathing is causing no difficulty at all and progressed through to number 10 where your breathing difficulty is maximal. (Collect Outcomes).**
>
> **Are you ready to start? When I say 1, 2, 3, GO begin walking. 1, 2, 3, GO (start timer)."**

During Test

> **"After each lap, the clinician should announce the number of laps completed and the number remaining. For example, you are doing well, you have completed 4 laps and have 6 to go."**

How to measure:

- **Record total time and individual lap time.**
- **If applicable the number, timing, and reasons for rest stops (fatigue, chest pain, feeling faint or dizzy, shortness of breath, or other) should be recorded.**
- **In the case of noncompletion, gait speed should be obtained from the distance and time walked until drop-out.**

Cut Points/Scoring:

low physical performance	**≥ 6 minutes or non-completion**

*** Select the most appropriate cut point for the population you are working with**

- **If test completion takes greater than 15 minutes, stop the test at 15 minutes and record as non-completion.**
- **A 400MWT of greater than 6 minutes is equivalent to a walking speed of 1.1 meters per second or slower and indicates low physical performance. A non-completion also indicates low physical performance.**

Frequently asked questions:

Q: Should the patient use their assistive walking device?
A: Whilst the authors of this tip sheet were unaware of any definitive advice regarding the use of walking aids we would recommend that patients use their normal walking device during test completion to ensure patient safety throughout.

Key references:

Newman AB, et al. Association of long-distance corridor walk performance with mortality, cardiovascular disease, mobility limitation, and disability. JAMA 2006; 295: 2018–26.

Rolland YM, Cesari M, Miller ME, Penninx BW, Atkinson HH, Pahor M. Reliability of the 400-m usual-pace walk test as an assessment of mobility limitation in older adults. J Am Geriatr Soc. 2004 Jun;52(6):972-6.

Lindemann U, Krumpoch S, Becker C, Sieber CC, Freiberger E. The course of gait speed during a 400m walk test of mobility limitations in community-dwelling older adults. Z Gerontol Geriatr. 2021 Dec;54(8):768-774.

Exemplars of evidence-based care in practice

The following case studies have been developed as exemplars of evidence-based care in practice. It is hoped they will help to support the implementation of the position statement recommendations into practice.

Assessment of skeletal muscle mass via CT

The nutritional biomarker in the oesophagogastric cancer care pathway	
WHAT did the initiative involve?	**Using Computed Tomography (CT) body composition assessment to measure skeletal muscle mass as part of malnutrition diagnosis for patients undergoing surgical resection of oesophageal and gastric cancer.** **This formed the basis for a nutrition care pathway that focused on the assessment and monitoring of nutrition status throughout treatment. Body composition assessment using CT occurred at diagnosis and restaging, with monitoring using calf circumference and hand grip strength, during chemoradiation and after surgery.**
WHO was involved in the initiative?	**Dietitian (project lead), surgeon (clinical lead) and nursing involvement in project planning and implementation.**
WHERE did the initiative occur?	**Alfred Health** **Outpatient setting – oesophagogastric surgery clinic, including MDM.**
WHO was the target of the initiative?	**Adult patients (≥18 years) diagnosed with oesophagogastric cancer undertaking a curative multimodal treatment pathway with surgical resection.**
WHEN was the initiative undertaken?	**At diagnosis and throughout treatment.**
HOW was the initiative undertaken?	**This project was funded by the South Melbourne Integrated Cancer Service Funding Program Quality Improvement Project grant. This included 0.4 full-time equivalent for a dietitian to lead the project.**
OUTCOMES	**The NuBio care pathway was developed. 90% of patients had a nutrition assessment, including muscle measurement (via CT body composition analysis) before multidisciplinary meeting. During the pilot phase (n=8) less weight loss and muscle loss occurred and less patients were diagnosed with malnutrition than usual care.** **The pathway has now been implemented into clinical practice.**
REFERENCE	**Final report available at:** **https://www.vics.org.au/_files/ugd/5b0453_be4d939ca1904d21bf17897df8daf446.pdf**

Nutrition care pathway for upper gastrointestinal cancer surgery

Implementation of a perioperative nutrition care pathway in upper gastrointestinal cancer surgery	
WHAT did the initiative involve?	**The aims of this study were to:** **1. Determine whether implementation of a standardised perioperative nutrition pathway for patients undergoing upper gastrointestinal (GI) cancer surgery improves access to dietetics care.** **2. To evaluate study feasibility, fidelity, resource requirements and effect on clinical outcomes.** **The pathway included guidelines for the timing, frequency and type of dietetics intervention patients should receive based on PG-SGA score for the following stages: diagnosis/planning, neoadjuvant therapy (if applicable), pre-surgery and surgery.**
WHO was involved in the initiative?	**Nutrition, surgical and oncology clinicians.**
WHERE did the initiative occur?	**Outpatient setting (surgical) at four major metropolitan hospitals in Melbourne.**
WHO was the target of the initiative?	**Adult patients (≥18 years) with newly diagnosed Upper GI cancer planned for curative intent surgery.**
WHEN was the initiative undertaken?	**September 2018 - August 2019**
HOW was the initiative undertaken?	**Prospective pilot study (n = 35), with historical controls (n = 35) as standard care.**
OUTCOMES	**Implementation of this standardised nutrition pathway resulted in improved access to dietetics care. The percentage of participants receiving preoperative dietetic intervention increased from 55% to 100% ($p < 0.001$). Mean ± SD dietetics contacts increased from 2.2 ± 3.7 to 5.9 ± 3.9 ($p < 0.001$). Non-statistically significant decreases in preoperative nutrition-related hospital admissions and surgical complications were demonstrated in patients who underwent neoadjuvant therapy. Recruitment feasibility and high fidelity to the intervention suggest that a larger study would be viable.**
REFERENCE	**Deftereos I, Hitch D, Butzkueven S, Carter V, Arslan J, Fetterplace K, Fox K, Ottaway A, Pierce K, Steer B, Varghese J, Kiss N, Yeung J. Implementation of a standardised perioperative nutrition care pathway in upper gastrointestinal cancer surgery: A multisite pilot study. J Hum Nutr Diet. 2023 Apr;36(2):479-492**

How to train clinicians in new assessment measures

PG-SGA training and skills maintenance program	
WHAT did the initiative involve?	**Development of a PG-SGA training and skills maintenance program:** • **Individual level – Development of an online training module and instructional video to instruct and train clinicians in completing the PG-SGA and increase knowledge and confidence about its use in clinical practice.** • **Team/service level – Planning and establishing a mandatory training/ competency program and monitoring of staff compliance to the program over time. This includes a frequent (approximately 6-monthly) skills maintenance session with a group of dietitians in order maintain competency in completing the PG-SGA, informal inter-rater reliability testing via peer observation and discussion of practical patient case studies in the context of the PG-SGA.**
WHO was involved in the initiative?	**Dietitians from Peter MacCallum Cancer Centre.**
WHERE did the initiative occur?	**Inpatient and outpatient setting, Peter MacCallum Cancer Centre.**
WHO was the target of the initiative?	**Dietitians working in cancer care.**
WHEN was the initiative undertaken?	**Ongoing.**
HOW was the initiative undertaken?	**Local quality improvement and education project.**
OUTCOMES	**Individual level – The training modules include information regarding who can do it, when to do it (frequency), settings that are appropriate, and instructions on how to complete the PG-SGA worksheets and physical exam. This has led to improved knowledge and confidence in using the PG-SGA in clinical practice.** **Team/service level – Development of a guideline that covers the details of the PG-SGA training and skills maintenance program, including timeframes and frequency for completion of the online learning package and peer review sessions.**

Advocating for a business case to establish a new clinical service

Developing a business case to establish a new nutrition service in chemotherapy outpatients	
WHAT did the initiative involve?	**Key components of business case included:** • **Gap in service – overview of current Alfred Health outpatient oncology service with analysis of attendance and growth rates; completion of benchmarking with other health services; data on rates of malnutrition using results from malnutrition point prevalence study.** • **Evidence base – outline of current evidence-based guidelines highlighting the importance of nutrition intervention throughout the whole trajectory of a patient's cancer journey (including pre/during/post treatment). This included: Optimal cancer care pathways (OCPs), ESPEN guideline on nutrition in cancer patients, and The National Institute of Clinical Excellence guidelines for haematological cancers.** • **Consequences and risk involved if no change is made - increased mortality/infections/serious complications, reduced muscle mass and poor physical function, increased length of hospital stay and admissions, increased healthcare costs, increased treatment-related toxicity, reduced response to treatment and increased relapse rates.** • **Predicted benefits of new service - reduced incidence of malnutrition/sarcopenia/cancer cachexia; improved recovery from the side-effects of chemotherapy; enhanced recovery post cancer surgery; reduced length of stay and prevention of readmissions due to nutrition failure; improved clinical outcomes, mortality and morbidity; improved patient satisfaction and quality of life.** • **Proposal – outline of proposed changes including what the new allocated nutrition service would include, expected outcomes and recommended actions.** • **Financials – breakdown of staffing full-time equivalent (FTE) and other financial requirements.**
WHO was involved in the initiative?	**Dietitian led initiative.**
WHERE did the initiative occur?	**Outpatient Haematology and Oncology Centre, Alfred Health, Melbourne.**
WHO was the target of the initiative?	**Adult patients (≥18 years) with cancer attending the haematology and oncology outpatient centre.**
WHEN was the initiative undertaken?	**April 2019**
HOW was the initiative undertaken?	**Business case presented to Alfred Cancer executives to advocate and request future funding to establish a new clinical service.**

OUTCOMES	**0.6FTE (Grade 3) requested, 0.3FTE (Grade 3) received.** **Next steps:** • **Design and implement a model of care based on international best practice guidelines and optimal care pathways to provide a collaborative and effective nutrition service for oncology outpatients.** • **Collect ongoing data to advocate for additional FTE.**

Prehabilitation program for patients undergoing gastrointestinal cancer surgery

A four-pillar multimodal prehabilitation program in colorectal cancer	
WHAT did the initiative involve?	**This prospective observational cohort study aimed to test the feasibility, safety, and effectiveness of a multimodal prehabilitation program.** **Patients were assigned to either the prehabilitation program or to a control group. The 4-week multimodal prehabilitation program consisted of:** **Exercise intervention:** • **High-intensity endurance (interval) training, complemented with upper and lower body resistance training 3 times per week.** • **Participants were encouraged to walk or cycle for 60 minutes on the days between the supervised training sessions.** **Nutrition intervention:** • **Tailored dietary advice aiming at a total protein intake of 1.5–1.8 g/kg per day, including twice daily protein supplements.** • **Daily Vitamin D and multivitamins (50% of recommended dietary allowance).** **Psychological support:** • **Assessment by a trained psychologist to address anxiety, provide coping strategies, teach relaxation techniques, and discuss postoperative expectations.** • **Weekly phone call from specialist nurse to reinforce coping mechanisms and address psychological complaints.** **Smoking cessation:** • **Intensive counselling in combination with nicotine replacement therapy was offered to all smokers.** **Clinical assessment measures were completed by physiotherapist (6M walk test, stair climb test, sit-to-stand test), dietitian (patient-generated subjective global assessment, handgrip strength) and psychologist (health-related quality of life, generalised anxiety disorder assessment, patient health questionnaire).**
WHO was involved in the initiative?	**Surgeons, nurse specialists, dietitians, physiotherapists and psychologists.**

WHERE did the initiative occur?	**Outpatient setting** **Máxima Medical Center, Veldhoven, the Netherlands.**
WHO was the target of the initiative?	**Adult patients (≥18 years) scheduled for elective resection for colorectal cancer without neoadjuvant treatment.**
WHEN was the initiative undertaken?	**Patients were approached to participate when diagnosis was final and surgery was scheduled. The prehabilitation program ran for 4 weeks prior to surgery.**
HOW was the initiative undertaken?	**This pilot RCT was conducted over 1 year.**
OUTCOMES	• **n=50 (prehabilitation 20, control 30).** • **The program had a high (90%) attendance rate and high level of patient satisfaction.** • **No adverse events occurred.** • **Endurance and/or strength were improved.** • **Eighty-six percent of patients with prehabilitation recovered to their baseline functional capacity 4 weeks postoperatively, compared to 40% in the control group (P < 0.01).** **Multimodal prehabilitation including high-intensity training for colorectal cancer patients was deemed feasible, safe, and effective.**
REFERENCE	**van Rooijen SJ, Molenaar CJL, Schep G, et al. Making Patients Fit for Surgery: Introducing a Four Pillar Multimodal Prehabilitation Program in Colorectal Cancer. Am J Phys Med Rehabil. 2019;98(10):888-896.**

Patient case studies

Oral Therapy

Oral Therapy Case Study	
SITUATION	**64F "Jane Smith" presented with severe back pain found to have thoracic bone lesion consistent with metastatic disease.** • **Investigations:** - **Biopsy confirms ER+/PR+/HER2 negative disease consistent with breast cancer** - **MRI: thoracic partial cord compression** - **Staging scans: bone only disease (other spinal lesions but nil at risk of compromise) and breast primary** • **Treatment** - **Surgical decompression completed and discharged to home as was able to undertake self-care** - **Completed radiotherapy as an outpatient** - **First line metastatic breast cancer therapy started as outpatient** - **Letrozole tablet daily** - **Ribociclib (tablet 21 days of 28-day cycle)** - **Denosumab 120mg monthly injection delivered by GP** • **Improvements:** - **Staging improving, cancer markers improving** • **Side effects:** - **Joint aches, reduced mobility, reduced strength, muscle wasting, weight gain**
WHAT care was provided? **(Action)**	• **Sarcopenia screening** - **SARC-F = 5 (at risk of sarcopenia)** • **Nutrition assessment and intervention** - **Recent weight gain related to hospitalisation, reduced mobility and capacity to exercise** - **PG-SGA 3 well-nourished (A)** - **Muscle mass assessed. ALM/height (m)2= 5 kg/m2** - **Educated on high protein diet to improve muscle mass** • **Physical assessment and intervention** - **Muscle strength assessed. Hand grip strength = 14 kg** - **Muscle function assessed. Short physical performance battery = 5 pts** - **Individualised exercise prescription to improve muscle mass, strength and function.** - **Sarcopenia diagnosed using EWGSOP 2 diagnostic criteria.** • **Multidisciplinary Care** - **Referral to occupational therapy for fatigue management.**

WHO delivered the care? **(Actor)**	• **Screening for sarcopenia – *Nurse specialist*** • **Nutrition assessment and intervention +/- sarc diagnosis – *Dietitian*** • **Physical assessment and intervention +/- sarc diagnosis – *Exercise physiologist***
WHERE was care delivered? **(Context)**	**Outpatient setting** **Private Cancer Centre**
WHO received care? **(Target)**	**Adult outpatient (≥18 years) undergoing oral therapy**
WHEN was care provided? **(Time)**	• **Medical Oncology - *reviewed every 3 months in conjunction with scans*** • **Nutrition and exercise physiology – *fortnightly review over the course of 12 weeks***
OUTCOMES	• **Weight gain stabilised** • **Muscle mass improved** • **Functional capacity increased** • **Participating in regular exercise 2-3 times per week**

Rural Patient

Rural Case Study	
SITUATION	**45M "Bob Smith" with oropharyngeal cancer living in rural NSW (8 hours from Sydney) requiring induction chemotherapy followed by 7 weeks of chemo-radiotherapy.**

WHAT care was provided? **(Action)**	• **Initial malnutrition screening**
	  - **7-month history of dysphagia and 15% weight loss in 3-6 months.**
	  - **MST = 4.**
	  - **Referral to dietitian.**
	  - **Bob also met criteria for automatic dietitian referral due to nature of treatment and expected nutrition impact symptoms.**
	• **Initial nutrition assessment**
	  - **Conducted face-to-face at Head & Neck multidisciplinary clinic.**
	  - **Weight loss due to dysphagia secondary to tumour location limiting patient to a liquid diet.**
	  - **PG-SGA 15 severely malnourished (C)**
	  - **Recommended prophylactic PEG insertion.**
	• **Repeat malnutrition screening**
	  - **Bob was admitted to hospital for induction chemotherapy where weekly weight and MST were performed by nursing staff.**
	• **Nutrition reviews**
	  - **Regular reviews by inpatient dietitian during induction chemotherapy.**
	  - **Weekly outpatient dietitian reviews including weight checks, nutrition assessment, nutrition education and oral/enteral supplement use during chemo-radiotherapy.**
	  - **Fortnightly dietitian telehealth reviews post treatment (patient returned home to rural NSW) to monitor weight (used home scales) and assist with progression of oral diet and weaning of enteral nutrition.**
	  - **Bob attended for follow up 4 weeks and 3 months post treatment.**
	• **Repeat nutrition assessment**
	  - **PG-SGA was repeated at 4 weeks (PG-SGA 12 B) and 3 months post treatment (PG-SGA 7 A).**
	• **Interventions**
	  - **Bob educated on High Protein High Energy diet and commenced on oral nutrition supplements prior to treatment.**
	  - **Suggested Bob purchase home scales to monitor weight.**
	  - **Enteral nutrition commenced via PEG during week 6 of chemo-radiotherapy due to worsening nutrition impact symptoms (dysphagia, odynophagia, dysgeusia).**
	  - **Bob recommenced oral diet 4 weeks post treatment. Over a period of 2 months he progressed from liquid diet to minced/moist diet and continues on a soft diet due to ongoing xerostomia.**

	- **Enteral nutrition was weaned as oral intake increased, with fortnightly dietitian phone review. PEG removed at 4 months post treatment.** • **Multidisciplinary Care** - **Speech pathology involved early to manage dysphagia.**
WHO delivered the care? **(Actor)**	• **Malnutrition screening – *Head & Neck Cancer Care Coordinator and inpatient nursing staff*** • **Nutrition assessment and review – *Head & Neck dietitian*** • **Symptom management – *medical staff, dietitian, speech pathologist***
WHERE was care delivered? **(Context)**	**Inpatient and outpatient setting** **Specialist Oncology Service in NSW**
WHO received care? **(Target)**	**Adult patient (≥18 years) undergoing treatment for oropharyngeal cancer**
WHEN was care provided? **(Time)**	• **Initial screening – *at treatment planning*** • **Initial dietitian assessment – *2 months prior to treatment*** • **Rescreening – *weekly during inpatient admission and at commencement of chemo-radiation*** • **Nutrition review - *during inpatient admission, weekly during chemo-radiation and at regular intervals until 3 months post treatment***
OUTCOMES	**The patient was identified early via malnutrition screening and referred to the dietitian in a timely manner. Early nutrition intervention prevented further weight loss and improved nutrition status prior to commencing treatment.** **The early intervention of purchasing home scales improved the accuracy of telehealth reviews and assisted the dietitian to provide accurate nutrition advice and improving Bob's nutrition status.**

Treatment

Position statement recommendations

All people with cancer-related malnutrition and sarcopenia should have access to the core components of treatment including individualised medical nutrition therapy, targeted exercise prescription and physical activity advice, and physical and psychological symptom management.

Treatment for cancer-related malnutrition and sarcopenia should be individualised, in collaboration with the multidisciplinary team, and tailored to consider multi-morbidities and meet needs at each stage of cancer treatment.

Multidisciplinary teams should work towards an individualised and coordinated approach to treating cancer-related malnutrition and sarcopenia.

The treatment chapter of this toolkit will be completed in stage 2 of this project.

Transition of care

Recommendations

Communicate with relevant health professionals to provide handover at transitions of care.

The transition of care chapter of this toolkit will be completed in stage 2 of this project.

Tools and tips for implementation

Implementation of the position statement recommendations

The tools and tips included within this section have been developed to support the implementation of the position statement recommendations at a health service/organisation level.

The authors of this toolkit suggest a 5-step process to begin implementation of the position statement recommendations:

1. Complete a baseline **audit** of your organisations' adherence to the position statement recommendations.

2. Select the example **AACTT framework/s** relevant to your clinical context and tailor timeframes to suit local policy and resources. Use of other evidence-based implementation theories, models and frameworks are encouraged to aid your implementation strategy, planning and execution (see details within this section).

3. Tailor the **generic pathway** to your local context using the AACTT frameworks as a guide (you may decide to create a different version of the pathway for each clinical context in your organisation).

4. Utilise the **example clinical indicators** to develop local key performance indicators to monitor adherence to your tailored pathway.

5. Use the **checklist to identify and address barriers to screening and assessment** to support the implementation process within your organisation.

Audit Tool

Comparison of clinical practices compared to the COSA cancer-related malnutrition and sarcopenia position statement.

Under the 'recommendation clarified' column the inpatient setting has been used as an example. The Actor, Context, and Target can be tailored to each clinical setting (i.e. day therapy unit / radiotherapy outpatients) at your organisation using the example AACTT frameworks included in the toolkit. Time should be determined with consideration given to best practice and local resourcing.

This audit tool is available as a downloadable Excel document on the COSA website.

	Recommendation	Recommendation Clarified (using the AACTT framework)	Baseline Practice
SCREENING	**All people with cancer should be screened for malnutrition in all health settings at diagnosis and repeated as the clinical situation changes, using a screening tool that is valid and reliable in the setting in which it is intended.**	**Action:** screening with a valid, reliable tool for cancer patients to identify patients 'at risk' of malnutrition **Actor:** screening can be conducted by nursing staff, allied health assistants or other relevant support staff **Context:** on the ward **Target:** patients with cancer **Time:** on admission to hospital (within 24hrs), repeated for those not considered 'at risk' at regular intervals (approx. 1 week)	☐ **met = ≥80% of the time** ☐ **partially met = ≥50-79% of the time** ☐ **not met = <50% of the time**
	All people with cancer should be screened for sarcopenia at diagnosis and repeated as the clinical situation changes, using the validated screening tool SARC-F or SARC-F in combination with calf circumference.	**Action:** screening with a valid, reliable tool for cancer patients to identify patients 'at risk' of sarcopenia **Actor:** screening can be conducted by nursing staff, allied health assistants or other relevant support staff **Context:** on the ward **Target:** patients with cancer admitted to ward X **Time:** on admission to hospital (within 24hrs), repeated for those not considered 'at risk' at regular intervals (approx. 1 week)	☐ **met = ≥80% of the time** ☐ **partially met = ≥50-79% of the time** ☐ **not met = <50% of the time**

ASSESSMENT	**All people with cancer identified as being 'at risk' of malnutrition following appropriate screening or with a cancer diagnosis or treatment plan known to lead to high risk of malnutrition should have comprehensive nutrition assessment using a tool validated in the oncology population.**	**Action:** all patients considered 'at risk' on screening or with a cancer diagnosis or treatment plan known to lead to high risk should be referred to a dietitian for a comprehensive nutrition assessment using a tool validated in the oncology population. **Actor:** the staff member who conducts screening should refer to a dietitian. The dietitian should conduct relevant assessments (some may be delegated to the nutrition assistant) **Context:** on the ward or in some cases, the gym or in outpatients/telehealth following discharge where appropriate **Target:** patients with cancer admitted to ward X and screened as 'at risk' **Time:** following referral from the staff member who conducts screening (approx. within 48hrs from referral to assessment) and/or in outpatients following discharge where appropriate	☐ **met = ≥80% of the time** ☐ **partially met = ≥50-79% of the time** ☐ **not met = <50% of the time**
	All people with cancer identified as being 'at risk' of sarcopenia following appropriate screening should have a comprehensive evaluation of muscle status using a combination of assessments for muscle mass, muscle strength and function.	**Action:** all patients considered 'at risk' on screening should be referred to a dietitian and physiotherapist/exercise physiologist for a comprehensive assessment including evaluation of muscle status (mass, strength, function) using validated outcome measures **Actor:** the staff member who conducts screening should refer to a dietitian and physiotherapist/exercise physiologist. The dietitian and physiotherapist/exercise physiologist should conduct relevant assessments (some may be delegated to an allied health assistant) **Context:** on the ward or in some cases, the physio gym or in outpatients/telehealth following discharge where appropriate **Target:** patients with cancer admitted to ward X and screened as 'at risk' **Time:** following referral from the staff member who conducts screening (approx. within 48hrs from referral to assessment) and/or in outpatients following discharge where appropriate	☐ **met = ≥80% of the time** ☐ **partially met = ≥50-79% of the time** ☐ **not met = <50% of the time**

	Interpretation of diagnostic criteria for sarcopenia should be applied recognising that: threshold values for assessing muscle mass, muscle strength and physical performance are variable; care should be taken to determine the appropriate cut-off values in the population in which they are being applied; most data regarding muscle strength and performance comes from older populations; the applicability of diagnostic criteria in different ethnicities is uncertain.	**Action:** apply appropriate threshold values based on measures chosen **Actor:** The dietitian and physiotherapist/exercise physiologist should conduct relevant assessments (some may be delegated to the nutrition assistant) **Context:** on the ward or in some cases the physio gym **Target:** patients with cancer admitted to ward X and screened as 'at risk' **Time:** on assessment by dietitian and physiotherapist/exercise physiologist (or alternatively by nutrition assistant) during admission	☐ **met = ≥80% of the time** ☐ **partially met = ≥50-79% of the time** ☐ **not met = <50% of the time**
TREATMENT	**All people with cancer-related malnutrition and sarcopenia should have access to the core components of treatment including medical nutrition therapy, targeted exercise prescription and physical activity advice, and physical and psychological symptom management.**	**Action:** all patients requiring medical nutrition therapy, targeted exercise prescription or physical and psychological symptom management receive a referral to the appropriate allied health, medical, nursing or other multidisciplinary team member **Actor:** the staff member who conducts screening, the dietitian, physiotherapy/exercise physiologist or other multidisciplinary team member involved in the patients care **Context:** ward X **Target:** patients with cancer admitted to ward X and screened as 'at risk' **Time:** anytime during admission or following discharge if appropriate	☐ **met = ≥80% of the time** ☐ **partially met = ≥50-79% of the time** ☐ **not met = <50% of the time**
	Treatment for cancer-related malnutrition and sarcopenia should be individualised, in collaboration with the multidisciplinary team (MDT), and tailored to meet the needs at each stage of cancer treatment.	**Action:** all patients requiring nutrition therapy and exercise advice will receive a referral to the dietitian/physiotherapist/ exercise physiologist (or other appropriate allied health, medical, nursing or other multidisciplinary team member); patients to receive individually tailored treatment based on assessments and goals developed collaboratively with the patient **Actor:** dietitian/physiotherapist/exercise physiologist (or other multidisciplinary team member) involved in the patients care	☐ **met = ≥80% of the time** ☐ **partially met = ≥50-79% of the time** ☐ **not met = <50% of the time**

		Context: ward X **Target:** patients with cancer admitted to ward X and screened as 'at risk' **Time:** anytime during admission or following discharge if appropriate	
MULTIDISCIPLINARY CARE	**Health services should ensure a broad range of health care professionals across the MDT have the skills and confidence to recognise malnutrition and sarcopenia to facilitate timely referrals and treatment.**	**Action:** dietitian/physiotherapist/exercise physiologist (or other appropriate allied health, medical, nursing or other multidisciplinary team member) have appropriate training/skills/confidence (i.e. pass competency/confidence test) **Actor:** nutrition assistant, dietitian/physiotherapist/exercise physiologist (or other multidisciplinary team member) involved in the patients care **Context:** ward X **Target:** patients with cancer admitted to ward X **Time:** anytime during admission or following discharge if appropriate	☐ **met = ≥80% of the time** ☐ **partially met = ≥50-79% of the time** ☐ **not met = <50% of the time**
	MDTs should work towards an individualised and coordinated approach to treating cancer-related malnutrition and sarcopenia.	**Action:** utilise an appropriate framework/pathway to specify components of care to enable individualised and coordinated care to patients **Actor:** the multidisciplinary team **Context:** ward X **Target:** patients with cancer admitted to ward X **Time:** anytime during admission or following discharge if appropriate	☐ **met = ≥80% of the time** ☐ **partially met = ≥50-79% of the time** ☐ **not met = <50% of the time**

AACTT Frameworks

The Action, Actor, Context, Target, Time (AACTT) framework[1] is a behaviour specification framework. It has been used to specify the behaviour of individuals relating to screening, assessment and treatment of malnutrition and sarcopenia in a number of clinical settings. These are examples only and recommended timeframes should be adapted to the target population and the local context in which they are being applied.

Inpatient or Ward Setting

	Action What care is provided?	**Actor** Who delivers care?	**Context** Where is the care?	**Target** Who receives care?	**Time** When is care provided?
SCREENING	Conduct malnutrition screening (and rescreening) i.e. MST, MUST	Nurse, allied health assistant, other health professional	Inpatient ward	Patients with cancer admitted to the ward	Within 24 hours of admission for initial screen* (day 6-8 for rescreen)
	Conduct sarcopenia screening (and rescreening) i.e. SARC-F, SARC-F in combination with calf circumference	Nurse, allied health assistant, other health professional	Inpatient ward	Patients with cancer admitted to the ward (and those screened as low risk for sarcopenia on admission and still an inpatient at day 7)	Within 24 hours of admission for initial screen* (day 6-8 for rescreen)
	Identify high risk patients for direct referral to dietitian	Dietitian, nurse, allied health assistant, other health professional	Inpatient ward	Patients with cancer admitted to the ward	Within 24 hours of admission*
	Refer patients at risk of malnutrition to dietitian	Nurse, allied health assistant, other health professional	Inpatient ward – referral via existing referral process/ system	Patients considered at risk of malnutrition after screening	Within 24 hours of admission*
	Refer patients at risk of sarcopenia to dietitian and exercise physiologist or physiotherapist	Nurse, allied health assistant, other health professional	Inpatient ward – referral via existing referral process/ system	Patients considered at risk of sarcopenia after screening	Within 24 hours of admission*
ASSESSMENT	Complete full individualised nutrition assessment	Dietitian	Inpatient ward – patients' room	Patients considered at risk of malnutrition after screening	As per local triage criteria
	Complete clinical assessment measures for nutrition assessment and diagnosis of malnutrition/ sarcopenia i.e. PG-SGA, BIA, calf circumference	Dietitian, allied health assistant	Inpatient ward – patients' room	Patients considered at risk of malnutrition after screening and undertaking assessment by dietitian	As per local triage criteria
	Complete full individualised sarcopenia assessment	Physiotherapist, exercise physiologist	Inpatient ward – patients' room, ward or gym	Patients considered at risk of sarcopenia after screening	As per local triage criteria
	Complete clinical assessment measures for evaluation of muscle mass, strength and function, and diagnosis of sarcopenia i.e. HGS, SPPB	Physiotherapist, exercise physiologist, allied health assistant	Inpatient ward – patients' room, ward or gym	Patients considered at risk of sarcopenia after screening and undertaking assessment by physiotherapist/ exercise physiologist	As per local triage criteria

TREATMENT	Prescribe individualised medical nutrition therapy	Dietitian (may be delegated to allied health assistant)	Inpatient ward – patients' room, ward or gym	Patients considered at risk of malnutrition after screening and/or diagnosed with malnutrition	As per local triage criteria and then as specified by dietitian
	Prescribe individualised exercise program	Physiotherapist, exercise physiologist (may be delegated to allied health assistant)	Inpatient ward – patients' room, ward or gym	Patients considered at risk of sarcopenia after screening and/or diagnosed with sarcopenia	As per local triage criteria and then as specified by physiotherapist or exercise physiologist
	Refer to other healthcare professionals where appropriate to optimise patient outcomes i.e. psychologist, speech pathologist, social worker, occupational therapist	Dietitian, physiotherapist, exercise physiologist	Inpatient ward – patients' room, ward or gym	Patients considered at risk of malnutrition/sarcopenia after screening and/or diagnosed with malnutrition/sarcopenia and under the care of a dietitian or physio	Within 1 day of identifying need*
DISCHARGE	Ensure malnutrition/ sarcopenia diagnosis documented in discharge summary	Dietitian, physiotherapist, exercise physiologist	Inpatient ward	Patients diagnosed with malnutrition/ sarcopenia	Prior to discharge
	Provide a copy of discharge summary to patient and patients' general practitioner	Dietitian, physiotherapist, exercise physiologist	Inpatient ward	Patients diagnosed with malnutrition/ sarcopenia	Prior to discharge
	Where indicated, deliver outpatient nutrition care and/or refer to external services to ensure transition of care	Dietitian	Clinic room, via telehealth and/or via external provider	Patients considered at risk of malnutrition after screening and/or diagnosed with malnutrition requiring ongoing intervention post discharge	Within 48 hours of discharge from hospital*
	Where indicated, deliver outpatient physiotherapy care and/or refer to external services to ensure transition of care	Physiotherapist, exercise physiologist	Clinic room, gym, via telehealth and/or via external provider	Patients considered at risk of sarcopenia after screening and/or diagnosed with sarcopenia requiring ongoing intervention post discharge	Within 48 hours of discharge from hospital*

* Timeframes may be dependent on local resources and should be aligned with local guidelines

Key: MST, Malnutrition Screening Tool; MUST, Malnutrition Universal Screening Tool; PG-SGA, Patient-Generated Subjective Global Assessment; BIA, Bioelectric Impedance Analysis; HGS, Handgrip Strength; SPPB, Short Physical Performance Battery

Day Therapy Unit Setting

	Action What care is provided?	**Actor** Who delivers care?	Context Where is the care?	**Target** Who receives care?	**Time** When is care provided?
SCREENING	Conduct malnutrition screening (and rescreening) i.e., MST, MUST	Nurse, allied health assistant, other health professional	Day therapy unit (F2F or via telehealth)	All new patients commencing treatment on the unit	C1D1 and at repeated intervals during treatment*
	Conduct sarcopenia screening (and rescreening) i.e., SARC-F, SARC-F in combination with calf circumference	Nurse, allied health assistant, other health professional	Day therapy unit (F2F or via telehealth)	All new patients commencing treatment on the unit	C1D1 and at repeated intervals during treatment*
	Identify high risk patients for direct referral to dietitian	Dietitian, nurse, allied health assistant, other health professional	Day therapy unit (F2F or via telehealth)	Patients with cancer admitted to the ward	C1D1
	Refer patients at risk of malnutrition to dietitian	Nurse, allied health assistant, other health professional	Day therapy unit - Referral via existing referral process/system	All new patients commencing treatment on the unit	C1D1 and at each cycle during treatment*
	Refer patients at risk of sarcopenia to dietitian and exercise physiologist or physiotherapist	Nurse, allied health assistant, other health professional	Day therapy unit - Referral via existing referral process/system	All new patients commencing treatment on the unit	C1D1 and at each cycle during treatment*
ASSESSMENT	Complete full individualised nutrition assessment	Dietitian	Day therapy unit (F2F or via telehealth)	Patients identified at risk of malnutrition after screening	Within 1 week of referral being placed*
	Complete clinical assessment measures for nutrition assessment and diagnosis of malnutrition i.e., PG-SGA, calf circumference	Dietitian	Day therapy unit (F2F[#])	Patients identified at risk of malnutrition after screening and undertaking assessment by dietitian	Baseline measures, within 1 week of referral*; repeated at regular intervals
	Complete full individualised sarcopenia assessment	Dietitian, physiotherapist, exercise physiologist	Day therapy unit (F2F or via telehealth)	Patients identified at risk of sarcopenia after screening	Within 1 week of referral being placed*
	Complete clinical assessment measures for sarcopenia assessment and diagnosis of sarcopenia i.e., HGS, SPPB	Dietitian, physiotherapist, exercise physiologist	Day therapy unit (F2F[#])	Patients identified at risk of sarcopenia after screening and undertaking assessment by dietitian, exercise physiologist or physiotherapist	Baseline measures, within 1 week of referral*; repeated at regular intervals

TREATMENT	Prescribe individualised medical nutrition therapy	Dietitian (may be delegated to allied health assistant)	Day therapy unit (F2F or via telehealth)	Patients identified at risk of malnutrition after screening and/or diagnosed with malnutrition	Within 1 week of referral*and then as clinically indicated
	Prescribe individualised exercise prescription	Physiotherapist, EP (may be delegated to allied health assistant)	Day therapy unit (F2F or via telehealth)	Patients identified at risk of sarcopenia after screening and/or diagnosed with sarcopenia	Within 1 week of referral* and then as clinically indicated
	Refer to other healthcare professionals where appropriate to optimise patient outcomes i.e., occupational therapist, psychologist, social worker, speech pathologist	Dietitian, physiotherapist, exercise physiologist	Day therapy unit (F2F or via telehealth)	Patients identified at risk of malnutrition/ sarcopenia after screening and/or diagnosed with malnutrition/sarcopenia and under the care of a dietitian and exercise physiologist or physiotherapist	Within 1 day of identifying need*
	Collaborate with the multidisciplinary team to provide individualised and tailored malnutrition and sarcopenia treatment	All health professionals involved with cancer-related malnutrition and/or sarcopenia treatment	Day therapy unit, MDT (F2F or via telehealth)	Patients identified at risk of malnutrition after screening and/or diagnosed with malnutrition requiring ongoing intervention	Follow up at each cycle or as clinically indicated*
DISCHARGE	Ensure malnutrition/sarcopenia diagnosis documented in discharge summary	Dietitian, physiotherapist, exercise physiologist	Day therapy unit	Patients diagnosed with malnutrition/ sarcopenia	Prior to discharge
	Provide a copy of discharge summary to patient and patients' general practitioner	Dietitian, physiotherapist, exercise physiologist	Day therapy unit	Patients diagnosed with malnutrition/ sarcopenia	Prior to discharge
	Refer to external services as indicated	Dietitian, physiotherapist, exercise physiologist	Via external provider	Patients diagnosed with malnutrition/ sarcopenia requiring ongoing intervention post discharge	Follow up as clinically indicated

* Timeframes may be dependent on local resources and should be aligned with local guidelines

Physical assessments should ideally be conducted F2F, however this may not be practical and appropriate mode should be decided according to local context/ resources/ type of assessment conducted

Key: MST, Malnutrition Screening Tool; MUST, Malnutrition Universal Screening Tool; F2F, Face to face; C1D1, Cycle 1 Day 1; PG-SGA, Patient-Generated Subjective Global Assessment; BIA, Bioelectric Impedance Analysis; HGS, Handgrip Strength; SPPB, Short Physical Performance Battery; MDT, Multidisciplinary Team

Radiotherapy Outpatient Setting

	Action What care is provided?	**Actor** Who delivers care?	**Context** Where is the care?	**Target** Who receives care?	**Time** When is care provided?
SCREENING	Conduct malnutrition screening (and rescreening) i.e., MST, MUST	Nurse, allied health assistant, other health professional	Radiotherapy outpatients	All new patients with cancer commencing treatment	Radiotherapy planning or week 1 of treatment* and at repeated intervals during treatment
	Conduct sarcopenia screening (and rescreening) i.e., SARC-F, SARC-CalF	Nurse, allied health assistant, other health professional	Radiotherapy outpatients	All new patients with cancer commencing treatment	Radiotherapy planning or week 1 of treatment* and at repeated intervals during treatment
	Identify high risk patients for direct referral to dietitian	Dietitian, allied health assistant, other health professional	Radiotherapy outpatients	All new patients with cancer commencing treatment on the unit	Radiotherapy planning or week 1 of treatment*
	Refer patients at risk of malnutrition to dietitian	Nurse, allied health assistant, other health professional	Radiotherapy outpatients - referral via existing referral process/system	Patients considered at risk of malnutrition after screening + all high-risk patients commencing treatment	Within 24 hours of screening*
	Refer patients at risk of sarcopenia to dietitian and exercise physiologist or physiotherapist	Nurse, allied health assistant, other health professional	Radiotherapy outpatients - referral via existing referral process/system	Patients considered at risk of sarcopenia after screening	Within 24 hours of screening*
ASSESSMENT	Complete full individualised nutrition assessment	Dietitian	Radiotherapy outpatients (F2F or via telehealth)	Patients identified at risk of malnutrition after screening	Within 1 week of referral being placed*
	Complete clinical assessment measures for nutrition assessment and diagnosis of malnutrition i.e., PG-SGA, calf circumference	Dietitian	Radiotherapy outpatients (F2F[#])	Patients identified at risk of malnutrition after screening and undertaking assessment by dietitian	Baseline measures, within 1 week of referral being placed*; repeated at regular intervals
	Complete full individualised sarcopenia assessment	Dietitian, physiotherapist, exercise physiologist	Radiotherapy outpatients (F2F or via telehealth)	Patients identified at risk of sarcopenia after screening	Within 1 week of referral being placed*
	Complete clinical assessment measures for sarcopenia assessment and diagnosis of sarcopenia i.e., HGS, SPPB	Dietitian, physiotherapist, exercise physiologist	Radiotherapy outpatients (F2F[#])	Patients identified at risk of sarcopenia after screening and undertaking assessment by dietitian and exercise physiologist or physiotherapist	Baseline measures, within 1 week of referral being placed*; repeated at regular intervals

TREATMENT	Prescribe individualised medical nutrition therapy	Dietitian (may be delegated to allied health assistant)	Radiotherapy outpatients (F2F or via telehealth)	Patients identified at risk of malnutrition after screening and/or diagnosed with malnutrition	Within 1 week of referral and then as clinically indicated*
	Prescribe individualised exercise program	Physiotherapist, exercise physiologist (may be delegated to allied health assistant)	Radiotherapy outpatients (F2F or via telehealth)	Patients identified at risk of sarcopenia after screening and/or diagnosed with sarcopenia	Within 1 week of referral and then as clinically indicated*
	Refer to other healthcare professionals where appropriate to optimise patient outcomes i.e., occupational therapist, psychologist, social worker, speech pathologist	Dietitian, physiotherapist, exercise physiologist	Radiotherapy outpatients (F2F or via telehealth)	Patients identified at risk of malnutrition/ sarcopenia after screening and/or diagnosed with malnutrition/sarcopenia and under the care of a dietitian and exercise physiologist or physiotherapist	Within 1 day of identifying need*
	Deliver ongoing outpatient nutrition care as indicated	Dietitian	Radiotherapy outpatients (F2F or via telehealth)	Patients identified at risk of malnutrition after screening and/or diagnosed with malnutrition requiring ongoing intervention	Follow up as clinically indicated High-risk patients*: - Weekly during treatment - 2 weekly for 6/52 post-treatment - As required to 6 months post-tx
	Deliver ongoing outpatient physiotherapy care as indicated	Physiotherapist, exercise physiologist	Radiotherapy outpatients (F2F or via telehealth)	Patients identified at risk of sarcopenia after screening and/or diagnosed with sarcopenia requiring ongoing intervention	Follow up as clinically indicated
DISCHARGE	Ensure malnutrition/ sarcopenia diagnosis documented in discharge summary	Dietitian, physiotherapist, exercise physiologist	Radiotherapy outpatients	Patients diagnosed with malnutrition/ sarcopenia	Prior to discharge
	Provide a copy of discharge summary to patient and patients' general practitioner	Dietitian, physiotherapist, exercise pysiologist	Radiotherapy outpatients	Patients diagnosed with malnutrition/ sarcopenia	Prior to discharge
	Refer to external services as indicated	Dietitian, physiotherapist, exercise physiologist	Via external provider	Patients diagnosed with malnutrition/ sarcopenia	Follow up as clinically indicated

* Timeframes may be dependent on local resources and should be aligned with local guidelines

Physical assessments should ideally be conducted F2F, however this may not be practical and appropriate mode should be decided according to local context/ resources/ type of assessment conducted

Key: MST, Malnutrition Screening Tool; MUST, Malnutrition Universal Screening Tool; RTx, Radiotherapy; F2F, Face to face; PG-SGA, Patient-Generated Subjective Global Assessment; BIA, Bioelectric Impedance Analysis; HGS, Handgrip Strength; SPPB, Short Physical Performance Battery

Rural / Community Setting

	Action What care is provided?	**Actor** Who delivers care?	**Context** Where is the care?	**Target** Who receives care?	**Time** When is care provided?
SCREENING	Conduct malnutrition screening (and rescreening) i.e., MST, MUST	Nurse, allied health assistant, patient, dietitian or other health professional	Outpatient clinic (F2F or via telehealth)	All patients with cancer	At diagnosis, at commencement or change of treatment, or when clinically indicated before, during and after treatment
	Conduct sarcopenia screening (and rescreening) i.e., SARC-F, SARC-CalF	Nurse, allied health assistant, dietitian or other health professional	Outpatient clinic (F2F or via telehealth)	All patients with cancer	At diagnosis, at commencement or change of treatment, or when clinically indicated before, during and after treatment
	Identify high risk patients for direct referral to dietitian	Nurse, allied health assistant, dietitian or other health professional	Outpatient clinic (F2F or via telehealth)	All patients with cancer	At diagnosis, at commencement or change of treatment*
	Refer patients at risk of malnutrition to dietitian	Nurse, allied health assistant, patient, dietitian, or other health professional	Outpatient clinic – referral via existing referral process/system	Patients considered at risk of malnutrition after screening	As soon as possible after identifying malnutrition risk
	Refer patients at risk of sarcopenia to dietitian and physiotherapist	Nurse, allied health assistant, dietitian or other health professional	Outpatient clinic – referral via existing referral process/ private practice	Patients considered at risk of sarcopenia after screening	As soon as possible after identifying sarcopenia risk
ASSESSMENT	Complete full individualised nutrition assessment	Dietitian, appropriately trained health professional	Outpatient clinic (F2F or via telehealth)	Patients considered at risk of malnutrition after screening	At first consult following identification of malnutrition risk*
	Complete clinical assessment measures for dietitian assessment and diagnosis of malnutrition i.e., PG-SGA, calf circumference	Dietitian, allied health assistant, appropriately trained health professional	Outpatient clinic (F2F[#])	Patients considered at risk of malnutrition after screening and undertaking assessment by dietitian	At first consult following identification of malnutrition risk*
	Complete full individualised sarcopenia assessment	Physiotherapist, exercise physiologist, allied health assistant, appropriately trained health professional	Outpatient clinic (F2F or via telehealth)	Patients considered at risk of sarcopenia after screening	At first consult following identification of sarcopenia risk*
	Complete clinical assessment measures for assessment and diagnosis of sarcopenia i.e., HGS, SPPB	Physiotherapist, exercise physiologist, allied health assistant, appropriately trained health professional	Outpatient clinic (F2F[#])	Patients considered at risk of sarcopenia after screening and undertaking assessment	At first consult following identification of sarcopenia risk*

TREATMENT	Prescribe individualised medical nutrition therapy	Dietitian (may be delegated to allied health assistant)	Outpatient clinic (F2F or via telehealth)	Patients considered at risk of malnutrition after screening and/or diagnosed with malnutrition	At first consult following malnutrition diagnosis* (or risk identification), and then as specified by dietitian
	Prescribe individualised exercise program	Physiotherapist, exercise physiologist (may be delegated to allied health assistant)	Outpatient clinic (F2F or via telehealth)	Patients considered at risk of sarcopenia after screening and/or diagnosed with sarcopenia	At first consult following sarcopenia diagnosis* (or risk identification), and then as specified by physiotherapist or exercise physiologist
	Refer to other healthcare professionals where appropriate to optimise patient outcomes i.e., psychologist, speech pathologist, social worker, occupational therapist	Dietitian, physiotherapist, exercise physiologist, health professional	Outpatient clinic (F2F or via telehealth)	Patients considered at risk of malnutrition/ sarcopenia after screening and/or diagnosed with malnutrition/sarcopenia and under the care of a dietitian, physiotherapist or exercise physiologist	Within 1 day of identifying need*
	Collaborate with the multidisciplinary team to provide individualised and tailored malnutrition and sarcopenia treatment	All health professionals involved with cancer-related malnutrition and/or sarcopenia treatment, general practitioner	Outpatient clinic, MDT meetings, correspondence, established communication pathways	All patients receiving treatment for malnutrition and/or sarcopenia	Throughout treatment
DISCHARGE	Ensure malnutrition/ sarcopenia diagnosis documented in discharge summary	Dietitian, physiotherapist, exercise physiologist	Outpatient clinic	Patients diagnosed with malnutrition/ sarcopenia	Prior to discharge
	Provide a copy of discharge summary to patient and patients' general practitioner	Dietitian, physiotherapist, exercise physiologist	Outpatient clinic	Patients diagnosed with malnutrition/ sarcopenia	Prior to discharge
	Refer to external services as indicated	Dietitian, physiotherapist, exercise physiologist	Via external provider	Patients diagnosed with malnutrition/ sarcopenia	Follow up as clinically indicated

* Timeframes may be dependent on local resources and should be aligned with local guidelines

Physical assessments should ideally be conducted F2F, however this may not be practical and appropriate mode should be decided according to local context/ resources/ type of assessment conducted

Key: MST, Malnutrition Screening Tool; MUST, Malnutrition Universal Screening Tool; F2F, Face to face; PG-SGA, Patient-Generated Subjective Global Assessment; BIA, Bioelectric Impedance Analysis; HGS, Handgrip Strength; SPPB, Short Physical Performance Battery; MDT, Multidisciplinary Team

Primary Care Setting

	Action What care is provided?	**Actor** Who delivers care?	**Context** Where is the care?	**Target** Who receives care?	**Time** When is care provided?
SCREENING	Conduct malnutrition screening (and rescreening) i.e., MST, MUST	General practitioner, general practice nurse	Primary care clinic	Patients attending an appointment with general practitioner, general practice nurse	At time of appointment
	Conduct sarcopenia screening (and rescreening) i.e., SARC-F, SARC-F in combination with calf circumference	General practitioner, general practice nurse	Primary care clinic	Patients attending an appointment with general practice nurse	At time of appointment
	Identify high risk patients for direct referral to dietitian	General practitioner, general practice nurse	Primary care clinic	Patients attending an appointment with general practice nurse	At time of appointment
	Refer patients at risk of malnutrition to dietitian	General practitioner, general practice nurse	Primary care clinic	Patients considered at risk of malnutrition after screening	Within 2 days of screening*
	Refer patients at risk of sarcopenia to dietitian and physiotherapist or exercise physiologist	General practitioner, general practice nurse	Primary care clinic	Patients considered at risk of sarcopenia after screening	Within 2 days of screening*
ASSESSMENT	Complete full individualised nutrition assessment	Dietitian	Private practice (F2F or via telehealth)	Patients considered at risk of malnutrition	At initial appointment
	Complete clinical assessment measures for nutrition assessment and diagnosis of malnutrition/ sarcopenia i.e., PG-SGA, BIA, calf circumference	Dietitian	Private practice	Patients considered at risk of malnutrition and undertaking assessment by dietitian	At initial appointment
	Complete full individualised sarcopenia assessment	Physiotherapist, exercise physiologist	Private practice (F2F or via telehealth)	Patients considered at risk of sarcopenia	At initial appointment
	Complete clinical assessment measures for evaluation of muscle mass, strength and function, and diagnosis of sarcopenia i.e., HGS, SPPB	Physiotherapist, exercise physiologist	Private practice	Patients considered at risk of sarcopenia and undertaking assessment by physiotherapist or exercise physiologist	At initial appointment

TREATMENT	Deliver individualised medical nutrition therapy	Dietitian	Private practice (F2F or via telehealth)	Patients considered at risk of malnutrition and/or diagnosed with malnutrition	At initial appointment and then as specified by dietitian
	Deliver individualised exercise prescription	Physiotherapist, exercise physiologist	Private practice (F2F or via telehealth)	Patients considered at risk of sarcopenia and/or diagnosed with sarcopenia	At initial appointment and then as specified by physiotherapist or exercise physiologist
	Refer to other healthcare professionals where appropriate to optimise patient outcomes i.e., psychologist, speech pathologist, social worker, occupational therapist	Dietitian, physiotherapist, exercise physiologist	Private practice	Patients considered at risk of and/or diagnosed with malnutrition/sarcopenia and under the care of a dietitian or physiotherapist or exercise physiologist	Within 2 days of identifying need*
	Collaborate with the multidisciplinary team to provide individualised and tailored malnutrition and sarcopenia treatment	All health professionals involved with cancer-related malnutrition and/or sarcopenia treatment	Private practice (F2F or via telehealth)	Patients considered at risk of and/or diagnosed with malnutrition/sarcopenia and under the care of a dietitian or physiotherapist or exercise physiologist	Follow up as clinically indicated
DISCHARGE	Ensure malnutrition/ sarcopenia diagnosis documented in discharge summary	Dietitian, physiotherapist, exercise physiologist	Private practice	Patients diagnosed with malnutrition/ sarcopenia	Prior to discharge
	Provide a copy of discharge summary to patient and patients' general practitioner	Dietitian, physiotherapist, exercise physiologist	Private practice	Patients diagnosed with malnutrition/ sarcopenia	Prior to discharge

* Timeframes may be dependent on local resources and should be aligned with local guidelines

Physical assessments should ideally be conducted F2F, however this may not be practical and appropriate mode should be decided according to local context/ resources/ type of assessment conducted

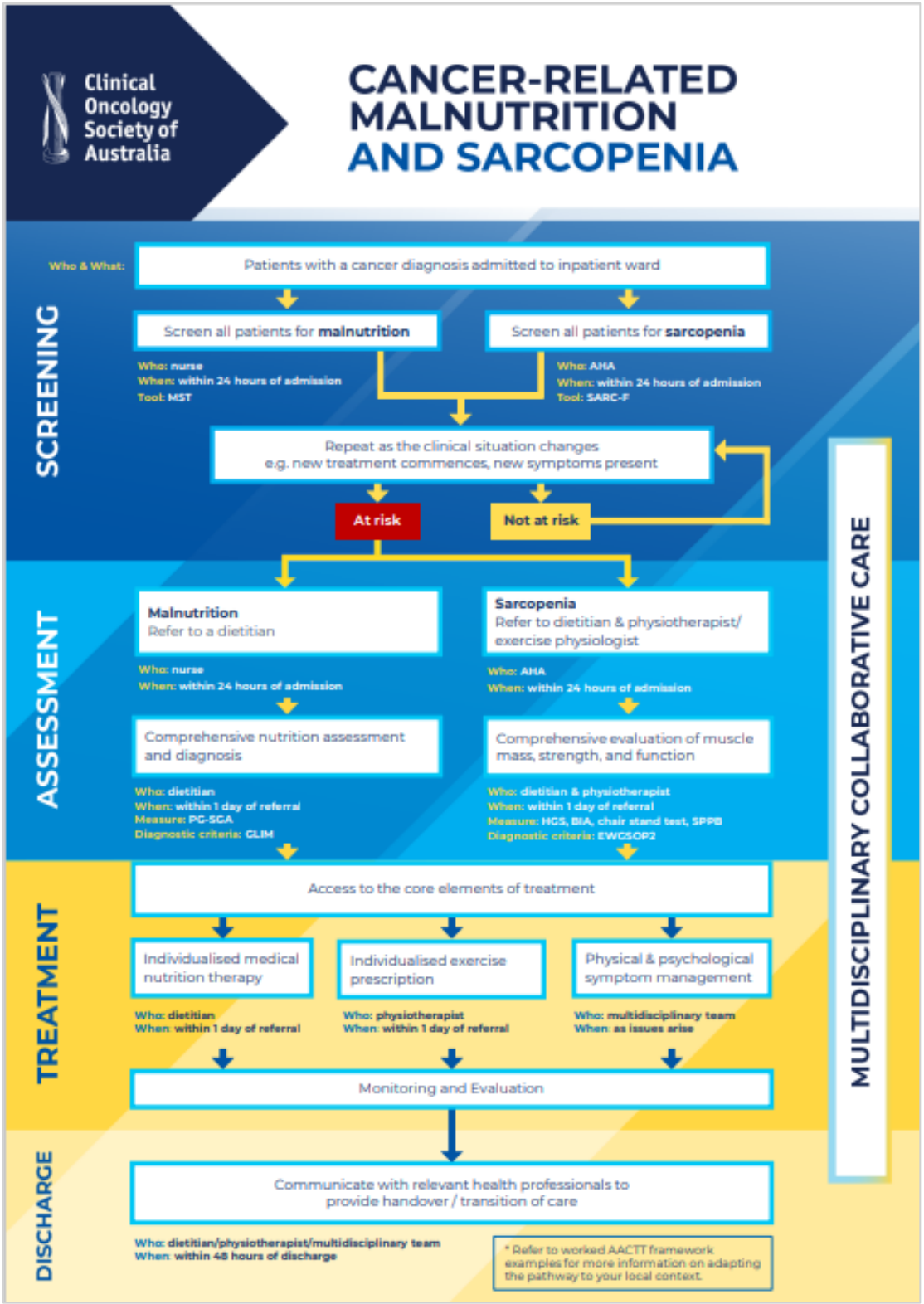
Key: MST, Malnutrition Screening Tool; MUST, Malnutrition Universal Screening Tool; F2F, Face to face; PG-SGA, Patient-Generated Subjective Global Assessment; BIA, Bioelectric Impedance Analysis; HGS, Handgrip Strength; SPPB, Short Physical Performance Battery

Reference:

1. Presseau J, McCleary N, Lorencatto F, Patey AM, Grimshaw JM, Francis JJ. Actor, Action, Context, Target, Time (AACTT): A framework for specifying behaviour. Implementation Science, December 2019, 14910:102.

Generic pathway

A generic pathway that can be tailored to each specific context has been developed and is available for download from the toolkit webpage. Use the example AACTT frameworks to tailor the pathway to your local context. A worked example can be found below.



The back page of the generic pathway provides more detail relating to the position statement recommendations.

	Malnutrition	Sarcopenia
SCREENING	Screen all patients with cancer using a validated tool **Tools:** MST, MUST, MSCT, PG-SGA SF + Identify all patients with a diagnosis or treatment plan known to lead to high nutrition risk: - Head and neck, lung, upper or lower GI cancer - Radiation therapy to oral cavity or GI tract - Chemotherapy, immunotherapy or targeted therapies with risk of GI toxicity - Stem cell transplant - Surgery to oral cavity or GI tract **AT RISK** → refer to dietitian **NOT AT RISK** → repeat as the clinical situation changes	Screen all patients with cancer using a validated tool **Tools:** SARC-F, SARC-F in combination with calf circumference **AT RISK** → refer to dietitian & physiotherapist/exercise physiologist **NOT AT RISK** → repeat as the clinical situation changes
ASSESSMENT	Conduct comprehensive nutrition assessment using assessment tool validated in the oncology population: **Measures:** PG-SGA SGA **Diagnostic criteria:** - GLIM	Conduct comprehensive evaluation of muscle mass, muscle strength and muscle function. **Measures:** Muscle mass- CT, BIA, BIS, DXA, MRI, calf circumference Muscle strength- hand grip strength, chair stand test Muscle function- SPPB, gait speed, TUG **Diagnostic criteria:** - EWGSOP 1 - EWGSOP 2 - FNIH - CT image analysis
TREATMENT	Dietitian to provide individualised medical nutrition therapy: - Dietary counselling on preserving or increasing lean muscle - 105-125kJ/kg/day - 1.0-1.5 g protein - Relevant education material - Frequency of review based on individual needs	Physiotherapist/exercise physiologist to provide individualised exercise prescription: - Targeted resistance +/- aerobic exercise program - Referral to exercise class - Relevant education material - Frequency of review based on individual needs
	Monitor clinical and patient-reported outcomes and consider referrals to other healthcare professionals where appropriate to optimise patient outcomes. i.e. psychologist, speech pathologist, social worker, occupational therapist	
DISCHARGE	Communicate with relevant health professionals to provide handover / transition of care - Document malnutrition/sarcopenia diagnosis in discharge summary - Provide discharge summary to patient and patients' GP - Refer to outpatient/community services	

KEY: MST, Malnutrition Screening Tool; MUST, Malnutrition Universal Screening Tool; MSCT, Malnutrition Screening Tool for Cancer Patients; PG-SGA SF, Patient-Generated Subjective Global Assessment Short Form; PG-SGA, Patient-Generated Subjective Global Assessment; SGA, Subjective Global Assessment; GLIM, Global Leadership Initiative on Malnutrition; CT, Computed Tomography; BIA, Bioelectric Impedance Analysis; BIS, Bioelectric Spectroscopy Analysis; DXA, Dual energy X-Ray Absorptiometry; MRI, Magnetic Resonance Imaging; SPPB, Short Physical Performance Battery; TUG, Timed Up and Go; EWGSOP1, European Working Group on Sarcopenia in Older People; EWGSOP2, European Working Group on Sarcopenia in Older People updated definition; FNIH, Foundation for the National Institutes of Health Biomarkers Consortium Sarcopenia Project; GP, General Practitioner

Example clinical indicators

- Clinical indicators (or key performance indicators) should be used after you have tailored the pathway to your local context, as a way of monitoring compliance to the care pathway.
- The below clinical indicators are examples only and variations can be applied. For example, you may choose to focus on whether the action (such as screening) is completed at all, or measure the timeframe within which it is completed, such as 24, 48 or 72 hours.
- Once you have chosen the clinical indicators relevant to your local context you will need to define how to measure, when to measure, who measures, local compliance targets (i.e. >90%), how to document and how this is communicated with relevant stakeholders in your organisation. For further information regarding how to define each clinical indicator refer to Chapter 2 of the Malnutrition Governance Toolkit (Malnutrition governance toolkit - Victorian Cancer Malnutrition Collaborative)
- Timeframes may be dependent on local resources and should be appropriate to the setting and aligned with local policies.

	Recommendation	Example clinical indicators
SCREENING	All people with cancer should be screened for malnutrition in all health settings at diagnosis and repeated as the clinical situation changes, using a screening tool that is valid and reliable in the setting in which it is intended.	Percentage of patients admitted to hospital who received malnutrition screening with a validated screening tool within 24 hours of admission*
		Percentage of patients attending chemotherapy day unit/radiotherapy who received malnutrition screening with a validated screening tool on their initial nursing appointment*
		Percentage of patients admitted to hospital who received repeat malnutrition screening with a validated screening tool within 7 days of admission*
		Percentage of patients identified as “at risk” through malnutrition screening who had a referral placed to the dietitian
	All people with cancer should be screened for sarcopenia at diagnosis and repeated as the clinical situation changes, using the validated screening tool SARC-F or SARC-F in combination with calf circumference.	Percentage of patients admitted to hospital who received sarcopenia screening with a validated screening tool within 24 hours of admission*
		Percentage of patients attending chemotherapy day unit/radiotherapy who received sarcopenia screening with a validated screening tool on their initial nursing appointment
		Percentage of patients admitted to hospital who received repeat sarcopenia screening with a validated screening tool within 7 days of admission*
		Percentage of patients identified as “at risk” through sarcopenia screening who had a referral placed to the dietitian and physiotherapist/exercise physiologist

ASSESSMENT	All people with cancer identified as being 'at risk' of malnutrition following appropriate screening or with a cancer diagnosis or treatment plan known to lead to high risk of malnutrition should have comprehensive nutrition assessment using a tool validated in the oncology population.	Percentage of patients identified as being “at risk” of malnutrition based on malnutrition screening who also had a completed nutrition assessment with a tool validated in the oncology population
		Length of time between patients identified as being “at risk” of malnutrition based on malnutrition screening and completion of a nutrition assessment using a tool validated in the oncology population
		Percentage of patients identified as malnourished who have a malnutrition diagnosis documented in their medical history
	All people with cancer identified as being 'at risk' of sarcopenia following appropriate screening should have a comprehensive evaluation of muscle status using a combination of assessments for muscle mass, muscle strength and function.	Percentage of patients identified as being “at risk” of sarcopenia, based on sarcopenia screening who also had a comprehensive evaluation of muscle status using a combination of assessments for muscle mass, muscle strength and muscle function.
		Length of time between patients identified as being “at risk” of malnutrition based on malnutrition screening and completion of a comprehensive evaluation of muscle status using a combination of assessments for muscle mass, muscle strength and function.
		Percentage of patients identified as sarcopenic who have a sarcopenia diagnosis documented in their medical history
TREATMENT	All people with cancer-related malnutrition and sarcopenia should have access to the core components of treatment including medical nutrition therapy, targeted exercise prescription and physical activity advice, and physical and psychological symptom management.	Percentage of patients with a completed nutrition assessment and a documented malnutrition diagnosis who have a documented malnutrition care plan in place
		Percentage of patients with a documented malnutrition diagnosis who had medical nutrition therapy implemented
		Length of time between admission and implementation of medical nutrition therapy for patients diagnosed with malnutrition
		Percentage of patients with a completed evaluation of muscle mass, strength and function and a documented sarcopenia diagnosis who have a documented exercise prescription in place
		Percentage of patients with a documented sarcopenia diagnosis who had an exercise prescription implemented
		Length of time between admission and implementation of an exercise prescription for patients diagnosed with sarcopenia
DISCHARGE	Communicate with relevant health professionals to provide handover / transition of care	Percentage of patients with a malnutrition diagnosis as a result of a nutrition assessment with a with a tool validated in the oncology population who have a malnutrition care plan included as part of their discharge summary
		Percentage of patients with a sarcopenia diagnosis as a result of a comprehensive evaluation of muscle status using a combination of assessment for muscle mass, strength and functional who have a sarcopenia care plan included as part of their discharge summary

Checklist to identify and address barriers to screening and assessment

Barriers	Enablers
Perceived lack of evidence to support practice	☐ **Refer to key evidence-based guidelines:** - COSA cancer-related malnutrition and sarcopenia position statement[1] - Updated evidence-based practice guidelines for the nutritional management of patients receiving radiation therapy and/or chemotherapy[2] - Evidence based practice guidelines for the nutritional management of adult patients with head and neck cancer[3] - ESPEN guidelines on nutrition in cancer patients[4] - Oncology evidence-based nutrition practice guidelines. Academy of Nutrition and Dietetics[5] - Sarcopenia: revised European consensus on definition and diagnosis[6] - Sarcopenia: A time for action. An SCWD position paper[7] ☐ **Gather key opinion leaders to support implementation - f**or example, clinical leaders within the multidisciplinary team.
Not a priority for health service	☐ **Gain leadership buy-in and engagement - f**or example, clinical leaders within multidisciplinary team and/or hospital executive. ☐ **Identify local barriers and enablers** - Identification of barriers and enablers to malnutrition and sarcopenia screening and assessment at individual, team and system levels is the first step to facilitate adherence to evidence-based nutrition care recommendations and policies (refer to implementation section of toolkit for details on how to do this). ☐ **Involve the quality department** - Develop local key performance indicators and relevant audit schedule. ☐ **Collect local data** - The audit tool in the toolkit can be used to show adherence to the COSA position statement recommendations. Use clinical data such as malnutrition or sarcopenia point prevalence survey data to highlight the need. If it's not available, make a plan to collect this data.
Low clinician awareness and understanding	☐ **Train relevant clinicians - U**tilise freely available training and incorporate into local training packages for clinicians: - COSA cancer-related malnutrition and sarcopenia implementation toolkit - Malnutrition and Sarcopenia in Cancer eLearning program on Cancer Institute NSW eviQ website[8] - Existing videos such as The Importance of Nutrition to Prevent and Treat Low Muscle Mass - YouTube - CanEAT pathway[9] resources freely available at: www.petermac.org/caneatpathway

Lack of local policies, procedures, pathways	☐ **Map local workflows** - Consider incorporating screening for malnutrition and sarcopenia into existing multidisciplinary and/or supportive care screening processes or patient-reported outcomes to aid ease of completion and compliance, reduce the need for additional resources and to support the initiation of appropriate assessment and care. ☐ **Care pathways** - Consider use of care pathways to support delivery of optimal patient care (see generic pathway and/or examples given in upper GI exemplar). ☐ **Local governance** - Malnutrition/sarcopenia screening and assessment should be incorporated into the appropriate nutrition care policy directives with local governance, management committees and performance review processes embedded to support successful and sustainable implementation. ☐ **Malnutrition governance toolkit**[10] - Utilise this toolkit to support development of local policies/procedures, key performance indicators and other governance supports.
Insufficient pre-existing processes	☐ **Build your team** - Ensure you have good multidisciplinary buy-in and specific strategies to maintain their engagement. Consider clinical champions to help your efforts. ☐ **Standardise the process** - Screening should focus on early identification using a systematised model of care or pathway that defines the tools to be used, who will conduct screening, the timing and frequency of screening, and pathways for treatment referrals appropriate to the setting (see generic pathway). ☐ **Utilise functionality of electronic medical records (EMR)** - Embed screening and assessment tools within the EMR and streamline referral processes. ☐ **Select one ward/area to begin screening** - Undergo iterative cycles of change using a recognised model for implementing change in health services. The Plan, Do, Study, Act model[11] is one such model that can be used to adapt and tailor the process accordingly.
Lack of role clarity	☐ **Communication is key** - Break down silos by talking to staff and keeping everyone involved. ☐ **Use a recognised framework or model to support implementation** - The AACTT framework[12] is one such framework that can be used to define roles and responsibilities of multidisciplinary team members (see AACCTT framework examples).
Inadequate services to refer to	☐ **Collect local data** - use clinical data such as malnutrition or sarcopenia point prevalence survey data to build business case. ☐ **Utilise a framework** - for example team mental model[13], to develop and refine multidisciplinary services to optimise the success of the team, and importantly clinical and patient-reported outcome and experience measures.

	Connect and network with local services to support transitions of care between your service and other providers.
Limited time and/or resources	☐ **Prioritise high risk groups** - in health services with limited resources prioritise screening of high-risk patient groups. ☐ **Disinvest to reinvest** – consider what new opportunities for care might be realised through disinvesting in low value activities and adopting systemised models of care (see Simple toolkit[14]).
Lack of tools/equipment required to screen and assess	☐ **Consider using indirect measures** - If you don't have access to tools such as BIA device or hand grip dynamometer consider using indirect measures of muscle mass and function such as calf-circumference, PG-SGA physical assessment or chair stand test. Consider the training requirements of each.
Low motivation for change	☐ **Build your team** - include key players in planning. ☐ **Clinical champions** - appoint clinical champions in each clinical area to help build motivation for change. ☐ **Use local data** – such as audit or activity data to create motivation for change. ☐ **Engage consumers** - in the development and evaluation of multidisciplinary services across the continuum of care. ☐ **Evaluate progress and report results**

User Guide:

- Form a multidisciplinary implementation team within your current health service / organisation.
- Assess current policies/procedures and resources available at your organisation.
- Use this checklist to identify current barriers and tips to overcome them in your organisation.
- Highlight the areas that are feasible and can be changed in consultation with the team/HOD etc.
- Look at exemplars of evidence-based care in practice for practical guidance.
- Implement selected strategies.
- Evaluate progress.

References:

1. Kiss N, Loeliger J, Findlay M, Isenring E, Baguley BJ, Boltong A, Butler A, Deftereos I, Eisenhuth M, Fraser SF, Fichera R, Griffin H, Hayes S, Jeffery E, Johnson C, Lomma C, van der Meij B, McIntyre C, Nicholls T, Pugliano L, Skinner T, Stewart J, Bauer J. Clinical Oncology Society of Australia: Position statement on cancer-related malnutrition and sarcopenia. Nutr Diet. 2020;77(4): 416-425.
2. Isenring E, Zabel R, Bannister M, et al. Updated evidence-based practice guidelines for the nutritional management of patients receiving radiation therapy and/or chemotherapy. Nutr Diet. 2013;70: 312-324.
3. Findlay M, Bauer J, Brown T, et al. Evidence based practice guidelines for the nutritional managment of adult patients with head and neck cancer. 2011 [updated April 2011].

http://wiki.cancer.org.au/australia/COSA:Head_and_neck_cancer_nutrition_guidelines
4. Arends J, Bachmann P, Baracos V, et al. ESPEN guidelines on nutrition in cancer patients. Clin Nutr. 2017; 36: 11-48.
5. Academy of Nutrition and Dietetics. Oncology evidence-based nutrition practice guideline. 2013. http://andevidenceanalysislibrary.com
6. Cruz-Jentoft AJ, Bahat G, Bauer J, et al. Sarcopenia: revised European consensus on definition and diagnosis. Age Ageing. 2018;48: 16-31.
7. Bauer J, Morley JE, Schols AMWJ, et al. Sarcopenia: a time for action. An SCWD position paper. J Cachexia Sarcopenia Muscle. 2019;10: 956-961.
8. Taylor MJ, McNicholas C, Nicolay C, Darzi A, Bell D, Reed JE. Systematic review of the application of the plan-do-study-act method to improve quality in healthcare. BMJ Qual Saf. 2014 Apr;23(4): 290-8.
9. Malnutrition Governance toolkit. Malnutrition governance toolkit – Victorian Cancer Malnutrition Collaborative
10. Presseau J, McCleary N, Lorencatto F, Patey AM, Grimshaw JM, Francis JJ. Action, actor, context, target, time (AACTT): a framework for specifying behaviour. Implement Sci. 2019 Dec 5;14(1): 102.
11. Klimoski, R., & Mohammed, S. Team mental model: Construct or metaphor? Journal of Management. 1994;20(2): 403-437.
12. Bell, Jack J., Rushton, A. (2020). The Simple Approach. Scaling, spreading, and sustaining The Systematized, Interdisciplinary Malnutrition Program for impLementation and Evaluation – SIMPLE Phase II.
13. Malnutrition and Sarcopenia in Cancer eLearning modules. eviQ
14. Loeliger J, Dewar S, Kiss N, Dumbrell J, Elliott A, Kaegi K, Kelaart A, McIntosh R, Swan W, Stewart J. Co-design of a cancer nutrition care pathway by patients, carers, and health professionals: the CanEAT pathway. Support Care Cancer. 2023 ;31(2): 99.

Implementation theories, models and frameworks

Process models

Process models help to describe or guide the process of translating research into practice.[1] These models outline key phases of the research-to-practice process, from research and the development of evidence-based knowledge or innovation to their implementation in various settings.[1] Process models highlight the importance of facilitating the implementation process and place emphasis on the contexts in which evidence-based knowledge or innovations are implemented and used.[1] Action models (such as the knowledge to action framework) are process models that facilitate implementation by offering practical guidance in the planning and execution of implementation strategies.[1]

Knowledge-to-Action framework

Graham ID, Logan J, Harrison MB, Straus SE, Tetroe J, Caswell W, Robinson N. Lost in knowledge translation: time for a map? J Contin Educ Health Prof. 2006;26(1): 13-24. (Pub Med)

Determinant frameworks

Determinant frameworks can be used to understand or explain the determinants (barriers and enablers) that have been found (or hypothesised) to influence implementation outcomes.[1] Understanding the barriers and enablers for implementation can support the design of implementation strategies to promote change.[1] Many frameworks recognise that implementation can have multiple interacting influences, identifying determinants at multiple levels from the individual user or adopter (e.g. health care practitioners) to the organisation and broader health system.[1] The Consolidated Framework for Implementation Research (CFIR) and the Theoretical Domains Framework (TDF) are two commonly used determinant frameworks.

Consolidated Framework for Implementation Research (CFIR)

Damschroder LJ, Reardon CM, Widerquist MAO, Lowery J. The updated Consolidated Framework for Implementation Research based on user feedback. Implement Sci. 2022;17(1):75. (Pub Med)

Theoretical Domains Framework (TDF)

Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. Implement Sci. 2012;7: 37. (Pub Med)

Evaluating Implementation

Evaluation frameworks can be used to formulate a plan to evaluate the effectiveness of implementation. Evaluation frameworks specify aspects of implementation or implementation outcomes that can be applied to evaluate the implementation process.[1]

Reach, Efficacy, Adoption, Implementation, and Maintenance (RE-AIM) framework

Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. Am J Public Health. 1999;89(9): 1322-7. (Pub Med)

Proctor's outcomes for implementation research

Proctor E, Silmere H, Raghavan R, Hovmand P, Aarons G, Bunger A, Griffey R, Hensley M. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. Adm Policy Ment Health. 2011;38(2): 65-76. (Pub Med)

Frameworks to help define implementation strategies

Fundamental to the implementation of new evidence is the need for someone, somewhere, to do something differently.[2] It requires healthcare providers and other health system stakeholders to change their behaviour. Specifying or describing the behaviour you want to change is an often overlooked first step in the implementation of new evidence.[2] The following frameworks can be used to specify implementation strategies.[2]

Action, Actor, Context, Target, Time (AACTT) framework

Presseau J, McCleary N, Lorencatto F, Patey AM, Grimshaw JM, Francis JJ. Action, actor, context, target, time (AACTT): a framework for specifying behaviour. Implement Sci. 2019;14(1):102. (Pub Med)

Proctor's recommendations for specifying and reporting implementation strategies

Proctor EK, Powell BJ, McMillen JC. Implementation strategies: recommendations for specifying and reporting. Implement Sci. 2013;8: 139. (*Pub Med*)

References:

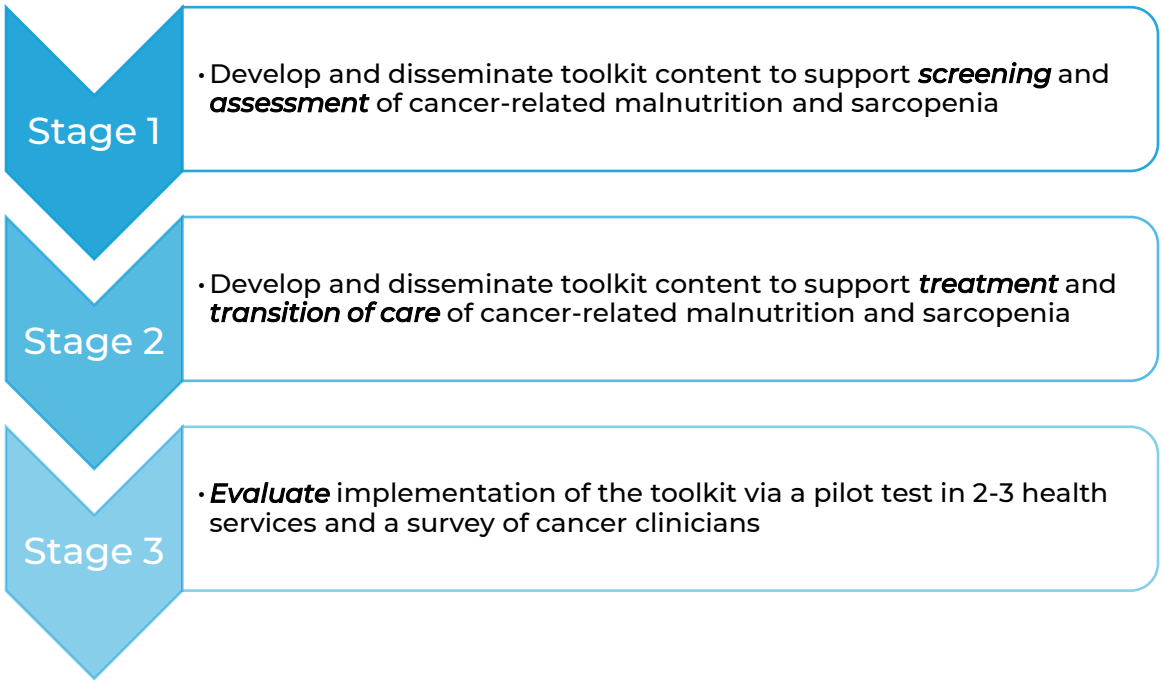
1. Nilsen P. Making sense of implementation theories, models and frameworks. Implement Sci. 2015;10: 53. (Pub Med)
2. Presseau J, McCleary N, Lorencatto F, Patey AM, Grimshaw JM, Francis JJ. Action, actor, context, target, time (AACTT): a framework for specifying behaviour. Implement Sci. 2019;14(1): 102. (*Pub Med*)

Enhancements to the toolkit

Next steps

This project forms stage 1 of a larger staged implementation process to develop a toolkit to support implementation of the COSA position statement on cancer-related malnutrition and sarcopenia and evaluate the outcomes of implementation.

The project is planned to be a staged implementation process conducted over three stages:



Feedback from users

We welcome feedback from toolkit users. If you have any comments or suggestions to improve the toolkit, please email jane.stewart@petermac.org.

Acknowledgements

COSA would like to thank the Cancer-Related Malnutrition and Sarcopenia Working Group members for their outstanding contribution and acknowledge the COSA Nutrition Group Chair, Ms Jenelle Loeliger and project dietitian Ms Jane Stewart for leading this project.

COSA also thanks the oncology clinicians and stakeholders who contributed to the development and review of the toolkit and gratefully acknowledges the feedback provided during the end-user review.

Project team members:

- **Ms Jenelle Loeliger AdvAPD- Chair**
  COSA Nutrition Group Chair, Manager Nutrition and Speech Pathology, Peter MacCallum Cancer Centre
- **Ms Jane Stewart APD - Project Dietitian**
  Clinical Lead Dietitian, Peter MacCallum Cancer Centre
- **Prof Judy Bauer FDA**
  Professor Nutrition, Dietetics and Food, Department of Nutrition, Dietetics and Food, Monash University
- **A/Prof Merran Findlay AdvAPD**
  Executive Research Lead, Cancer Nutrition, Royal Prince Alfred Hospital
- **A/Prof Nicole Kiss AdvAPD**
  Victorian Cancer Agency Clinical Research Fellow Co-lead, Exercise and Nutrition for Cancer Research Group, Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University

Project steering group members:

- **Ms Jenelle Loeliger AdvAPD – Chair**
  COSA Nutrition Group Chair, Manager Nutrition and Speech Pathology, Peter MacCallum Cancer Centre
- **Ms Jane Stewart APD - Project Dietitian**
  Clinical Lead Dietitian, Peter MacCallum Cancer Centre
- **Prof Judy Bauer FDA**
  Professor Nutrition, Dietetics and Food, Department of Nutrition, Dietetics and Food, Monash University
- **A/Prof Merran Findlay AdvAPD**
  Executive Research Lead, Cancer Nutrition, Royal Prince Alfred Hospital
- **A/Prof Nicole Kiss AdvAPD**
  Victorian Cancer Agency Clinical Research Fellow Co-lead, Exercise and Nutrition for Cancer Research Group, Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University
- **Dr Brenton Baguley**
  Lecturer in Dietetics, Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University
- **A/Prof Steve Fraser**
  Discipline Lead Clinical Exercise, Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University

- **Prof Sandra Hayes**
  Senior Research Fellow, Menzies Health Institute Queensland, Griffith University
- **Ms Catherine Johnson**
  Cancer Nurse Coordinator, Calvary Mater Newcastle
- **Dr Chris Lomma**
  Medical Oncologist, Fiona Stanley Hospital
- **Dr Carolyn McIntyre**
  Senior Lecturer, Exercise Medicine Research Institute, School of Medical and Health Science, Edith Cowan University
- **Ms Tracey Nicholls**
  ENT Nurse Practitioner, Flinders Medical Centre
- **Dr Lina Pugliano**
  Medical Oncologist, Northern Cancer Institute / Cancer Fit Australia
- **A/Prof Tina Skinner**
  Senior Lecturer in Clinical Exercise Physiology, School of Human Movement and Nutrition Sciences, University of Queensland

Instructional video working group members:

- **Ms Jane Stewart APD - Co-facilitator**
  Clinical Lead Dietitian, Peter MacCallum Cancer Centre
- **A/Prof Nicole Kiss AdvAPD– Co-facilitator**
  Victorian Cancer Agency Clinical Research Fellow Co-lead, Exercise and Nutrition for Cancer Research Group, Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University
- **A/Prof Steve Fraser**
  Discipline Lead Clinical Exercise, Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University
- **Ms Tracey Nicholls**
  ENT Nurse Practitioner, Flinders Medical Centre
- **Ms Amy Bowman**
  Senior Clinical Physiotherapist, Peter MacCallum Cancer Centre
- **Ms Megan Sanders APD**
  Clinical Oncology Dietitian, Peter MacCallum Cancer Centre

Generic pathway and audit tool working group members:

- **Ms Jane Stewart APD- Co-facilitator**
  Clinical Lead Dietitian, Peter MacCallum Cancer Centre
- **Ms Jenelle Loeliger AdvAPD- Co-facilitator**
  COSA Nutrition Group Chair, Manager Nutrition and Speech Pathology, Peter MacCallum Cancer Centre
- **Prof Sandra Hayes**
  Senior Research Fellow, Menzies Health Institute Queensland, Griffith University
- **Dr Chris Lomma**
  Medical Oncologist, Fiona Stanley Hospital
- **Mr Shane McAuliff APD**

Oncology/Research Dietitian, Chris O'Brien Lifehouse

- **Ms Louise Moodie AdvAPD**
  Director Dietetics, Allied Health & Clinical Support Services, Mackay Hospital and Health Service

Case studies and tips to overcome barriers working group members:

- **Ms Jane Stewart APD- Co-facilitator**
  Clinical Lead Dietitian, Peter MacCallum Cancer Centre
- **Prof Judy Bauer FDA- Co-facilitator**
  Professor Nutrition, Dietetics and Food, Department of Nutrition, Dietetics and Food, Monash University
- **A/Prof Merran Findlay AdvAPD- Co-facilitator**
  Executive Research Lead, Cancer Nutrition, Royal Prince Alfred Hospital
- **Dr Brenton Baguley**
  Lecturer in Dietetics, Institute for Physical Activity and Nutrition, Deakin University
- **Ms Catherine Johnson**
  Cancer Nurse Coordinator, Calvary Mater Newcastle
- **Dr Carolyn McIntyre**
  Senior Lecturer, Exercise Medicine Research Institute, School of Medical and Health Science, Edith Cowan University
- **Dr Lina Pugliano**
  Medical Oncologist, Northern Cancer Institute / Cancer Fit Australia
- **Ms Manelle Challita**
  Physiotherapist, Chris Obrien Lifehouse
- **Ms Carol Chan**
  Physiotherapist in Continence and Pelvic Floor Disorder, Cancer Rehabilitation, Digestive Pelvic Floor Centre
- **Dr Ashfaq Chauhan**
  Postdoctoral Research Fellow and Patient Safety Movement Foundation Fellow, Centre for Health Systems and Safety Research, Australian Institute of Health Innovation, Macquarie University
- **Ms Tiffani Jones APD**
  Oncology Dietitian, Calvary Mater Newcastle
- **Dr Michael Krasovitsky**
  Medical Oncologist, The Kinghorn Cancer Centre. Conjoint Senior Lecturer, University of New South Wales
- **Ms Marina Nguyen APD**
  Clinical Oncology Dietitian, Nutrition and Dietetics Department, Alfred Health

Production of instructional videos:

- **Ms Amy Bowman**
  Senior Clinical Physiotherapist, Peter MacCallum Cancer Centre
- **Ms Megan Sanders APD**
  Clinical Oncology Dietitian, Peter MacCallum Cancer Centre
- **Ms Zhen Yu**
  Student Dietitian, Deakin University
- **Mr Darren Steele**

Cancer consumer, Peter MacCallum Cancer Centre

- **Mr Chris Baker**
  Video production, Skrilled

Multidisciplinary end-user review:

We thank the following clinicians for their thoughtful end-user review:

- **Ms Lauren Atkins AdvAPD**
  Co-director, OnCore Nutrition
- **Dr Megan Crichton APD**
  Research Fellow, Cancer and Palliative Care Outcomes Centre, Queensland University of Technology
- **Dr Lara Edbrooke**
  The University of Melbourne and Peter MacCallum Cancer Centre
- **Ms Michelle Eisenhuth**
  Senior Oncology and Haematology Dietitian, Nepean Hospital and Nepean Cancer and Wellness Centre
- **Dr Hayley Griffin**
  Clinical Oncology Society of Australia
- **Dr Michael S Krasovitsky**
  Staff Specialist Medical Oncologist, The Kinghorn Cancer Centre
- **Ms Sandra McKendry**
  Cancer Care Coordinator Head and Neck, Calvary Mater Newcastle
- **Mr Rohan Miegel**
  Physiotherapist, Flinders Medical Centre
- **Ms Meredith Oatley**
  Nurse Practitioner Medical Oncology, Royal North Shore Hospital
- **Ms Belinda Steer APD**
  Manager Nutrition and Speech Pathology, Peter MacCallum Cancer Centre
- **Ms Talisha Varoxis**
  Oncology Dietitian, Calvary Mater Newcastle
- Plus additional clinicians who also kindly participated

Editing of toolkit resources and webpage:

- **Ms Megan Sanders APD**
  Clinical Oncology Dietitian, Peter MacCallum Cancer Centre
- **Dr Hayley Griffin**
  Clinical Oncology Society of Australia

Project Funding:

- **Abbott Australasia**

Abbott
life. to the fullest.

References:

- Abbott J, Teleni L, McKavanagh D, Watson J, McCarthy AL, Isenring E. Patient-Generated Subjective Global Assessment Short Form (PG-SGA SF) is a valid screening tool in chemotherapy outpatients. Support Care Cancer. 2016;24(9): 3883-7.
- Academy of Nutrition and Dietetics. Oncology evidence-based nutrition practice guideline. 2013. http://andevidenceanalysislibrary.com
- Arends J, Bachmann P, Baracos V, et al. ESPEN guidelines on nutrition in cancer patients. Clin Nutr. 2017; 36: 11-48.
- Bahat G, Tufan A, Tufan F, Kilic C, Akpinar TS, Kose M, Erten N, Karan MA, Cruz-Jentoft AJ. Cut-off points to identify sarcopenia according to European Working Group on Sarcopenia in Older People (EWGSOP) definition. Clin Nutr. 2016;35(6): 1557-1563.
- Barbosa-Silva TG, Menezes AM, Bielemann RM, Malmstrom TK, Gonzalez MC; Grupo de Estudos em Composição Corporal e Nutrição (COCONUT). Enhancing SARC-F: Improving Sarcopenia Screening in the Clinical Practice. J Am Med Dir Assoc. 2016;17(12): 1136-1141.
- Bauer J, Capra S, Ferguson M. Use of the scored Patient-Generated Subjective Global Assessment (PG-SGA) as a nutrition assessment tool in patients with cancer. Eur J Clin Nutr. 2002 Aug;56(8):779-85.
- Bauer J, Morley JE, Schols AMWJ, et al. Sarcopenia: a time for action. An SCWD position paper. J Cachexia Sarcopenia Muscle. 2019;10: 956-961.
- Bell, Jack J., Rushton, A. (2020). The Simple Approach. Scaling, spreading, and sustaining The Systematized, Interdisciplinary Malnutrition Program for impLementation and Evaluation – SIMPLE Phase II.
- Bohannon, R.W., Reference values for the five-repetition sit-to-stand test: a descriptive meta-analysis of data from elders. Perceptual and motor skills, 2006. 103(1):215-222.
- Bohannon, R. W. Population representative gait speed and its determinants. Journal of Geriatric Physical Therapy. 2008;31: 49-52.
- Buatois, S., et al., Five times sit to stand test is a predictor of recurrent falls in healthy community-living subjects aged 65 and older. Journal of the American Geriatrics Society, 2008. 56(8): 1575-1577.
- Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. Implement Sci. 2012;7: 37.
- Cederholm T, Jensen GL, Correia MITD, et al. GLIM Core Leadership Committee; GLIM Working Group. GLIM criteria for the diagnosis of malnutrition - A consensus report from the global clinical nutrition community. Clin Nutr. 2019;38(1): 1-9.
- Centers for Disease Control and Prevention. National Center for Health Statistics (NCHS). National Health and Nutrition Examination Survey questionnaire (or examination protocol, or laboratory protocol). 2006. Available from: https://wwwn.cdc.gov/nchs/data/nhanes/1999-2000/manuals/bm.pdf

- Cesari M, Kritchevsky SB, Newman AB et al. Added value of physical performance measures in predicting adverse health-related events: results from the Health, Aging and Body Composition Study. J Am Geriatr Soc 2009; 57: 251–259.
- 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. Sarcopenia: European consensus on definition and diagnosis: Report of the European Working Group on Sarcopenia in Older People. Age Ageing. 2010;39(4): 412-23.
- Cruz-Jentoft AJ, Bahat G, Bauer J, Boirie Y, Bruyère O, Cederholm T, Cooper C, Landi F, Rolland Y, Sayer AA, Schneider SM, Sieber CC, Topinkova E, Vandewoude M, Visser M, Zamboni M. Sarcopenia: revised European consensus on definition and diagnosis. Age Ageing. 2019;48(1): 16-31.
- Cruz-Jentoft AJ, Bauer, J, Bahat, G, et al., Writing Group for the European Working Group on Sarcopenia in Older People 2 (EWGSOP2), and the Extended Group for EWGSOP2, Sarcopenia: revised European consensus on definition and diagnosis, Age and Ageing. 2018, 48: 16–31.
- Damschroder LJ, Reardon CM, Widerquist MAO, Lowery J. The updated Consolidated Framework for Implementation Research based on user feedback. Implement Sci. 2022;17(1): 75.
- Deftereos I, Hitch D, Butzkueven S, Carter V, Arslan J, Fetterplace K, Fox K, Ottaway A, Pierce K, Steer B, Varghese J, Kiss N, Yeung J. Implementation of a standardised perioperative nutrition care pathway in upper gastrointestinal cancer surgery: A multisite pilot study. J Hum Nutr Diet. 2023;36(2): 479-492.
- Detsky AS, McLaughlin JR, Baker JP, Johnston N, Whittaker S, Mendelson RA, Jeejeebhoy KN. What is subjective global assessment of nutritional status? JPEN J Parenter Enteral Nutr. 1987;11(1): 8-13.
- Di Bella A, Croisier E, Blake C, Pelecanos A, Bauer J, Brown T. Assessing the Concurrent Validity and Interrater Reliability of Patient-Led Screening Using the Malnutrition Screening Tool in the Ambulatory Cancer Care Outpatient Setting. J Acad Nutr Diet. 2020;120(7): 1210-1215.
- Di Bella A, Blake C, Young A, Pelecanos A, Brown T. Reliability of Patient-Led Screening with the Malnutrition Screening Tool: Agreement between Patient and Health Care Professional Scores in the Cancer Care Ambulatory Setting. J Acad Nutr Diet. 2018;118(6): 1065-1071.
- Dodds RM, Syddall HE, Cooper R et al. Grip strength across the life course: normative data from twelve British studies. PLoS One. 2014; 9: e113637.
- Ferguson M, Capra S, Bauer J, Banks M. Development of a valid and reliable malnutrition screening tool for adult acute hospital patients. Nutrition. 1999;15(6): 458-64.
- Findlay M, Bauer J, Brown T, et al. Evidence based practice guidelines for the nutritional managment of adult patients with head and neck cancer. 2011 [updated April 2011]. http://wiki.cancer.org.au/australia/COSA:Head_and_neck_cancer_nutrition_guidelines
- Findlay M, et al. Best Evidence to Best Practice: Implementing an Innovative Model of Nutrition Care for Patients with Head and Neck Cancer Improves Outcomes. Nutrients. 2020;12(5): 1465.
- Fu X, Tian Z, Thapa S, Sun H, Wen S, Xiong H, Yu S. Comparing SARC-F with SARC-CalF for screening sarcopenia in advanced cancer patients. Clin Nutr. 2020;39(11): 3337-3345.
- Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. Am J Public Health. 1999;89(9): 1322-7.

- Gonzalez, M. C., Mehrnezhad, A., Razaviarab, N., Barbosa-Silva, T. G., & Heymsfield, S. B. (2021). Calf circumference: cutoff values from the NHANES 1999–2006. The American Journal of Clinical Nutrition, 113(6), 1679-1687.
- Graham ID, Logan J, Harrison MB, Straus SE, Tetroe J, Caswell W, Robinson N. Lost in knowledge translation: time for a map? J Contin Educ Health Prof. 2006;26(1): 13-24.
- Guralnik JM, Ferrucci L, Simonsick EM, Salive ME, Wallace RB. Lower-extremity function in persons over the age of 70 years as a predictor of subsequent disability. N Engl J Med. 1995; 332(9): 556-61.
- Isenring E, Zabel R, Bannister M, et al. Updated evidence-based practice guidelines for the nutritional management of patients receiving radiation therapy and/or chemotherapy. Nutr Diet. 2013;70: 312-324.
- Ishii S, Tanaka T, Shibasaki K et al. Development of a simple screening test for sarcopenia in older adults. Geriatr Gerontol Int. 2014;14(Suppl 1): 93–101.
- Kim JY, Wie GA, Cho YA, Kim SY, Kim SM, Son KH, Park SJ, Nam BH, Joung H. Development and validation of a nutrition screening tool for hospitalized cancer patients. Clin Nutr. 2011;30(6): 724-9.
- Kiss, N., et al., Clinical Oncology Society of Australia: Position statement on cancer-related malnutrition and sarcopenia. Nutr Diet, 2020;77(4): 416-425.
- Klimoski, R., & Mohammed, S. Team mental model: Construct or metaphor? Journal of Management. 1994;20(2): 403-437.
- Klukowska, A.M., et al., Five-repetition sit-to-stand test performance in healthy individuals: reference values and predictors from 2 prospective cohorts. Neurospine, 2021;18(4): 760.
- Lindemann U, Krumpoch S, Becker C, Sieber CC, Freiberger E. The course of gait speed during a 400m walk test of mobility limitations in community-dwelling older adults. Z Gerontol Geriatr. 2021;54(8): 768-774.
- Lim SL, Ng SC, Lye J, Loke WC, Ferguson M, Daniels L. Improving the performance of nutrition screening through a series of quality improvement initiatives. Jt Comm J Qual Patient Saf. 2014;40(4): 178-86.
- Loeliger J, Dewar S, Kiss N, Dumbrell J, Elliott A, Kaegi K, Kelaart A, McIntosh R, Swan W, Stewart J. Co-design of a cancer nutrition care pathway by patients, carers, and health professionals: the CanEAT pathway. Support Care Cancer. 2023 ;31(2): 99.
- Loeliger J, Edbrooke L, Daly RM, Stewart J, Bucci L, Puskas C, Fitzgerald M, Baguley BJ, Kiss N. Development and Feasibility of an Inpatient Cancer-Related Sarcopenia Pathway at a Major Cancer Centre. Int J Environ Res Public Health. 2022;19(7): 4038.
- Malmstrom TK, Miller DK, Simonsick EM, Ferrucci L, Morley JE. SARC-F: a symptom score to predict persons with sarcopenia at risk for poor functional outcomes. J Cachexia Sarcopenia Muscle. 2016;7(1): 28-36.
- 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;31(12): 1539-47.

- Martinez BP, Gomes IB, Oliveira CS, Ramos IR, Rocha MD, Forgiarini Júnior LA, Camelier FW, Camelier AA. Accuracy of the Timed Up and Go test for predicting sarcopenia in elderly hospitalized patients. Clinics (Sao Paulo). 2015;70(5): 369-72.
- Massy-Westropp, N.M., et al., Hand Grip Strength: age and gender stratified normative data in a population-based study. BMC research notes. 2011;4(1): 1-5.
- Mehmet, H., A.W.H. Yang, and S.R. Robinson, What is the optimal chair stand test protocol for older adults? A systematic review. Disabil Rehabil, 2020;42(20): 2828-2835.
- Montero-Odasso, M., Schapira, M., Soriano, E. R., Varela, M., Kaplan, R., Camera, L. A., Mayorga, L. M. Gait velocity as a single predictor of adverse events in healthy seniors aged 75 years and older. Journal of Gerontology: Biological Sciences. 2005;60: 1304-1309.
- Newman AB, et al. Association of long-distance corridor walk performance with mortality, cardiovascular disease, mobility limitation, and disability. JAMA 2006; 295: 2018–26.
- Nilsen P. Making sense of implementation theories, models and frameworks. Implement Sci. 2015;10: 53.
- Núñez-Cortés R, Cruz BDP, Gallardo-Gómez D, Calatayud J, Cruz-Montecinos C, López-Gil JF, López-Bueno R. Handgrip strength measurement protocols for all-cause and cause-specific mortality outcomes in more than 3 million participants: A systematic review and meta-regression analysis. Clin Nutr. 2022;41(11):2473-2489.
- Ottery FD. Definition of standardized nutritional assessment and interventional pathways in oncology. Nutrition. 1996;12(1 Suppl): S15-9.
- Pavasini R., Guralnik J., Brown J.C., di Bari M., Cesari M., Landi F., Vaes B., Legrand D., Verghese J., Wang C., et al. Short physical performance battery and all-cause mortality: Systematic review and meta-analysis. BMC Med. 2016;14: 215.
- Podsiadlo, D. and Richardson, S. "The timed "Up & Go": a test of basic functional mobility for frail elderly persons." J Am Geriatr Soc. 1991;39(2): 142-148.
- Prado CM, Landi F, Chew STH, Atherton PJ, Molinger J, Ruck T, Gonzalez MC. Advances in muscle health and nutrition: A toolkit for healthcare professionals. Clin Nutr. 2022;41(10): 2244-2263.
- Prado CM, Lieffers JR, McCargar LJ, Reiman T, Sawyer MB, Martin L, Baracos VE. Prevalence and clinical implications of sarcopenic obesity in patients with solid tumours of the respiratory and gastrointestinal tracts: a population-based study. Lancet Oncol. 2008;9(7): 629-35.
- Presseau J, McCleary N, Lorencatto F, Patey AM, Grimshaw JM, Francis JJ. Actor, Action, Context, Target, Time (AACTT): A framework for specifying behaviour. Implementation Science. 2019;14910:102.
- Price K, Earthman C. Update on body composition tools in clinical settings: computed tomography, ultrasound, and bioimpedance applications for assessment and monitoring. European Journal of Clinical Nutrition 2019; 73: 187 – 193.
- Proctor EK, Powell BJ, McMillen JC. Implementation strategies: recommendations for specifying and reporting. Implement Sci. 2013;8: 139.
- Proctor E, Silmere H, Raghavan R, Hovmand P, Aarons G, Bunger A, Griffey R, Hensley M. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. Adm Policy Ment Health. 2011;38(2): 65-76.

- Roberts HC, Denison HJ, Martin HJ, Patel HP, Syddall H, Cooper C, Sayer AA. A review of the measurement of grip strength in clinical and epidemiological studies: towards a standardised approach. Age Ageing. 2011;40(4):423-9.
- Rolland YM, Cesari M, Miller ME, Penninx BW, Atkinson HH, Pahor M. Reliability of the 400-m usual-pace walk test as an assessment of mobility limitation in older adults. J Am Geriatr Soc. 2004;52(6): 972-6.
- Sheean P et al., American Society for Parenteral and Enteral Nutrition Clinical Guidelines: The Validity of Body Composition Assessment in Clinical Populations. Journal of Parenteral and Enteral Nutrition 2020; 44(1): 12-43.
- Stratton RJ, Hackston A, Longmore D, Dixon R, Price S, Stroud M, King C, Elia M. Malnutrition in hospital outpatients and inpatients: prevalence, concurrent validity and ease of use of the 'malnutrition universal screening tool' ('MUST') for adults. Br J Nutr. 2004;92(5): 799-808.
- Studenski SA, Peters KW, Alley DE, Cawthon PM, McLean RR, Harris TB, Ferrucci L, Guralnik JM, Fragala MS, Kenny AM, Kiel DP, Kritchevsky SB, Shardell MD, Dam TT, Vassileva MT. The FNIH sarcopenia project: rationale, study description, conference recommendations, and final estimates. J Gerontol A Biol Sci Med Sci. 2014;69(5): 547-58.
- Taylor MJ, McNicholas C, Nicolay C, Darzi A, Bell D, Reed JE. Systematic review of the application of the plan-do-study-act method to improve quality in healthcare. BMJ Qual Saf. 2014;23(4): 290-8
- Trujillo EB, Shapiro AC, Stephens N, Johnson SJ, Mills JB, Zimmerman AR, Spees CK. Monitoring Rates of Malnutrition Risk in Outpatient Cancer Centers Utilizing the Malnutrition Screening Tool Embedded into the Electronic Health Record. J Acad Nutr Diet. 2021;121(5): 925-930.
- van Rooijen SJ, Molenaar CJL, Schep G, et al. Making Patients Fit for Surgery: Introducing a Four Pillar Multimodal Prehabilitation Program in Colorectal Cancer. Am J Phys Med Rehabil. 2019;98(10): 888-896.