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BARIATRIC REHABILITATION

Position statement

2023



Royal Australasian College of Physicians (RACP)

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About the Royal Australasian College of Physicians (RACP)

The RACP trains, educates and advocates on behalf of physicians and trainee physicians, across Australia and Aotearoa New Zealand. The College represents a broad range of medical specialties including general medicine, paediatrics and child health, cardiology, respiratory medicine, neurology, oncology, public health medicine, infectious diseases medicine, occupational and environmental medicine, palliative medicine, sexual health medicine, rehabilitation medicine, geriatric medicine, and addiction medicine. Beyond the drive for medical excellence, the RACP is committed to developing health and social policies which bring vital improvements to the wellbeing of patients, the health system and the community.

About the Australasian Faculty of Rehabilitation Medicine (AFRM)

The AFRM of the RACP is the peak medical body for rehabilitation medicine physicians, comprising over 800 medical specialists in Australia and Aotearoa New Zealand. AFRM provides training and continuing education for rehabilitation medicine Fellows and trainees throughout all stages of their career.

The AFRM's focus on interdisciplinary training and teamwork makes the rehabilitation medicine physician the best qualified specialist to lead teams of allied health staff, nurses and other medical practitioners (specialists or general practitioners) in providing coordinated, patient-focused, individualised programs of goal-directed rehabilitative care in order to optimise the health and wellbeing of those with short-term or long-term disability. Rehabilitation medicine is a diverse specialty whose members are trained to facilitate the best possible recovery of function over the full range of medical and surgical conditions seen in contemporary practice.

Rehabilitation medicine physicians are trained and experienced to manage all patient types who experience disability due to illness or injury affecting all body systems and are experts in appropriate assessment, treatment and management. Also, they are trained in injury prevention, conditioning, fitness and wellness. Rehabilitation medicine physicians engage in the delivery of various healthcare services to provide a holistic approach, have experience in integrated care with primary care physicians and are trained in leading interdisciplinary teams.



We acknowledge and pay respect to the Traditional Custodians and Elders – past, present and emerging – of the lands and waters on which RACP members and staff live, learn and work. The RACP acknowledges Māori as tangata whenua and Te Tiriti o Waitangi partners in Aotearoa New Zealand.

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Glossary of terms

AROC	The Australasian Rehabilitation Outcomes Centre is the national rehabilitation medicine integrated outcomes centre of Australia and Aotearoa New Zealand. The aims of AROC include developing a national benchmarking system to improve clinical rehabilitation outcomes in both the public and private sectors.
Bariatric	The study or treatment of obesity
BMI	Body Mass Index is a person's weight in kilograms divided by the square of their height in metres
FIM	The Functional Independence Measure is an instrument that was developed as a measure of disability for a variety of populations and is not specific to any diagnosis.
MBS	Medicare Benefits Schedule
Obesity	BMI* of 30 or more
Class 1 obesity	BMI* of 30 to < 35
Class 2 obesity	BMI* of 35 to < 40
Class 3 obesity	BMI* of 40 or more**. Also known as severe obesity.
Overweight (Children)	BMI is at or above the 85th percentile but less than the 95th percentile for age and gender
Obesity (Children)	BMI is at or above the 95th percentile for age and gender
Class 3 obesity (Children)	BMI \geq 140% of the 95th percentile or BMI \geq 40kg/m ²
Sarcopenic obesity	The presence of both sarcopenia (loss of muscle) and obesity
Waist Circumference	The measurement taken around the abdomen at the level of the umbilicus.

*Note: using BMI alone to define obesity may be limited to the general Caucasian population. Using other measures of obesity in addition to/instead of BMI may be preferable for other populations, for example: older people, people of non-Caucasian background, and some people with disability, e.g. spinal cord injury, amputees.

Executive Summary

All rehabilitation medicine physicians are likely to be involved in the care of patients with bariatric needs*. It is the responsibility of every physician to ensure that good patient-centred care is always delivered. This includes patients having improved independence to support daily living, having access to ongoing care, and participating in all areas of life.

Multiple factors contribute to barriers in providing effective rehabilitation to patients with bariatric needs. This document identifies models of care that demonstrate some solutions to these problems and addresses four key areas to improve rehabilitation care for patients with bariatric needs:

1. Service planning, staffing, training, resources and infrastructure.
2. Rehabilitation assessment and management of patients with bariatric needs.
3. Obesity assessment and weight management in patients with bariatric needs and weight-related complications.
4. Potential collaboration between rehabilitation medicine and weight management services in Australia and Aotearoa New Zealand.

Efficient and effective implementation of the suggested recommendations requires the utilisation of local healthcare systems and resources. The RACP and individual rehabilitation medicine physicians need to advocate for rehabilitation services in each jurisdiction, and at the National level, to assist in the provision of optimal care for patients with bariatric needs. The RACP recognises that there may be shortfalls in resources, particularly in remote and rural locations, to fulfil these recommendations.

Bariatric needs

** The term 'bariatric needs' has been used throughout this document to refer to patients who are overweight, obese and/or living with obesity.*

Recommendations

The following recommendations have been developed for children, adolescents and adults receiving bariatric rehabilitation care.

1. Service planning, staffing, training, resources and infrastructure

- a. Staffing, facilities, equipment, and infrastructure within the rehabilitation setting should meet the [RACP Standards for Provision of Rehabilitation Services](#), including adult, paediatric, inpatient, and outpatient standards. Additional staff, specialised bariatric equipment, telehealth technology and accessible facilities are required to enable the effective rehabilitation of patients with bariatric needs.
- b. Rehabilitation staff should recognise that obesity is a chronic disease and require training and education regarding current evidence-informed management of obesity, its causes, mechanisms, complications, and treatments.
- c. Rehabilitation services should comply with local, state/territory and/or national work health and safety policies and procedures regarding risk management and safe manual handling of patients with bariatric needs.
- d. Rehabilitation services should adopt a culture of removing weight bias and stigmatisation.
- e. Cultural competence and cultural safety training for rehabilitation staff is recommended for understanding the drivers of obesity resulting from inequities experienced by Aboriginal and Torres Strait Islander peoples, and Māori and Pasifika. These need to be considered in the context of colonisation and its ongoing impact.
- f. Patients across all rehabilitation settings should be screened for risk of developing obesity, and prevention strategies implemented for those identified as being at risk of developing obesity.
- g. Attempts should be made to ensure access to rehabilitation services, especially for those with socioeconomic and geographic disadvantages, as these factors are associated with increased prevalence of obesity. Strategies may include telehealth and outreach clinics and collaborating with local providers for capacity building.

2. Rehabilitation assessment and management of patients with bariatric needs

- a. During the initial rehabilitation consultation of a patient with bariatric needs, a rehabilitation medicine physician should determine the patient's suitability for inclusion into a rehabilitation program and the most appropriate location and type of rehabilitation program.
- b. Ongoing assessment and management of rehabilitation patients with bariatric needs should involve a multidisciplinary rehabilitation team, with patient (and whānau/family/carer) participation in individualised goal-setting, based on the [International Classification of Functioning, Disability and Health \(ICF\) principles](#).
- c. Rehabilitation assessment should include screening for obesity and associated conditions, for example: diabetes, malnutrition, mental health, eating disorders, cardiac and respiratory/sleep conditions, musculoskeletal disorders, pain, and skin conditions.
- d. If available, early referral and assessment for inreach (acute) rehabilitation is recommended for acute inpatients with bariatric needs to reduce disability and length of hospital stay.
- e. Rehabilitation programs involving patients with bariatric needs should include physical activity to reverse sarcopenia and improve strength, motor function, mood, participation, and quality of life.
- f. In addition to standard multidisciplinary discharge planning, the rehabilitation team should consider the following for patients with bariatric needs: bariatric-suitable transport, manual handling (if required), appropriate accommodation and modifications, availability of trained care supports, funding, bariatric equipment and storage, and accessibility to follow up services.
- g. Research is recommended to determine the most appropriate outcome and benchmarking measurement tools for rehabilitation patients with bariatric needs. There is an opportunity to develop rehabilitation measurement tools to suit patients with bariatric needs.

3. Weight management programs for rehabilitation patients with bariatric needs

- a. Assessment of obesity and measuring the effectiveness of weight management programs in rehabilitation patients requires a highly individualised approach, factoring in the patient's age, gender, cultural background, impairment, and medical comorbidities, and using the most appropriate measurement tools for that individual.
- b. Multidisciplinary team involvement is recommended for weight management programs for rehabilitation patients with bariatric needs, whether medical or surgical. The team should have representation from medical, nursing, allied health, and integrated health such as accredited exercise physiologists, pain specialists, mental health clinicians and educators.

- c. Weight management programs for rehabilitation patients with bariatric needs should be patient-centred and include physical activity, nutrition, and behavioural and psychological therapy. Family/whānau/carers are also important facilitators in the treatment program and should be included, with agreement from the patient.
- d. Pharmacological and/or surgical interventions should be considered in the weight management of rehabilitation patients with bariatric needs.
- e. Weight management programs for rehabilitation patients with bariatric needs from priority populations, including Aboriginal and Torres Strait Islander populations and Māori and Pasifika, must be socially and culturally appropriate, and integrate the principles of culturally safe care and trauma informed care.

4. Potential for collaboration between rehabilitation medicine and weight management services in Australia and Aotearoa New Zealand

- a. Rehabilitation services have the potential to provide joint care, or consultation service, with weight management services for managing the complex needs of patients with comorbid disability in Australia and Aotearoa New Zealand.
- b. With appropriate funding, rehabilitation services have the potential to provide resources to complement under-resourced public health weight management services.
- c. There is a potential role for “prehabilitation” (multidisciplinary rehabilitation intervention prior to bariatric surgery) with this cohort of patients, e.g., nutrition, exercise prescription, management of mental health etc.
- d. There is a potential role for outpatient rehabilitation services after weight loss surgery for maintenance of weight loss and prevention of relapse.
- e. There are opportunities for rehabilitation-led research into obesity and consumer engagement.
- f. There are opportunities for rehabilitation medicine organisations to collaborate with other healthcare organisations for education and networking, and with patient advocacy organisations for informing of lived experience of obesity.

Background

The prevalence of obesity has increased rapidly in Australia and Aotearoa New Zealand with rates effectively doubling for adults and children between 1980 and 2013.¹ In Australia, 3.5% of children had obesity in 1980, increasing to 7% in 2013. In Aotearoa New Zealand, 4.5% cent of children had obesity in 1980, doubling to more than 9% in 2013. High body mass index (BMI) is the leading cause of preventable morbidity and mortality.

The increase in childhood obesity is particularly concerning as those who develop obesity in childhood and adolescence, without intervention, are more likely to live with obesity in adulthood and may experience comorbid symptoms earlier in life.² Children and young people with bariatric needs often have significant disease-related psychological and medical morbidity as well as an increased risk of premature death from cardiovascular disease.

Adults and children with socioeconomic disadvantage are more likely to have obesity than those who are less disadvantaged. Obesity is also more prevalent in regional and rural areas than in metropolitan areas.³

First Nations people have disproportionately higher rates of overweight and obesity. In 2018-19, 71% of Indigenous Australians aged 15 years and over had a Body Mass Index (BMI) in the overweight (25-29.9kg/m²) or obesity (>30.0 kg/m²) range (29% overweight and 43% obesity).⁴ An increase in obesity rates was also seen in Aotearoa New Zealand (AoNZ) with the highest prevalence of obesity within Pasifika and Māori adults.⁵ The two leading causes of health inequity between Māori and non-Māori are diabetes and cardiovascular disorders, where health loss is around twice as high for Māori than non-Māori.¹

There is an increasing number of patients with Class 3 obesity being referred to inpatient rehabilitation services, including those with rehabilitation needs after bariatric surgery.⁶ This often exposes limitations in equipment, environment, and staff expertise to support these patients. It is important that rehabilitation medicine physicians have the necessary skills, equipment, and facilities to support these patients to optimise their health, regardless of their weight.

This position statement is based on a review of the literature and expert input from physicians and health professionals working in this area. This position statement also draws on results from the [2021 AFRM](#)

Bariatric Rehabilitation Survey; a survey conducted in early 2021 of over 100 Australasian Faculty of Rehabilitation Medicine (AFRM) Fellows and trainees, working in both adult and paediatric medicine.⁷ The survey aimed to explore the current situation of bariatric rehabilitation in different areas of practice, challenges of working in this area and whether there is a role for rehabilitation services to complement weight management services. A similar smaller survey of weight management clinics was also conducted.

This position statement outlines recommendations and defines appropriate practice for the rehabilitation needs of patients with bariatric needs and defines the potential role of rehabilitation medicine physicians in weight management services. This position statement explores the role that rehabilitation medicine physicians and the multidisciplinary team play in managing patients with bariatric needs and weight-related complications.

This position statement does not specifically include the rehabilitation needs of patients with bariatric needs being managed for other primary impairments typically seen in rehabilitation settings, e.g., stroke, spinal cord injury, deconditioning and orthopaedics, although many of the recommendations are applicable.

The recommendations in this position statement cover care in rehabilitation settings for both adult and paediatric patients, except where otherwise specified. Children and young people with bariatric needs have distinct needs that should be considered in their care, such as the particular importance of family/whānau/carer support and interventions. Multidisciplinary paediatric weight management services are essential to the treatment and management of children and young people with bariatric needs with health impairment.⁸

1. Service planning, staffing, training, resources and infrastructure

- a. **Staffing, facilities, equipment, and infrastructure within the rehabilitation setting should meet the RACP Standards for Provision of Rehabilitation Services, including adult, paediatric, inpatient and outpatient standards. Additional staff, specialised bariatric equipment, telehealth technology and accessible facilities are required to enable the effective rehabilitation of patients with bariatric needs.**

In the [2021 AFRM Bariatric Rehabilitation Survey](#), multiple factors were identified as limiting the effectiveness of rehabilitation of patients with Class 3 obesity, and weight-related complications including:

- Insufficient staff numbers.
- Inappropriate facilities/infrastructure, e.g., room size, doorway width.
- Inadequate equipment, e.g., appropriate beds, hoists, and mobility devices.
- Increased length of stay compared to patients without Class 3 obesity.
- Decreased Functional Independence Measure (FIM) efficiency compared to patients without Class 3 obesity.

In the same survey, the following factors were identified as important in enabling more effective rehabilitation of patients with Class 3 obesity:

- Appropriate rehabilitation staffing ratios.
- Improved access to equipment specific for patients with Class 3 obesity.
- Improved access to facilities specific for patients with Class 3 obesity.
- Change in benchmarking of patients with obesity using the Australasian Rehabilitation Outcomes Centre (AROC) data.

It is recommended that the RACP Standards consider an amendment for Rehabilitation Services Committee to ensure that rehabilitation facilities can accommodate people with Class 3 obesity.

- b. **Rehabilitation staff should recognise that obesity is a chronic disease and requires training and education regarding current evidence-informed management of obesity, its causes, mechanisms, complications, and treatments.**

In the [2021 AFRM Bariatric Rehabilitation Survey](#), there were notable shortfalls in rehabilitation medicine physician expertise in managing obesity in the rehabilitation setting:

- 53.5% of rehabilitation medicine physicians reported “minimal knowledge” of best practice for managing weight loss in their patients.
- 90% of rehabilitation medicine physicians were interested in additional education and training for managing weight loss in their patients.
- 46% of rehabilitation medicine physicians felt that inadequate expertise within rehabilitation staff in managing patients with Class 3 obesity limited the effectiveness of rehabilitation.
- 75% of rehabilitation medicine physicians felt that improved staff expertise in managing obesity and comorbidities could enable more effective rehabilitation.

Obesity is a complex multifactorial non-communicable disease defined by excessive adiposity that can impair health.⁹ It is recommended that rehabilitation staff have up-to-date knowledge about obesity, including being informed and knowledgeable about the drivers and determinants of obesity and its associated complications, as well as the latest evidence-informed obesity management and weight management approaches.

Obesity-specific education and training can enable rehabilitation staff to appropriately manage patients with bariatric needs and its associated complications in the rehabilitation setting, and to determine the suitability and type of weight management strategies for their patients and/or facilitate appropriate referral pathways, if indicated.

c. Rehabilitation services should comply with local, state/territory and/or national work health and safety policies and procedures regarding risk management and safe manual handling of patients with bariatric needs.¹⁰

Rehabilitation services should develop management plans for patients with bariatric needs based on local, state/territory and/or national policies that:

- Identify patients with bariatric needs that require specialised equipment.
- Implement risk management strategies throughout all stages of the patient’s admission, taking the safety of staff and the physical and psychological needs of patients into consideration.
- Identify and assess potential work health and safety hazards.
- Ensure safe and appropriate patient transport and appropriate handover to ambulance, or transport provider, if transporting between facilities.
- Ensure safe manual handling practices, including instruction and training, equipment, and infrastructure, to suit patients with bariatric needs.
- Establish emergency evacuation plans.
- Implement procedures for managing the death of patients with bariatric needs.

d. Rehabilitation services should adopt a culture aimed at removing weight bias and stigmatisation.

Weight stigmatisation and bias are highly prevalent in society, including in the healthcare systems of Australia and AoNZ. Weight bias negatively impacts the mental, emotional, and social wellbeing of people with obesity, affecting health outcomes and experience of health care. Healthcare services should ensure respect and dignity are maintained by providing care that meets the needs of people with bariatric needs.¹¹ Studies have confirmed weight bias occurs within rehabilitation settings and steps should therefore be taken to address this issue.¹²

In the [2021 AFRM Bariatric Rehabilitation Survey](#):

- 37.7% of rehabilitation medicine physicians felt that weight bias and staff attitudes to obesity may limit the effectiveness of rehabilitation; and
- 38.4% of rehabilitation medicine physicians felt that advocacy on behalf of patients and whānau/family/carers and removing weight stigma would enable more effective rehabilitation.

e. Cultural competence and cultural safety training for rehabilitation staff is recommended for understanding the drivers of obesity resulting from inequities experienced by Aboriginal and Torres Strait Islander peoples and Māori and Pasifika. These need to be considered in the context of colonisation and its ongoing impact.¹³

The [RACP Position Statement on Obesity](#) recommends the implementation of regionally appropriate actions to support and empower priority populations in Australia and AoNZ to address obesity at the individual, whānau/family/carers and community levels.¹⁴ These actions need to be designed, implemented, and evaluated collaboratively with communities and their leadership to ensure they are culturally centred and meet community needs.

In the [2021 AFRM Bariatric Rehabilitation Survey](#):

- 19.5% of rehabilitation medicine physicians felt that inadequate staff cultural awareness training limited the effectiveness of rehabilitation of patients with Class 3 obesity; and
- 44.6% of rehabilitation medicine physicians felt that improving staff cultural awareness education and training would enable more effective rehabilitation of patients with Class 3 obesity.

It has been estimated that obesity contributes 16% of the health gap between Aboriginal and Torres Strait Islander peoples and the total Australian population.¹ It is recommended that rehabilitation medicine physicians work alongside General Practitioners (GPs) who are able to conduct comprehensive preventative health assessments designed specifically to support the health needs of First Nations people. This assessment may also help identify early risk for obesity in First Nations children as it is available to children between the ages of 0 and 14 years.¹⁵

f. Patients across all rehabilitation settings should be screened for risk of developing obesity, and prevention strategies implemented for those identified as being at risk of developing obesity.

Patients managed by rehabilitation services often have comorbidities^{16, 17, 18} that increase the risk of developing obesity and obesity-related comorbidities over time. Screening for the risk of obesity should occur across all rehabilitation settings, including paediatric, transition and adult populations, and inpatient, outpatient, and community settings. There is an opportunity to implement prevention strategies for rehabilitation patients at risk of developing obesity.

g. Attempts should be made to ensure access to rehabilitation services, especially for those with socioeconomic and geographic disadvantages, as these factors are associated with increased prevalence of obesity. Strategies may include telehealth and outreach clinics and collaborating with local providers for capacity building.

Obesity is more prevalent in regions with lower socioeconomic status and non-metropolitan areas.¹⁹ Access to rehabilitation services is also more difficult in non-metropolitan areas, and there is an identified need to increase rehabilitation service provision in rural and remote areas.^{20, 21, 22, 23} Limitations of local rehabilitation service include reduced staff numbers, limited skill sets, and time and distance required to travel. Strategies to improve access to rehabilitation services include local capacity building, telehealth, and outreach clinics.^{24, 25}

2. Rehabilitation assessment and management of patients with bariatric needs

- a. **During the initial rehabilitation consultation of the patient with bariatric needs, a rehabilitation medicine physician should determine the patient's suitability for inclusion into a rehabilitation program and the most appropriate location and type of rehabilitation program.**

Rehabilitation medicine physicians should consider patient-associated factors, including comorbidities, the type and severity of impairments and their management requirements. It is also important to educate the patient about the drivers of obesity to reduce internalised weight stigma.

Patient-associated factors should be balanced against the availability of resources within the rehabilitation setting; for example, rehabilitation staff numbers, rehabilitation staff expertise in managing the patient's comorbidities (or access to other staff with relevant expertise in managing the patient's comorbidities), and the availability of appropriate equipment and facilities to enable effective rehabilitation.

The patient (and family/whānau/carer) should be able and willing to participate in a rehabilitation program and have realistic and achievable patient-led rehabilitation goals that can be met within an acceptable timeframe, determined by the multidisciplinary rehabilitation team or other appropriate benchmarking standards.

- b. **Ongoing assessment and management of rehabilitation patients with bariatric needs should involve a multidisciplinary rehabilitation team, with patient (and family/whānau/carer) participation in individualised goal-setting, based on the International Classification of Functioning, Disability and Health (ICF) principles.**

The principles of rehabilitation of patients with bariatric needs should be based on the ICF principles²⁶ - assessing a patient's impairments, activity limitations and participation restrictions, whilst considering environmental and personal factors. Rehabilitation should include a multidisciplinary team and incorporate an individualised, patient-centred approach. The multidisciplinary team should assist in identifying SMART (Specific, Measurable, Achievable,

Relevant, and Time-Bound) goals that can be achieved within the rehabilitation setting. If deemed appropriate, family/whānau/carer participation is recommended.

c. Rehabilitation assessment should include screening for obesity and associated conditions; for example, diabetes, malnutrition, mental health, eating disorders, cardiac and respiratory/sleep conditions, musculoskeletal disorders, pain, and skin conditions.

The [National Association of Clinical Obesity Services](#) outlines the standards of care for clinical providers. Upon entering a rehabilitation service, staff should adhere to these standards, in particular: *Assess patients for weight-related complications*. Manage obesity complications and comorbidities within the scope of their practice and/or refer to other health care providers where necessary using established referral networks.

Clinical pathways should include links and referral pathways to community and allied health services to maximise the opportunity for individuals' post-intervention to maintain health behavioural changes.²⁷

In the [2021 AFRM Bariatric Rehabilitation Survey](#):

- 58.7% of rehabilitation medicine physicians felt they did not have the specialist medical support or expertise to manage the acute needs or comorbidities associated with Class 3 obesity.
- 56.6% of rehabilitation medicine physicians felt that difficulty managing physical comorbidities of obesity interfered with their patient's rehabilitation.
- 59.3% of rehabilitation medicine physicians had difficulty managing psychiatric comorbidities.

Referral to other specialist clinicians for management of identified comorbidities may be required if needs are unable to be met within the skillset of the rehabilitation multidisciplinary team.

d. If available, early referral and assessment for inreach (acute) rehabilitation are recommended for acute inpatients with bariatric needs to reduce disability and length of hospital stay.

The option of inreach (acute) rehabilitation (joint care with an acute medical or surgical team and the multidisciplinary rehabilitation team) may be undertaken for patients who are unable to be admitted to a rehabilitation facility due to ongoing medical or surgical issues that require management by an acute medical/surgical team. Inreach rehabilitation may be beneficial for patients with bariatric needs who require multiple staff to assist with mobility and personal care

tasks, where there are inadequate resources available within the rehabilitation setting to manage these needs.

The purpose of inreach rehabilitation is to commence rehabilitation as early as possible to reduce the effects of deconditioning. This has been shown to be effective in reducing hospital length of stay by facilitating earlier discharge from the acute care setting. The patient will be able to receive concurrent acute medical and/or surgical treatment while undergoing rehabilitation. Inreach rehabilitation has shown to be effective at reducing disability in patients with bariatric needs.²⁸

e. Rehabilitation programs involving patients with bariatric needs should include physical activity to reverse sarcopenia, and improve strength, motor function, mood and quality of life.

Sarcopenic obesity in the rehabilitation setting is associated with increased disability and worse quality of life.²⁹ Exercise has been shown to reverse the effects of sarcopenia, and improve function, mood, cardiometabolic profile and quality of life in elderly patients with obesity.³⁰ Current evidence, including existing international guidelines and rehabilitation position papers, promote the inclusion of exercise and physical activity in the management of obesity and obesity-related conditions.^{31, 32, 11}

More research is needed to determine the most effective exercise type, intensity, frequency, duration, and level of supervision required to improve functional independence. However, exercise prescription for the rehabilitation patient with bariatric needs should be highly individualised, taking into consideration patient-related factors such as pain and other impairments, balanced against the availability of resources within the rehabilitation setting.

f. In addition to standard multidisciplinary discharge planning, the rehabilitation team should consider the following for patients with bariatric needs: bariatric-suitable transport, manual handling (if required), appropriate accommodation and modifications, availability of trained care supports, funding, bariatric equipment and storage, and accessibility to follow up services.

Planning for discharge after hospitalisation requires multidisciplinary team input with patient and family/whānau/carer education and diligent handover to primary practitioners and community supports. People with bariatric needs may require specialised transport and manual handling equipment that is used only by appropriately trained staff or carers.³³

Ideally a home visit should be performed prior to discharge to ensure the discharge address is appropriate, and whether modifications are required. Bariatric equipment will need to be sourced

prior to discharge, and appropriate education and training should be given prior to discharge from hospital. Family/whānau/carers should be trained on safe manual handling techniques should the patient require this after discharge from hospital. Funding should be adequate to ensure ongoing provision of care, purchase or rental of specialised equipment and storage. Patients with bariatric needs ideally should be able to access follow up services, and special arrangements be put in place where necessary, e.g., telehealth.^{34, 35, 36}

g. Research is recommended to determine the most appropriate outcome and benchmarking measurement tools for rehabilitation patients with bariatric needs as there is an opportunity to develop rehabilitation measurement tools to suit patients with bariatric needs.

The impact of obesity on rehabilitation FIM gain and efficiency has not been well-demonstrated in available evidence, which consists predominantly of single-centre, retrospective studies, or case studies. There are mixed results of the effect of obesity on FIM-associated rehabilitation outcomes in the subacute setting, irrespective of primary impairment, based on two retrospective single-centre studies.^{37, 38}

There are also mixed results regarding the effect that obesity has on FIM gain and FIM efficiency on stroke rehabilitation patients based on single-centre retrospective cohort studies. Some studies have shown favourable or non-inferior FIM outcomes for overweight or obesity,^{39, 40} whereas others have shown worse outcomes.⁴¹

There are few studies examining the effect of obesity and FIM in patients requiring rehabilitation for other primary impairments such as post-orthopaedic, cardiac, reconditioning, brain injury, spinal cord injury and amputee rehabilitation. These studies are single-centre studies with weak evidence and mixed results.^{42, 43, 44, 45}

Due to the floor effect, FIM may not be the most appropriate tool for measuring change in rehabilitation patients with bariatric needs. Case studies have shown that inreach (acute) rehabilitation of patients with Class 3 obesity can reduce carer burden significantly, however, it may not affect FIM.²⁸

The floor effect of FIM is exemplified by a case study in which a patient required eight (8) staff to assist with bed mobility and four (4) staff for hoist transfers at the beginning of inreach rehabilitation, however by the end of inreach rehabilitation required only two (2) staff to transfer and mobilise 80 metres with a mobility aid. This would equate to zero change in transfer and locomotion FIM scores despite the significant reduction in care requirements and likely improved patient satisfaction.²⁸

In the 2021 AFRM Bariatric Rehabilitation Survey, 58.9% of rehabilitation medicine physicians felt the need for a change in benchmarking of patients with bariatric needs using the AROC data.

The RACP recommends a review of AROC data items, “morbid (Class 3) obesity interfering with rehabilitation” and establish if there is any effect on rehabilitation outcomes. Obesity is one of the many comorbidities that are listed with recommendation for only four (4) comorbidities to be listed that interfere with rehabilitation. Collecting alternative data for rehabilitation episodes, such as BMI or weight, may enable more accurate results regarding the effect that obesity (in particular Class 3 obesity) has on rehabilitation outcomes and benchmarking.

There may be additional data collection standards that can be used in rehabilitation settings based on those recommended for weight management services.⁴⁶

There is an opportunity for development of additional rehabilitation outcome and benchmarking tools better suited for use in rehabilitation patients with bariatric needs.

3. Weight management programs for rehabilitation patients with bariatric needs

- a. **Assessment of obesity and measuring the effectiveness of weight management programs in rehabilitation patients requires a highly individualised approach, factoring in the patient's age, gender, cultural background, impairment, and medical comorbidities, and using the most appropriate measurement tools for that individual.**

Where applicable, weight management should be guided by the principles and standards of care recommended by the National Framework for Clinical Obesity Services or equivalent.⁴⁷

Traditional anthropometric measurements such as BMI alone may not be applicable for some rehabilitation patient groups, e.g., spinal cord injury, amputees, older persons and some population groups (e.g., Asian subgroups). Amputees require adjusted body weight estimates due to limb loss, which also affects estimated glomerular filtration rate.^{48, 49} Body weight can also be affected by medical comorbidities, such as heart or kidney failure, which may be present in rehabilitation patients.

Radiological imaging, such as dual-energy x-ray absorptiometry and magnetic resonance imaging (MRI), have been shown to be an accurate way of measuring body fat in patients with spinal cord injury.⁵⁰ Due to muscle atrophy associated with spinal cord injury, BMI tends to underestimate body fat and obesity in the spinal cord injured population.⁵¹

BMI alone is not a universally accepted measurement tool for assessing risk of mortality and morbidity in older persons and differ compared to those under 65 years of age. A meta-analysis comparing BMI and mortality in older persons⁵² showed mortality risk increases for older persons with BMI less than 23kg/m² and a BMI greater than 33kg/m².

Not all rehabilitation patients with comorbid obesity may be suitable for a weight management program. Factors that may need to be considered include patient factors (consent, medical stability, intellectual disability, impairment, and comorbidities) and the available resources for implementing a weight management program within the rehabilitation setting. Weight loss in patients with neurological diseases, such as stroke, may be due to dysphagia (swallowing impairment) and is often associated with poorer outcomes.⁵³

Evidence-based weight management strategies are often insufficiently studied in some rehabilitation impairment groups, e.g., bariatric surgery in spinal cord injured patients or patients with intellectual disability.^{54, 55} Caution should be used when applying these interventions in the rehabilitation patient with complex impairments.

Current Australasian National Framework Eligibility Criteria⁵⁶ for public bariatric surgery is for patients aged 18-70 years of age, depending on the Edmonton Obesity Scoring System (EOSS) score, noting other qualifying criteria and contraindications.

A 2010 position paper⁵⁷ from the Australian and New Zealand Association of Paediatric Surgeons, the Obesity Surgery Society of Australia and New Zealand and the Paediatrics and Child Health Division of the RACP suggest minimum age for bariatric surgery to be 15 years. (NB. *This document is due for revision and may be amended*).

- b. Multidisciplinary team involvement is recommended for weight management programs for rehabilitation patients with bariatric needs, whether medical or surgical. The team should have representation from medical, nursing, allied health, and integrated health such as accredited exercise physiologists, pain specialists, mental health clinicians and educators.**

For weight management programs in a rehabilitation setting, it is recommended that if expertise is not available within the rehabilitation team, referrals are made to health professionals with experience in managing weight loss. Examples of such health professionals may include, but are not limited to, bariatric physicians, bariatric surgeons, specialist general practitioners, specialist nurses, dietitians, physiotherapists, exercise physiologists, psychologists/psychiatrists and cultural support workers.

If required, it is also recommended that suitably experienced specialists be consulted to manage conditions associated with obesity, including respiratory conditions, e.g., obstructive sleep apnoea, obesity hypoventilation syndrome, diabetes and skin conditions.

The patient's family/whānau/carer should be included in weight management programs whenever appropriate. Consultation with relevant community members is recommended for certain populations, such as Aboriginal and Torres Strait Islander peoples and Māori and Pasifika. For paediatric patients there is also potential to explore support with education teachers and schools to enable implementation of weight management strategies.

- c. Weight management programs for rehabilitation patients with bariatric needs should be patient-centred and include physical activity, nutrition, and behavioural and psychological therapy. The family/whānau/carer are also important facilitators in the treatment program and should be included, with agreement from the patient.**

It is recommended that weight management programs for rehabilitation patients with chronic disability and obesity are highly individualised with emphasis on defining the person's goals, as traditional evidence-informed interventions may not be applicable to some rehabilitation patients. Weight management programs are most successful when the patient is treated as the central member of the team, with consideration and support provided to their family/whānau/carer and their immediate community. This is particularly relevant for paediatric patients, where it is essential that the family/whānau/carer are involved as part of a family-centred approach. Individual patient characteristics including age, gender, cultural background, type and severity of impairment, and comorbidities need to be considered prior to implementation of a weight management program.

Weight management programs for rehabilitation patients should include comprehensive interventions:

- Physical activity should be supervised by a physiotherapist or exercise physiologist, aimed at improving muscle strength and range of movement, cardiorespiratory function, functional independence, and quality of life.
- Nutrition education and dietary prescription should be provided by a clinical dietitian, aimed at promoting weight loss (only if deemed appropriate for the individual), whilst preserving muscle mass and function. Nutrition intervention should also allow effective management of comorbid conditions such as diabetes, kidney disease and wound management.
- Psychological and eating disorders should be screened for and appropriately managed by a clinical psychologist, with referral to psychiatry if required.
- Education about obesity and its drivers should be provided to patients, family/whānau/carer and communities, including schools, with promotion of positive behavioural change.

Community led organisations also play a role in promoting healthy lifestyle and behaviours. In Australia, Aboriginal Community Controlled Health Organisations (ACCHOs) were established to address not only access to health, but to provide holistic, culturally safe care to the Aboriginal community. Community-led interventions which are undertaken as an act of self-determination should be preferentially supported and facilitated wherever possible.⁵⁸

Special consideration must be considered given the evidence showing most patients regain weight lost from non-surgical and non-pharmacological interventions. Rehabilitation patients discharged back into their obesogenic environments may find it extremely difficult to maintain healthy lifestyle choices long-term.⁵⁹

d. Pharmacological and/or surgical interventions should be considered in the weight management of rehabilitation patients with bariatric needs.

Consideration of pharmacological and/or surgical intervention for rehabilitation needs to be highly individualised. Pharmacological weight management prescription can be considered after review of patient comorbidities and ruling out any contraindications. It is recommended that medications only be prescribed by a medical practitioner with appropriate training and experience. Presently pharmacological options for paediatric obesity treatment are very limited and focus should be mainly on age-appropriate family-centred lifestyle interventions. Additional options for pharmacotherapy in adolescents are likely to be expanded in the next few years. Referral to a bariatric surgeon is recommended if the patient meets the referral criteria and consents to surgical review.⁵⁷

It is recommended that any pharmacological or surgical interventions aimed at weight loss need to be complemented by an integrated multidisciplinary weight management program, including nutrition, lifestyle, exercise, and psychological intervention, where appropriate.

e. Weight management programs for rehabilitation patients with bariatric needs from priority populations including Aboriginal and Torres Strait Islander populations and Māori and Pasifika must be socially and culturally appropriate and integrate the principles of trauma informed care.¹¹

A culturally appropriate service is one which considers language, beliefs, gender, and kinship systems; delivers care in a manner which respects these factors, and is free of discrimination. Collaboration with local communities and their leaders is recommended for weight management programs for rehabilitation patients from priority populations including Aboriginal and Torres Strait Islander populations and Māori and Pasifika, to ensure programs are socially and culturally appropriate.

In the [2021 AFRM Bariatric Rehabilitation Survey](#), 44.6% of rehabilitation medicine physicians felt that improved staff cultural awareness education and training would enable more effective rehabilitation of patients with bariatric needs.

Many weight management programs do not consider the vital role of stress and trauma in weight management. Trauma-informed programs respond to how people, family/whānau/carer and communities have been impacted by trauma. Values and principles of trauma-informed services can include awareness of trauma impacts, patient safety, cultural competency, enabling an individual's control, enabling healing, and providing integrated care.^{60, 61}

National funding and community-led strengths-based approaches underpinned by self-determination, which address multiple risk factors simultaneously, are likely to be most effective at reducing obesity in Indigenous children.⁶¹ High level mapping and evaluation and dissemination of findings need to be prioritised in program design, along with appropriate funding and support to facilitate the building of an Aboriginal health workforce to develop, coordinate, deliver and evaluate programs.⁶²

4. Potential for collaboration between rehabilitation medicine and weight management services in Australia and Aotearoa New Zealand

In Europe, physical and rehabilitation medicine (PRM) physicians and the rehabilitation multidisciplinary team implement multidisciplinary weight management programs. PRM physicians across Europe have developed a rehabilitation position paper (2017) and rehabilitation practice guideline (2020) for patients with obesity and obesity-related comorbidities.³² Within the European Union PRM community, obesity and obesity-related comorbidities are classified as disabilities, therefore assessment and management of obesity is based on the ICF principles that are fundamental to rehabilitation medicine.^{32, 63}

There is evidence for multidisciplinary rehabilitation inpatient and outpatient intervention for patients with obesity, resulting in weight loss, reduction in waist circumference, improved strength, balance, gait speed, metabolic markers and quality of life.^{64, 65, 66, 31, 67, 68, 69, 18, 70} There is also evidence and recommendations for a disability approach to weight management, based on rehabilitation principles.^{63, 71, 66}

Exercise is a core component of rehabilitation programs. The benefits of exercise in weight management programs not only includes weight loss, but also reversal of sarcopenia, reduction of cardiometabolic risk factors (including hypertension, hypercholesterolaemia and diabetes), improved strength, functional independence, cardiorespiratory function, mood, quality of life and pain reduction.^{72, 73, 74, 75, 76, 77, 78, 79, 80, 30, 81}

- a. Rehabilitation services have the potential to provide joint care, or consultation service, weight management services for managing the complex needs of patients with comorbid disability.**

In Australia, in 2017-18 children with disability were more likely to be overweight or have obesity (30%) compared to those without disability (24%).⁸² Rates of obesity are higher in people with disability, who are often known to rehabilitation services.^{83, 84, 85, 86}

In the [2021 AFRM Bariatric Rehabilitation Survey](#), 58.6% of rehabilitation medicine physicians felt there could be a role for joint care of patients with Class 3 obesity who were already known to rehabilitation services. The survey of Australasian public weight management clinics revealed that 85.7% of responders felt that rehabilitation services could complement their clinic by management of concurrent disability by the multidisciplinary model, e.g. assessment of exercise tolerance, exercise prescription, assessment of aids and tools requirement, psychosocial support, and dietary advice.

b. With the appropriate funding, rehabilitation services have the potential to provide resources to complement under-resourced public health weight management services.

Distance to clinic services is a significant factor affecting patients' incompleteness in weight management programs in Australia. There is also a lack of access to specialised staff in public health weight management clinics in Australia, including exercise specialists.

In the [2021 AFRM Bariatric Rehabilitation Survey](#):

- 54.1% of rehabilitation medicine physicians felt that rehabilitation services could provide additional resources for understaffed weight management clinics.
- 53.15% of rehabilitation medicine physicians responded that rehabilitation services could provide an alternative service for those that are ineligible for weight loss surgery.
- 45.1% of rehabilitation medicine physicians felt that rehabilitation services could provide an alternative option for those unable to attend weight loss clinics due to geographical inequity or other reasons.

However, in the same survey there were concerns regarding resource limitations within the rehabilitation service to be able to manage patients with bariatric needs, including insufficient rehabilitation staff numbers, inadequate facilities and inadequate equipment.

c. There is a potential role for “prehabilitation” (multidisciplinary rehabilitation intervention prior to bariatric surgery) with this cohort of patients, e.g., nutrition, exercise prescription and management of depression.

“Prehabilitation” or “prehab” refers to multidisciplinary intervention including exercise, diet, lifestyle changes and psychology prior to weight loss surgery. Prehab has been shown to improve 1-year post-operative weight loss, strength, gait speed and exercise levels, improved asthma, and quality of life, and is endorsed by the Obesity Society and American Society for Bariatric and Metabolic Surgery (2020).⁸⁷

Surgical weight management programs must also be familiar with and advance both prehab and post-operative rehabilitation in those with morbid obesity. Most surgical weight loss clinics advance the cause of pre-operative weight loss as this is established to improve anaesthetic risk and surgical complication profile, but this would be best performed in a holistic prehab program for both physical and metabolic recovery, as well as management of comorbidities and in particular type 2 diabetes.

In the survey of Australasian public weight management clinics in 2021, a third of clinics reported that there would be benefit for rehabilitation medicine services to provide prehab prior to weight loss surgery. In the [2021 AFRM Bariatric Rehabilitation Survey](#) 83.8% of rehabilitation medicine physicians felt that rehabilitation services had the potential to provide prehab prior to weight loss surgery.

The RACP Position Statement on Obesity¹¹ recommends equal access to public bariatric surgery. Prehab has the potential to improve access to weight management clinics for those previously unable to attend due to physical limitations, e.g. housebound due to reduced mobility.

The Australia and New Zealand Metabolic and Obesity Surgery Society is promoting and advancing the availability of surgical weight loss in the public health sector. Most weight loss surgical procedures are currently carried out in the private health sector, although most tertiary referral centres are looking to engage in the process of weight management. To this end, all rehabilitation services must be familiar with the services available in their locality. Indeed, given the strong evidence base for weight loss surgery, it should be advocated for the patient whether the service is unavailable or not.

d. There is a potential role for outpatient rehabilitation services after weight loss surgery in Australia and Aotearoa New Zealand for maintenance of weight loss and prevention of relapse.

There is increasing evidence of the benefits of an exercise program after weight loss surgery, including the potential for maintenance of weight loss and muscle mass, and improved quality of life. There are also recommendations for high quality research into this area, which is an opportunity for rehabilitation services.^{88, 89, 90, 91, 92, 81}

In terms of the management and care of patients post weight loss surgery, outpatient rehabilitation can be offered to selected cases. 16.7% of public weight management clinics felt that inpatient and outpatient rehabilitation would complement their current services. Larger proportions of rehabilitation medicine physicians considered the merit of inpatient (53.2%) and outpatient (70.3%) rehabilitation for complementing the post-weight loss surgery.

However multiple barriers were identified that might prevent effective rehabilitation of patients with bariatric needs, including inability to admit patients with bariatric needs due to limited resources, increased length of stay, decreased FIM efficiency, occupational health and safety concerns, insufficient staff numbers, inadequate facilities, inadequate equipment, weight stigma and lack of suitable nutrition options. It is well documented that a proportion of patients will regain weight and obesity-associated health issues sometime after weight loss surgery.^{93, 94, 95}

In the 2021 AFRM Bariatric Rehabilitation Survey, 60.4% of rehabilitation medicine physicians felt that a long-term maintenance rehabilitation program may reduce relapse rates. In the 2021 survey of public weight management clinics in Australia and AoNZ, 83.3% felt that rehabilitation services could provide a long-term maintenance program. An opportunity exists to determine the effectiveness of rehabilitation intervention to maintain weight loss after weight loss surgery.

e. There are opportunities for rehabilitation-led research into obesity and consumer engagement.

Rehabilitation medicine physicians have been involved in creating assessment tools specific to patients with bariatric needs.^{96, 97, 98, 99, 100} There are potential opportunities for further research into validated assessment and outcome tools that can be used in weight management services and rehabilitation services managing patients with bariatric needs.

There is opportunity for research into the effectiveness of:

- Complementary rehabilitation intervention in patients participating in weight management services.
- Measuring effectiveness of multidisciplinary rehabilitation intervention.
- Exercise prescription for patients involved in weight management services.
- Smart technology, telehealth, and internet-based interventions.^{101, 102}

f. There are opportunities for rehabilitation medicine organisations to collaborate with other healthcare organisations for education and networking, and with patient advocacy organisations for informing of lived experience of obesity.

Involvement of consumers in health care and research is vital to policy planning. Consumers must be equal partners with health care organisations and providers to ensure that they are included in the design and planning of research.¹⁰³ There are opportunities for rehabilitation medicine societies and organisations to form collaborative links with healthcare organisations such as the Australian and New Zealand Metabolic and Obesity Surgery Society (ANZMOSS) and National Association of Clinical Obesity Services (NACOS) for education and networking. For

patient advocacy and education regarding lived experiences, there are opportunities for rehabilitation medicine to collaborate with groups such as the Weight Issues Network (WIN).

References

- ¹ Royal Australasian College of Physicians. Evidence Review: Action to Prevent Obesity and Reduce its Impact Across the Life Course [Internet]. Sydney, NSW. 2018. Available from: <https://www.racp.edu.au/docs/default-source/advocacy-library/racp-obesity-evidence-review.pdf>
- ² Baur LA. Treatment of childhood obesity. Australian Prescriber [Internet]. 2003;04(26):30-2. Available from: <https://www.nps.org.au/australian-prescriber/articles/treatment-of-childhood-obesity>
- ³ Australian Institute of Health and Welfare. Overweight and obesity: an interactive insight [Internet]. 2020 [cited 2022 June 28]. Available from <https://www.aihw.gov.au/reports/overweight-obesity/overweight-and-obesity-an-interactive-insight/contents/differences-between-groups>
- ⁴ Australian Institute of Health and Welfare. Aboriginal and Torres Strait Islander Health Performance Framework [Internet]. AIHW National Indigenous Australians Agency. Australia. 2020 [cited 2021 Feb 2]. Available from: <https://www.indigenoushpf.gov.au/measures/2-22-overweight-obesity#keyfacts>
- ⁵ Ministry of Health. New Zealand Health Survey [Internet]. Annual Data Explorer; Aotearoa New Zealand. 2021 [cited 2021 Feb 2]. Available from: <https://minhealthnz.shinyapps.io/nz-health-survey-2020-21-annual-data-explorer/ w 73e83a76#!/key-indicators>
- ⁶ Australasian Rehabilitation Outcomes Centre. AROC calendar Year 2021 benchmark data (Data Access Application: 2020_04_STUR)
- ⁷ Royal Australasian College of Physicians. The Australasian Faculty of Rehabilitation Medicine (AFRM) Bariatric Rehabilitation Survey Results [Internet]. Sydney, NSW. 2021 [cited 2021 Feb 2]. Available from: <https://www.racp.edu.au/docs/default-source/policy-and-adv/afrm-bariatric-rehabilitation-survey-results-2021.pdf>
- ⁸ McMaster CM, Calleja E, Cohen J, Alexander S, Denney-Wilson E, Baur LA. Current status of multi-disciplinary paediatric weight management services in Australia. Journal of Paediatrics and Child Health. 2021; 57(8):1259-1266.
- ⁹ World Health Organisation. Draft recommendations for the prevention and management of obesity over the life course, including potential Targets. August 2021. P16. Report No.:1.
- ¹⁰ NSW Health. Work Health and Safety – Management of Patients with bariatric needs [Internet]. NSW, 2018 May. [cited 2020 December]. Available from: https://www1.health.nsw.gov.au/pds/ActivePDS/Documents/GL2018_012.pdf
- ¹¹ Royal Australasian College of Physicians. Position Statement on Obesity [Internet]. Sydney, NSW. 2018. Available from: https://www.racp.edu.au/docs/default-source/advocacy-library/racp-obesity-position-statement.pdf?sfvrsn=6e3b0b1a_5
- ¹² Wise FM, Harris DW, Olver, JH. Attitudes to obesity among rehabilitation health professionals in Australia. Journal of Allied Health. 2014; 43(3):162-168.
- ¹³ Royal Australasian College of Physicians. Indigenous child health in Australia and Aotearoa New Zealand [Internet]. Sydney, NSW. 2020. [cited 2021 June 25]. Available from: <https://www.racp.edu.au/docs/default-source/advocacy-library/indigenous-ch-statement-on-ich.pdf>

- ¹⁴ Royal Australasian College of Physicians. Position Statement on Obesity. Action to prevent obesity and reduce its impact across life course [Internet]. Sydney, NSW. 2018 [cited 2021 June 25]. Available from: https://www.racp.edu.au/docs/default-source/advocacy-library/racp-obesity-position-statement.pdf?sfvrsn=6e3b0b1a_5
- ¹⁵ Aboriginal Health and Medical Research Council of NSW. A Practical Guide to Chronic Conditions. NSW, Australia. 2015 [updated 2020 June; cited 2021 Feb 17]. Available from: https://www.ahmrc.org.au/wp-content/uploads/2021/03/AHMRC_LLS_ChronicDiseasePracGuide_Sep2020_14.pdf
- ¹⁶ Giaquinto S, Palma E, Maiolo I, Piro M, Roncacci S, Sciarra A, Vittoria E. Importance and evaluation of comorbidity in rehabilitation. *Disability and Rehabilitation*. 2001; 23:7:296-299.
- ¹⁷ Giaquinto S. Comorbidity in post-stroke rehabilitation. *European Journal of Neurology* [Internet]. 2003;10(3):235-8. Available from: <https://pubmed.ncbi.nlm.nih.gov/12752396/>
- ¹⁸ Seida J, Sharma A, Johnson J, Forhan M. Hospital rehabilitation for patients with obesity: a scoping review. *Disability Rehabilitation*. 2016;16:125-134.
- ¹⁹ Australian Institute of Health and Welfare. Overweight and obesity: an interactive insight [Internet]. 2020 [cited 2022 June 28]. Available from <https://www.aihw.gov.au/reports/overweight-obesity/overweight-and-obesity-an-interactive-insight/contents/differences-between-groups>
- ²⁰ Graham SK, Cameron ID. A survey of rehabilitation services in Australia. *Australian Health Review*. 2008;32:392-399.
- ²¹ Lahham A, Holland AE. The Need for Expanding Pulmonary Rehabilitation Services. *Life*. 2021; 11(11):1236.
- ²² Prior SJ, Reeves NS, Campbell SJ. Challenges of delivering evidence-based stroke services for rural areas in Australia. *Australian Journal of Rural Health*. 2020;28:15-21.
- ²³ Mitsch V, Curtin M, Badge H. The provision of brain injury rehabilitation services for people living in rural and remote New South Wales, Australia. *Brain Injury*. 2014;28(12):1504-1513.
- ²⁴ Bohanna I, Harriss L, McDonald M, Cullen J, Strivens E, Bird K, et al. A systematic review of disability, rehabilitation and lifestyle services in rural and remote Australia through the lens of the people-centred health care. *Disability and Rehabilitation*. 2021 July. DOI: 10.1080/09638288.2021.1962992
- ²⁵ Sharp VL, Chapman J, Gardner B, Ponsford J, Giummarra M, Lannin N, et al. Perspectives of major traumatic injury survivors on accessibility and quality of rehabilitation services in rural Australia. *Disability and Rehabilitation*. 2022 March. DOI: 10.1080/09638288.2022.2060345
- ²⁶ World Health Organisation. International Classification of Function, Disability and Health [Internet]. 2020 [cited 2020 Feb 4]. Available from: <https://www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health>
- ²⁷ National Association of Clinical Obesity Services. National Framework for Clinical Obesity Services. Sydney: Australia. 2020. P43. Report No.:1.
- ²⁸ Narayanan B, Kohler F, Arulanandam P. The efficacy of in-reach rehabilitation in morbidly obese post-septic patients: two retrospective case reports. *Journal of Rehabilitation Medicine. Clinical Communications*. 2020;3:1000042.
- ²⁹ Donini LM, Poggiogalle E, Migliaccio S, Pinto A, Lubrano C, Lnenzi A. Sarcopenic obesity: correlations with clinical, functional, and psychological status in a rehabilitation setting.

Food and Nutrition Sciences. 2014;5(20):2020-2031.

³⁰ Stoever K, Heber A, Eichberg S, Brixius K. Influences of Resistance Training on Physical Function in Older, Obese Men and Women with Sarcopenia. *Journal of Geriatric Physical Therapy*. 2018; 41(1):20-27.

³¹ Capodaglio P, Ilieva E, Oral A, Kiekens C, Negrini S, Donoso EV, et al. Evidence based position paper on Physical and Rehabilitation Medicine (PRM) professional practice for people with obesity and related comorbidities. The European PRM position (UEMS PRM Section). *European Journal of Physical Rehabilitation Medicine*. 2017;53(4): 611-624.

³² Giusti E.M, Spatola CA, Brunani A, Kumbhare D, Oral A, Ilieva E, et al. ISPRM ESPRM guidelines on physical and rehab medicine professional practice for adults with obesity and related comorbidities. *European Journal of Physical Rehabilitation Medicine*. 2020;56(4): 496-507.

³³ Hignett S, Griffiths P. Manual Handling Risks in the Bariatric (obese) Patient Pathway in Acute Sector, Community and Ambulance Care and Treatment. *National Library of Medicine*. 2009:175-18.

³⁴ Ewens B, Kemp V, Towell-Barnard A, Whitehead L. The nursing care of people with class III obesity in an acute care setting: a scoping review. *BMC Nursing*. 2022;21:33.

³⁵ Popejoy LL, Galambos C, Moylan K, Madsen R. Challenges to hospital discharge planning for older adults. *Clinical Nursing Research*. 2012;21(4):431-49.

³⁶ Huang, SL, Cheng H, Duffield C, Denney-Wilson E. The relationship between patient obesity and nursing workload: an integrative review. *Journal of Clinical Nursing*. 2021;30(13-14):1810-1825.

³⁷ Padwal RS, Wang X, Sharma AM, Dyer D. The impact of severe obesity on post-acute

rehabilitation efficiency, length of stay, and hospital costs. *Journal of Obesity*. 2012:1-7.

³⁸ Oakley L, Soh SE, Kimmel L, Mulvey N, Curtis H, Holland AE. The impact of obesity in rehabilitation: a mismatch between staff perception and hospital outcomes, *Disability Rehabilitation*. 2020;1-7.

³⁹ Burke DT, Al-Adawi S, Bell RB, Easley K, Chen S, Burke DP. Effect of body mass index on stroke rehabilitation. *Archives of Physical Medicine and Rehabilitation*. 2014;95(6):1055-9.

⁴⁰ Ciancarelli I, Tonin P, Garo ML, Ciancarelli MG. Effectiveness of intensive neurorehabilitation in obese subacute stroke patients. *Functional neurology*. 2019;34(1):45-51.

⁴¹ Kalichman L, Alperovitch-Najenson D, Treger I. The impact of patient's weight on post-stroke rehabilitation. *Disability and Rehabilitation*. 2016;38(17):1684-1690.

⁴² Jain NB, Al-Adawi S, Dorvlo ASS, Burke DT. Association between body mass index and functional independence measure in patients with deconditioning. *American Journal of Physical Medicine and Rehabilitation*. 2008;87(1): 21-25.

⁴³ Le D, Shafi S, Gwartz P, Bennett M, Reeves R, Callender L, et al. Effect of Obesity on Motor Functional Outcome of Rehabilitating Traumatic Brain Injury Patients. *American Journal of Physical Medicine and Rehabilitation*. 2015; 94(8):627-32

⁴⁴ Prohaska MG, Keeney BJ, Beg HA, Swarup I, Moschetti WE, Kantor SR, Tomek IM. Preoperative body mass index and physical function are associated with length of stay and facility discharge after total knee arthroplasty. *Knee*. 2017;24(3):634-640.

⁴⁵ Vincent H, Weng J, Vincent K. Effect of Obesity on Inpatient Rehabilitation Outcomes after Total Hip Arthroplasty*. *Obesity*. 2007;15(2):522-530.

-
- ⁴⁶ Ramachandran D, Altantis E, Markociv T, et al. Standard baseline data collections on obesity management clinics: A Delphi study with recommendations from an expert panel. *Clinical Obesity*. 2019;9(3).
- ⁴⁷ National Framework for Clinical Obesity Services. First Edition. National Association of Clinical Obesity Services [Internet] 2020. [Accessed 28 June 2022]. Available from <https://www.nacos.org.au/base/wp-content/uploads/NACOSFrameworkupdated24022020.pdf>
- ⁴⁸ Osterkamp LK. Current perspective on assessment of human body proportions of relevance to amputees. *Journal of the American Dietetic Association*. 1995Feb;95(2):215-8.
- ⁴⁹ Im EE, Stewart IJ, Morrow BD, Tilley MA, Heegard KD, Aden JK, et al. Retrospective review of serum creatinine and creatinine-based measures of estimated glomerular filtration rate in an amputee population. *Military Medicine*. 2012;177(8):952-6.
- ⁵⁰ Gorgey AS, Mather KJ, Poarch HJ, Gater DR. Influence of motor complete spinal cord injury on visceral and subcutaneous adipose tissue measured by multi-axial magnetic resonance imaging. *Journal of Spinal Cord Medicine*. 2011;34(1):99–109.
- ⁵¹ Dionyssiotis Y. Malnutrition in spinal cord injury: more than nutritional deficiency. *Journal of clinical medicine research*. 2012;4(4):227–236.
- ⁵² Winter JE, MacInnis RJ, Wattanapenpaiboon N, Nowson CA. BMI and all-cause mortality in older adults: a meta-analysis. *American Journal of Clinical Nutrition*. 2014;99(4):875-90.
- ⁵³ Morone G, Iosa M, Paolucci T, Muzziolo L, Paolucci S. Relationship between body mass index and rehabilitation outcomes in subacute stroke with dysphagia. *American Journal of Physical Medicine and Rehabilitation*. 2019;98(7):608-612.
- ⁵⁴ Layton GR, Bhanderi S, Sahloul M, Charalampakis V, Daskalakis M, Singhal R. Challenges and outcomes for bariatric surgery in patients with paraplegia: case series and systematic review. *Clinical Obesity*, 2020;10(4):1-8.
- ⁵⁵ Gibbons E, Casey AF, Brestler KZ. Bariatric surgery and intellectual disability: Furthering evidence-based practice. *Disability Health Journal*. 2017;10(1):3-10.
- ⁵⁶ Australian and New Zealand Metabolic and Obesity Surgical Society. Public Bariatric Surgery A National Framework – Executive Summary Document [Internet]. 2020 [Cited 2021 April 19]. Available from: https://anzmoss.com.au/wp-content/uploads/Public-Bariatric-Surgery-Framework_EXEC-SUM-ONLY.pdf
- ⁵⁷ Royal Australasian College of Physicians. Recommendations for bariatric surgery in adolescents in Australia and New Zealand [Internet]. 2010. [Cited 2021 April 19]. Available from: <https://www.racp.edu.au/docs/default-source/advocacy-library/recommendations-for-bariatric-surgery-in-adolescents.pdf>
- ⁵⁸ National Aboriginal Community Controlled Health Organisation (NACCHO). National Obesity Prevention Strategy Consultation Submission to the Department of Health. Canberra: Australia. 2021. P13. Report No.:1.
- ⁵⁹ Nordmo M, Danielson YS, Nordmo M. The challenge of keeping it off, a descriptive systematic review of high-quality, follow-up studies of obesity treatments. *Obesity Review*. 2020;21(1):12949.
- ⁶⁰ Australian Institute of Health and Welfare. Trauma-informed services and trauma-specific care for Indigenous Australian children, Resource sheet no.21. Closing the Gap Clearinghouse. 2013:196.
- ⁶¹ Sherriff A, Baur LA, Lambert MG, Dickson ML, Eades SJ, Muthayya S. Aboriginal childhood overweight and obesity: the need for Aboriginal

designed and led initiatives. *Public Health Research and Practice*. 2019;29(4)

⁶² Sherriff A, Baur LA, Lambert MG, Dickson ML, Eades SJ, Muthayya S. Aboriginal childhood overweight and obesity: the need for Aboriginal designed and led initiatives. *Public Health Research and Practice*. 2019;29(4)

⁶³ Brunani A, Raggi A, Sirtori A, Berselli ME, Villa V, Ceriani F, et al. An ICF-based model for implementing and standardizing multidisciplinary obesity rehabilitation programs within healthcare system. *International Journal of Environmental Research and Public Health*. 2015;12:6084-6091

⁶⁴ Budui S, Bigolin F, Giordano F, Leoni S, Berteotti M, Sartori E, et al. Effects of an Intensive Inpatient Rehabilitation Program in Elderly Patients with Obesity. *Obesity Facts*. 2019;12(2):199–210.

⁶⁵ Capodaglio P, Cimolin V, Tacchini E, Precilios H, Brunani A. Effectiveness of in-patient rehabilitation in obesity-related orthopaedic conditions. *Journal of Endocrinological Investigation*, 2013;36(8):628-631.

⁶⁶ Capodaglio P, Donini LM, Petroni ML, Brunani A, Grave RD, Flaviano CED, et al. Rehabilitation in obesity with comorbidities: a consensus document from experts of the Italian Society of Physical and Rehabilitation Medicine (SIMFER), the Italian Society of Obesity (SIO) and the Italian Society of Eating Disorders (SISDCA). *Eating and Weight Disorders*. 2014;19(3):383-386

⁶⁷ Capodaglio P, Lafortuna C, Petroni ML, Gondoni SA, Castelnuovo G, Brunani A. Rationale for hospital-based rehabilitation in obesity with comorbidities. *European Journal of Physical Rehabilitation Medicine*. 2013;69:399-417.

⁶⁸ Giordano F, Berteotti M, Budui S, Calgaro N, Franceschini L, Gilli F, et al. Multidimensional improvements induced by an intensive obesity

inpatients rehabilitation programme. *Eating and Weight Disorders*. 2017;22:329-338.

⁶⁹ Rigamonti A, De Col A, Tamini S, Cicolini S, Caroli D, De Micheli R et al. Multidisciplinary Integrated Metabolic Rehabilitation in Elderly Obese Patients: Effects on Cardiovascular Risk Factors, Fatigue and Muscle Performance. *Nutrients*. 2019;11(6):1240.

⁷⁰ Takahashi T, Ebihara S, Kohzuki M. Improvement of pulmonary function after comprehensive obesity rehabilitation program in obese patients. *Tohoku Journal of Experimental Medicine*. 2017;242:215-221.

⁷¹ Stucki A, Daansen P, Fuesl M, Cieza A, Huber E, Atkinson R, et al. ICF core sets for obesity. *Journal of Rehabilitation Medicine*. 2004 (Supp);44:107-113.

⁷² Annesi J, Gorjala S. Relationship of Exercise Program Participation with Weight Loss in Adults with Severe Obesity: Assessing Psychologically Based Mediators. *Southern Medical Journal*. 2010;103(11):1119-1123.

⁷³ Baillet A, Romain AJ, Boisvert-Vigneault K, Audet M, Baillargeon JP, Dionne IJ, et al. Effects of Lifestyle Interventions that include a Physical Activity Component in Class II and III Obese Individuals: A Systematic Review and Meta-Analysis. 2015;1;10(4):e0119017.

⁷⁴ Bouaziz W, Schmitt E, Kaltenbach G, Geny B, Vogel T. Health benefits of endurance training alone or combined with diet for obese patients over 60: a review. *International Journal of Clinical Practice*. 2015;69(10):1032-49.

⁷⁵ Drigny J, Gremeaux V, Dupuy O, Gayda M, Bherer L, Juneau M, Nigam A. Effect of interval training on cognitive functioning and cerebral oxygenation in obese patients: a pilot study. *Journal of Rehabilitation Medicine*. 2014;46(10):1050-4.

⁷⁶ Gorostegi-Anduaga I, Corres P, Martinez-Aguirre-Betolaza A, Perez-Asenjo J, Aispuru GR, Fryer SM. Effects of different

aerobic exercise programmes with nutritional intervention in sedentary adults with overweight/obesity and hypertension: EXERDIET-HTA study. *European Journal of Preventive Cardiology*. 2018;25(4):343-353.

⁷⁷ Nicolai SP, Kruidenier LM, Leffers P, Hardeman R, Hidding A, Teijink JA. Supervised exercise versus non-supervised exercise for reducing weight in obese adults. *Journal of Sports Medicine and Physical Fitness*. 2009;49(1):85-90.

⁷⁸ Paley CA, Johnson MI. Abdominal obesity and metabolic syndrome: exercise as medicine? *MBC Sports Science Medicine and Rehabilitation*. 2018;10(7):1-8.

⁷⁹ Sarsan A, Ardiç F, Özgen M, Topuz O, Sermez Y. The effects of aerobic and resistance exercises in obese women. *Clinical Rehabilitation*. 2006;20(9):773-782.

⁸⁰ Sheets CS, Peat CM, Berg KC, White EK, Bocchieri-Ricciardi L, Chen EY, et al. Post-operative psychosocial predictors of outcome in bariatric surgery. *Obesity Surgery*. 2015;25(2):330-345.

⁸¹ Stolberg CR, Mundbjerg LH, Bladbjerg EM, Funch-Jensen P, Gram B, et al. Physical training following gastric bypass: effects on physical activity and quality of life-a randomized controlled trial. 2018;27(12):3113-3122.

⁸² Australian Institute of Health and Welfare. Australia's Children [Internet]. 2020 [cited 4 May 2021]. Available at <https://www.aihw.gov.au/reports/children-youth/australias-children/contents/health/overweight-obesity>.

⁸³ Fox MH, Witten MH, Lullo C. Reducing Obesity among People with Disabilities. *Journal of disability policy studies*. 2014;25(3):175–185.

⁸⁴ Ells LJ, Lang R, Shield JPH, Wilkinson JR, Lidstone JSM, Coulton S, Summerbell CD.

Obesity and disability A short review. *Obesity Reviews*. 2006;7(4):341–345.

⁸⁵ Australian Institute of Health and Welfare. Australia's health 2016 [Internet]. Australia; 2016;242-243. Available from <https://www.aihw.gov.au/reports/australias-health/australias-health-2016>.

⁸⁶ Patradoon-Ho P, Scheinberg A, Baur LA. Obesity in children and adolescents with acquired brain injury. *Paediatric Rehabilitation*. 2005;8(4):303-8.

⁸⁷ Mechanick JI, Apovian C, Brethauer S, Garvey TW, Joffe AM, Kim J, et al. Clinical practice guidelines for the perioperative nutrition, metabolic, and nonsurgical support of patients undergoing bariatric procedures – 2019 update: cosponsored by American Association of Clinical Endocrinologists/American College of Endocrinology, The Obesity Society, American Society for Metabolic and Bariatric Surgery, Obesity Medicine Association, and American Society of Anaesthesiologists. *Surgery for Obesity and Related Diseases*. 2019;16(2):175-247.

⁸⁸ Coen PM, Goodpaster BH. A role for exercise after bariatric surgery? *Diabetes, obesity and metabolism*. 2015;18(1):16–23.

⁸⁹ Coen PM, Camero EA, Goodpaster BH. Exercise and bariatric surgery: an effective therapeutic strategy. *Exercise and sports science reviews*. 2018; 46 (4): 262-270.

⁹⁰ Davidson LE, Wen Y, Goodpaster BH, DeLany JP, Widen E, Lemos T, et al. Fat-free mass and skeletal muscle mass five years after bariatric surgery. *Obesity*. 2018;26(7):1130-1136.

⁹¹ Faintuch J, Souza SAF, Fabris SM, Cecconello PC. Rehabilitation needs after bariatric surgery. *European Journal of Physical and Rehabilitation Medicine*. 2013;49(3):431-437.

-
- ⁹² Morana C, Collignon M, Nocca D. Effectiveness of a functional rehabilitation program after bariatric surgery: a pilot study. *Obesity Surgery*. 2018;28:2321-2326.
- ⁹³ Golomb I, Ben David M, Glass A, Koltz T, Keidar A. Long-term Metabolic Effects of Laparoscopic Sleeve Gastrectomy. *JAMA Surgery*. 2015;150(11):1051.
- ⁹⁴ Johnson Stoklossa C, Atwal S. Nutrition Care for Patients with Weight Regain after Bariatric Surgery. *Gastroenterology Research and Practice*. 2013;1-7.
- ⁹⁵ Himpens J, Dobbeleir J, Peeters G. Long-term results of laparoscopic sleeve gastrectomy for obesity. *Annals of surgery*. 2010;252(2):319–324.
- ⁹⁶ Capodaglio, P, Brunani A, Cimolin, V. Reference values for six-minute walking test in obese subjects. *Physical medicine and rehabilitation*. 2012;4(10s): S307-308.
- ⁹⁷ Donini ML, Dalle Grave R, Di Flaviano E, Gentile MG, Mezzani B, Pandolfo Mayme M, et al. Assessing the appropriateness of level of care morbidly obese subjects: validation of CASCO-R scale. *Annali di Igiene*. 2014;26(3):195-204.
- ⁹⁸ Gruchala-Niedoszytko M, Niedoszytko P, Kaczkan M, Pieszko M, Gierat-Haponiuk K, Sliwinska A, et al. Cardiopulmonary exercise test and bioimpedance as prediction tools to predict the outcomes of obesity treatment, *Polish archives of internal medicine*. 2019;129(4):225-233.
- ⁹⁹ Lanzi S, Codecasa F, Comacchia M, Maestrini S, Capodaglio P, Brunani A, et al. Long Maximal Incremental Tests Accurately Assess Aerobic Fitness in Class II and III Obese Men. *PLOS ONE*. 2015;10(4):1-12.
- ¹⁰⁰ Sirtori A, Brunani A, Capodaglio P, Berselli, M, Villa V, Corti S, et al. ICF-OB: a multidisciplinary questionnaire based on the International Classification of Functioning, Disability and Health to address disability in obesity. *European Journal of Physical Rehabilitation Medicine, letters to editor*. 2018;54(1):119-121.
- ¹⁰¹ Maurice AP, Punnasseril J, King SE, Dodd BR. Improving Access to Bariatric Surgery for Rural and Remote Patients: Experiences from a State-Wide Bariatric Telehealth Service in Australia. *Obesity surgery*. 2020;30(11):4401–4410.
- ¹⁰² Coldebella B, Armfield NR, Bambling M, Hansen J, Edirippulige S. The use of telemedicine for delivering healthcare to bariatric surgery patients: A literature review. *Journal of telemedicine and telecare*. 2018;24(10), 651–660.
- ¹⁰³ Janamian T, Crossland L, Wells L. On the road to value co-creation in health care: the role of consumers in defining the destination, planning the journey and sharing the drive. *Medical Journal of Australia [Internet]*. 2016;204(7):S12 – S.