

## **Weight a Moment! What are the preventive measures we can take to minimise sarcopenia in the geriatric population?**

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## **Key Learning Points**

- 1) Early recognition and diagnosis using screening tools and diagnostic criteria plays a crucial role in improving outcomes for patients with sarcopenia.**
- 2) The timely utilization of pharmacological/non-pharmacological interventions is paramount to changing disease progression, prognosis and disease-burden.**
- 3) A holistic approach should be adopted when managing patients with sarcopenia, making sure to factor in the psychological and spiritual burden of the disease.**
- 4) Effective multi-disciplinary teams and constructive team meetings are core to the successful management of sarcopenia.**
- 5) The need for greater awareness of sarcopenia amongst healthcare workers, medical students and the general public to familiarise themselves with definitions and guidelines for prompt recognition, diagnosis and timely treatment.**

## **Introduction**

The term “sarcopenia” is derived from the Greek phrase meaning “poverty of flesh”, and is a phenomenon where-by the progressive loss of muscle mass, strength and function, leads to adverse health-outcomes, including increased frequency of falls, functional decline, frailty, institutionalised care, as well as higher rates of morbidity and mortality (Cho et al. 2022). Ultimately, these all interact to negatively affect quality of life through loss of independence and functional capacity.

Sarcopenia is predominantly observed in the ageing population, affecting those mostly between the ages of 70 to 80 years-old and affects both male and female genders with equal proportions. The BELFRAIL study by (Legrand et al. 2013) demonstrated that sarcopenia affects a staggering 12.5% of those who are ≥80 years-old and is particularly predominant in some specific patient-groups i.e. diabetics, where it is seen to affect up to 18% of patients (Yuan and Larsson 2023). It is expected that these figures will continue to rise exponentially, as the ageing population in the UK is set to double in size, from only 1.7 million individuals in 2020 to 3.1 million individuals by 2045 (ONS 2023). Furthermore, the financial implications of sarcopenia is immense, costing the NHS in excess of £2.5 billion annually (NIHR 2023). Therefore, as future clinicians it is imperative that sarcopenia is a condition that is not overlooked and as healthcare providers, we must take a pro-active stance in raising awareness for timely recognition, accurate diagnosis and prompt in-situ treatment.

## **Patient X**

The inspiration for choosing the focus of this essay is single-handedly attributed to Patient X, who I had the pleasure of meeting during my clinical placement at The Royal Glamorgan Hospital. He was an 80-year-old retired male patient, who was initially admitted to the respiratory ward with an exacerbation of his chronic obstructive pulmonary disease (COPD).

However, after a number of post-exacerbation complications, it resulted in a prolonged and lengthy admission, which in turn, was the setting-stone for the development of sarcopenia. Being able to follow Patient X from the moment he was admitted up until his discharge, gave me an unique insight as to the profound holistic effects this condition exerts on patients, including its effects on disease progression, recovery and importantly – quality of life (QoL). Ultimately, it also made me appreciate the significant adverse consequences sarcopenia has on comorbidity diseases as well.

Before admission, Patient X described himself as ‘fully independent’ - mobile, independently completing all Activities of Daily Living (ADLs) e.g. dressing/bathing and Instrumental Activities of Daily Living (IADLs) e.g. cooking/driving. However, as the development of sarcopenia progressed, I witnessed the immense detrimental effects this condition has on one’s physical capabilities. Over the course of the admission, Patient X became increasingly reliant on his wheelchair to be ambulatory and by the end, it was apparent that he had marked difficulties even standing or sitting upright for prolonged periods of time. Functionally, I was able to see how this impacted almost all aspects of his life including his social one, markedly limiting his ability to visit friends and family, and ultimately leading to further social isolation – a risk factor in itself to poorer outcomes in our elderly population (Donovan and Blazer 2020).

Another key aspect that continued to trouble him was the notable decline in hand-grip strength as it caused considerable difficulty performing day-day tasks such as getting dressed in the morning, eating/drinking with cutlery/cups, grooming, bathing and writing. Subsequently, it meant most ADLs and IADLs were in-part or completely undertaken by others i.e. his family, nurses and carers. For Patient X, he was devastated to lose his independence, owing to the fact that he had never had to rely so much on others, and he did not want to burden his wife with the debilitating effects of this condition.

Before retirement, Patient X worked in the public sector, a career he cherished, describing it as “incredibly rewarding” but “hard-work and tiring at times.” With his occupation being so physically-taxing in nature, it meant it was pivotal to remain strong, fit and healthy for the vast majority of his working-life. Because of this, it was incredibly hard for him to come to terms with his dwindling physical reserve; that he was losing his original stamina, that he was becoming progressively weaker by the day, that he was finding it difficult to balance resulting in frequent falls and finally, the fact he was having to rely upon others to complete day-day tasks. Imperatively, this highlights the importance to not focus solely on the physical implications of sarcopenia, but factor in the psychological aspects of this disease as well.

During Patient X’s admission, I was able to see first-hand the different treatment strategies available to manage sarcopenia and it was a pleasure to meet the different members that made-up the wider multi-disciplinary team (MDT) of staff involved in his care. Different management strategies such as exercise/nutritional interventions were utilised as soon as diagnosis was definitive, to not only help mitigate the effects of the disease, but to help stop the progression and bring Patient X back to his pre-admission baseline-level of physical wellness. Upon discharge, Patient X was so grateful to the MDT that took care of him during his stay in hospital and he would often say that his recovery would not have been possible without them. Healthcare professionals involved in Patient X’s care-planning included doctors, nurses, dieticians, occupational therapists (OTs) and physiotherapists.

## **Pathophysiology, Histology and Risk Factors**

To improve my understanding of sarcopenia pathogenesis, I researched into the pathophysiology, histology and risk factors of this disease. Many studies described the pathophysiology of sarcopenia to be “complex” and “multifactorial,” with most instances involving several impaired biological processes before the succession of disease (Aslam et al. 2023). Risk factors contributing to the development of this disease include lifestyle ones i.e. lack of physical exercise, age-related factors, bio-chemical causes i.e. protein synthesis/regeneration dysfunction and hormonal changes i.e. the age-related decrease in anabolic hormones. Cumulatively, over a sustained period of time, these changes lead to globally reduced muscle quality/quantity and ultimately, the subsequent loss of muscle strength and function (Cho et al. 2022). When histological analysis is performed in muscle biopsies taken from subjects with sarcopenia, it reveals disproportionately reduced-levels of type-II fibres, with the reduction of the individual muscle fibre size themselves (Shen et al. 2024).

## **Screening and Diagnosis**

I wanted to do some further reading to understand what different types of screening and diagnostic methods are currently available for sarcopenia. I learnt that diagnosis is based upon the internationally accepted definition of sarcopenia formulated by The European Working Group on Sarcopenia in The Older People (EWGSOP). It includes three-main criteria: muscle mass, muscle strength and physical performance. The exact diagnostic thresholds are listed below:

- 1) **Low Muscle Mass** - quantified as a Skeletal Muscle Mass (SMM) index  $<8.9\text{kg/m}^2$ .
- 2) **Low Muscle Strength** - where hand-grip strength is below 30kg in men and 20kg in women.
- 3) **Low Physical Performance** - where gait speed is less than  $0.8\text{m/s}^2$ .

Confirmation of this condition is where there is low muscle mass accompanied with either low muscle strength or low physical performance or both. In some scenarios, further imaging i.e. CT/MRI/DEXA or muscle biopsies may be used to further aid diagnosis by assessing muscle architecture and quality. Once diagnosis is established, patients are placed in one of three groups: pre-sarcopenic, sarcopenic or severe-sarcopenic.

Screening for sarcopenia in the hospital setting can be guided by questionnaires such as the SARC-F, which is a comprehensive screening tool that assesses five main parameters, including strength, ambulation, rising from a chair, stair climbing and history of falls. Patients are scored out of 10 points with each component scoring 2 points, with 4 or more points being highly predictive of sarcopenia (Malmstrom et al. 2016).

It is important to note, that sarcopenia is an umbrella term that can be further split into primary and secondary forms depending on the underlying cause. Secondary sarcopenia includes conditions such as cachexia, which is often indicative of severe systemic disease such as cancer and frailty. Finally, an important sub set of sarcopenia that should not be overlooked is sarcopenic-obesity, due to the adverse synergistic relationship that sarcopenia has on obesity itself and the fact that overweight and obesity rates in the UK are said to be currently some of the highest in western Europe at 63% of the adult population (Haase et al. 2021).

## **Discussion**

Patient X's case highlighted the imperative need as future healthcare professionals for the early recognition of sarcopenic patients to improve overall clinical outcomes. Many studies have concluded that sarcopenia is often under detected amongst healthcare providers, with most patients being misdiagnosed or not diagnosed at all (Sayer and Cruz-Jentoft 2022). In part, this is due to sarcopenia not being an integral aspect in bone-health assessment in the UK, as well as the lack of awareness amongst healthcare workers of the different sub-types of sarcopenia i.e. sarcopenic obesity. Thus, a potential recommendation is that clinicians should be familiar and up-to-date with the current definitions of sarcopenia and that they should utilize a pragmatic approach when diagnosing this condition. Furthermore, they should use screening tools i.e. SARC-F where possible in the primary/secondary setting to help identify patients who are at-risk of sarcopenia and make timely referrals to escalate their care to specialist services. Finally, they should use the most up-to-date evidence-based guidelines for the treatment and management of these patients. A practical intervention for Cardiff Medical students is the inclusion of sarcopenia teaching in their current curriculum as it will help to raise awareness for the recognition, diagnosis and treatment of this condition in future practice.

Another aspect that was outlined in Patient X's case was the importance of focusing on addressing the underlying cause of sarcopenia and the timely utilization of exercise, nutritional and pharmacological intervention. During his stay in hospital, Patient X benefitted immensely from physiotherapists and occupational therapists guided exercise interventions including resistance training, aerobic exercises and balance/flexibility training. These exercise not only helped him to maintain and build muscle mass, but overtime improved his overall physical strength and manual dexterity, which allowed him to start to undertake ADLs/IADLs independently. Literature has shown that exercise interventions, in particular resistance training, is the gold-standard treatment of choice for sarcopenia and it is shown in randomized controlled trials to significantly improve grip strength, gait speed and skeletal muscle index (Zhao et al. 2022). Engaging in resistance training 2-3 times a week and undertaking moderate-intensity aerobic exercise for at least 150 minutes a week are shown to reduce the risk of sarcopenia (Park et al. 2023). Thus, this stresses the importance as future clinicians to empower and encourage older patients to take up healthy life-style changes i.e. the introduction of resistance training in their daily routine to prevent the formation of sarcopenia in the first place.

Nutritional interventions guided by the dieticians also played a key role in Patient X's recovery. During his stay in hospital, his nutritional intake was optimized strictly to increase protein/vitamin intake and to prevent malnutrition through the prescription of specialist oral nutritional support. Just like physical exercise, literature stresses the critical role that nutrition plays in sarcopenia due to its profound effects it has on maintaining muscle mass/function (Calvani et al. 2013). It is suggested that adults that are over the age of 65 years old require a higher daily protein intake when compared to their younger counterparts, with them having to receive a minimum of 1.0-1.2g protein/kg body weight from high quality sources i.e. lean meats and plant-based options (van Dijk et al. 2021). This goes to show that as future clinicians, more health promotion is needed to educate the importance of a healthy and balanced diet amongst older adults who are identified to be at risk of sarcopenia. We should ensure that they are firstly, receiving the adequate calorific intake accounting for age, sex, health profile, metabolic profile and physical activity levels and secondly, ensure they are receiving this nutrition at the right quality, quantity and time.

A consequential aspect of sarcopenia highlighted by Patient X's case was the psychological burden this disease exerted on its patients. In recent years, a number of studies have shown that there is a correlation between sarcopenia/mental health illnesses and the prevalence of depressive symptoms amongst patients with sarcopenia is reported to be between 8-87% (Li et al. 2022). This shows as future practitioners, the need for a holistic approach when treating patients with sarcopenia, not solely focusing on their physical needs but also factoring-in their psychological and spiritual needs as well. We must actively screen for depression in patient with sarcopenia, referring those that need further support to specialist care and sign-posting these individuals to charities/support groups when needed.

Being able to follow Patient X through his journey from admission to discharge from hospital, gave me a unique insight for the crucial role the multi-disciplinary team played in his care-planning and allowed me to appreciate the importance of good team-working in my future practice. One of the cornerstones of treating sarcopenia and preventing it re-occurring in the future, is to treat or manage sufficiently the underlying cause i.e. in Patient X's case it was to manage his underlying COPD. Therefore, it was of vital importance that there was close effective communication and collaboration between Patient X and the different teams including the clinical respiratory team, physios, dieticians and OTs. Studies have shown that effective MDTs and coordinated team meetings are core to a successful geriatric assessment and that training together as MDTs can improve team performance and patient outcomes substantially (Ellis and Sevdalis 2019). It has also made me aware of the importance to continue to develop/improve my own non-technical skills i.e. leadership, communication and team-working in preparation to work as a junior doctor. In addition, an important take-home message for me was the fact that in future practice, we should not think that MDT involvement for patients with sarcopenia ends when they are discharged from the hospital. Instead, many patients require long-term support in the form of comprehensive care-packages. For Patient X, this continuation of care was seen when OTs conducted a home visit to risk assess his residence and to see what aids/adaptations can be implemented to reduce the risk of falls in the future.

## **The Future**

To grapple with the challenges posed by sarcopenia, it will inevitably require a multi-disciplinary approach that circumscribes healthcare with research and public initiatives. Potential recommendations can likely include: efforts to improve healthcare worker/medical student understanding of sarcopenia through educational classes or addition to the current medical school curriculum. Furthermore, further emphasis should be placed on research looking into the development of novel diagnostic marker and pharmaceutical drugs to facilitate early detection of disease and more personalized therapies. Sustained efforts must be continued for effective collaboration between multidisciplinary specialties to ensure patients are receiving comprehensive and individualized care addressing their holistic needs. Finally, the implementation of effective nation-wide public health initiatives/policies aimed at healthy lifestyle-changes and further research into sarcopenia is paramount in improving our understanding of the disease and its prevention.

## **Conclusion**

When I reflect upon this case-study, I am incredibly grateful for the wealth of knowledge I have learnt about sarcopenia and feel it has been a great honour to witness first-hand the holistic impacts of this condition; including the key physical, pathological and phyco-social aspects of the disease. As a future practicing doctor, this case-study has taught me to view all patients holistically, making sure to actively-screen for patients at risk of sarcopenia and the need for involvement from the multi-disciplinary team and for prompt treatment. What makes this project truly special for me and an experience that I will cherish for my whole professional career, is that it has been encompassed in a real patient case, with real stories, real emotions, real interactions and most importantly a real heart-warming, inspirational individual at its core - Patient X.

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