



Original Article

Nutritional Screening, Initial Management and Referral for Older People with Sarcopenia or Frailty - Results from a UK-Wide Survey

Caroline Bowler¹, Elizabeth Moriarty¹, Melody Chawner², Andrew Clegg³, Sarah De Biase⁴, Natalie Offord⁵, Vittoria Romano⁶, Avan A. Sayer^{7,8}, Alison Smith^{6,9}, Oliver Todd³, Miles D. Witham^{7,8}

¹Chesterfield Royal Hospital, Chesterfield Road, Callow, Chesterfield, UK;

²Solent NHS Trust, Portsmouth, UK;

³Academic Unit for Ageing and Stroke Research, University of Leeds, Bradford Teaching Hospitals NHS Foundation Trust, Bradford, UK;

⁴AGILE, Professional Network for Physiotherapists Working with Older People and West Yorkshire Integrated Care Board, Long-term Conditions and Personalisation, White Rose House, Wakefield, UK;

⁵Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, UK;

⁶British Dietetic Association Older People's Specialist Group, Central London Community Health Care Trust, London, UK;

⁷AGE Research Group, Translational and Clinical Research Institute, Faculty of Medical Sciences, Newcastle University, Newcastle, UK;

⁸NIHR Newcastle Biomedical Research Centre, Newcastle upon Tyne Hospitals NHS Foundation Trust, Cumbria, Northumberland, Tyne and Wear NHS Foundation Trust and Newcastle University, Newcastle, UK;

⁹Hertfordshire and West Essex Integrated Care Board, Hemel Hempstead, UK

Abstract

Objectives: We surveyed healthcare staff working with older people to understand current practice in nutrition screening, initial management and referral for older people with sarcopenia and frailty. **Methods:** We conducted a UK-wide web-based survey of staff working with older people in both hospital and community settings. Surveys were distributed through professional organisation e-mail lists and social media channels. Descriptive data were generated from categorical responses and inductive thematic analysis was applied to free-text responses. **Results:** Data were analysed from 169 respondents (110 hospital, 59 community), representing 99 healthcare organisations. 91 (83%) hospital respondents and 24 (41%) community respondents reported that nutrition screening was performed on all patients with sarcopenia or frailty. The Malnutrition Universal Screening Tool was most commonly used to trigger referral to dietetics teams, but there was considerable variation in management before referral, referral thresholds and referral pathways. Themes derived from free-text responses included the need for training, issues of responsibility and ownership, inadequate resources (time, staff and equipment) and ineffective or inefficient processes for referral and management. **Conclusions:** Current UK nutritional care for older people with sarcopenia and frailty is heterogeneous. There are opportunities for better tools, processes, training and resources to improve current practice and pathways.

Keywords: Frailty, Nutrition, Older People, Sarcopenia, Survey

The authors have no conflict of interest.

Corresponding author: Professor Miles Witham, AGE Research Group, NIHR Newcastle Biomedical Research Centre, Translational Clinical Research Institute, Newcastle University and Newcastle-upon-Tyne NHS Trust, Newcastle upon Tyne, UK

E-mail: Miles.Witham@newcastle.ac.uk

Edited by: Jagadish K. Chhetri

Accepted 22 January 2024

Introduction

The consequences of sarcopenia and the related construct of physical frailty are significant and include an increased risk of falls and hospital admission, longer length of hospital stay, greater dependency and need for care, poorer quality of life and higher mortality^{1,2}. Resistance exercise has been shown to improve muscle strength and physical function in patients with sarcopenia and patients with physical frailty^{3,4}. Comprehensive geriatric assessment (CGA)⁵ is likely to benefit those with frailty⁶, although evidence for this intervention was mostly collected before modern operational definitions of frailty were in use.

More recently, the role of nutritional interventions to prevent or treat sarcopenia and frailty has received increasing attention in both research and clinical practice⁷. A range of interventions have been studied, from specific compounds (e.g. individual amino acids such as leucine), nutrient groups (e.g. protein), and whole diets (e.g. Mediterranean diet)⁸⁻¹⁰. At present, evidence for protein supplementation in older people undergoing exercise training has reasonable evidence⁹; other interventions remain areas of active research but lack sufficient evidence to be recommended for clinical use at present^{11,12}.

There is a need to ensure effective translation of nutritional intervention evidence into practice for older people with sarcopenia or frailty where such evidence exists. At the same time, there is a need to conduct large, pragmatic randomised trials to improve the strength of evidence for nutritional interventions in this population. Both of these imperatives require knowledge of current practice around identification of need, screening and referral for nutritional intervention in older people with sarcopenia or frailty. Such knowledge provides both the foundation for improving current practice, and also for designing trials that can be delivered successfully at scale in clinical settings. The aim of this work was therefore to describe current UK health service nutritional practice (identification, initial management and referral) for older people with sarcopenia or frailty.

Methods

Survey design and content

A collaborative team designed the questionnaires and involved representation from the British Geriatrics Society (BGS) Sarcopenia and Frailty Research Special interest Group (SiG), the British Dietetic Association (BDA) Older People Specialist Group and AGILE (the Chartered Society of Physiotherapists professional network specialising in the care of older people). We designed two online surveys targeted at clinicians working with older people with sarcopenia or frailty within the UK National Health Service (NHS). The first was for NHS staff (in all professional roles) working within community settings including primary care; the second was for NHS staff working in hospitals. Both surveys aimed to identify usual practice for nutritional

screening, intervention prior to dietetic referral, and criteria and practice in referral for further assessment of older people with sarcopenia or frailty.

Survey distribution

We used SurveyMonkey (www.surveymonkey.com) to collect responses. The questionnaires were distributed to members of the BGS Sarcopenia and Frailty Research SiG, members of the BDA Older People Specialist Group and members of AGILE, and via email and social media networks of the study authors. We also used Twitter to promote the surveys to the above groups and their wider audiences. The surveys were open from October 2021 to February 2022.

The community survey had twelve questions and the secondary care survey had eight questions, provided in Supplementary Material. Initial questions clarified the respondents' work setting and professional role. No information that would lead to identification of individual respondents was sought. We asked respondents for details of their place of work, nutrition screening tools used in their routine practice, referral pathways and thresholds for dietetic referral or further assessment, together with details of what interventions could be offered before dietetic referral.

Statistical analysis

Microsoft Excel was used to collate responses and generate descriptive statistics and graphical displays. Respondents based outside the UK were excluded. Responses were analysed according to the stated place of work (community vs hospital). The large number of professional roles reported were collapsed into a small number of representative categories to facilitate analysis. Free-text comments were analysed using an inductive thematic analysis approach, extracting key phrases or points from each response, and then grouping these phrases into high-level themes without imposing an *a priori* framework.

Results

In total there were 181 responses across the two domains; 59 responses from community settings (including primary care practices, care homes, community rehabilitation and assessment teams) and 122 from hospital settings. Of the responses from hospital settings, 12 were excluded due to no valid response, or the responder working within the community or outpatient setting or abroad. Figure 1 shows the professional roles of respondents, and the place of work for respondents is shown in Supplementary Table 1. A total of 99 different healthcare organisations were represented in the survey responses, including 61 of the 145 acute Trusts and health boards in England, Scotland and Wales.

Nutritional screening practice - hospital

In the hospital setting, 91 (83%) respondents reported that all patients underwent nutritional screening, and that the

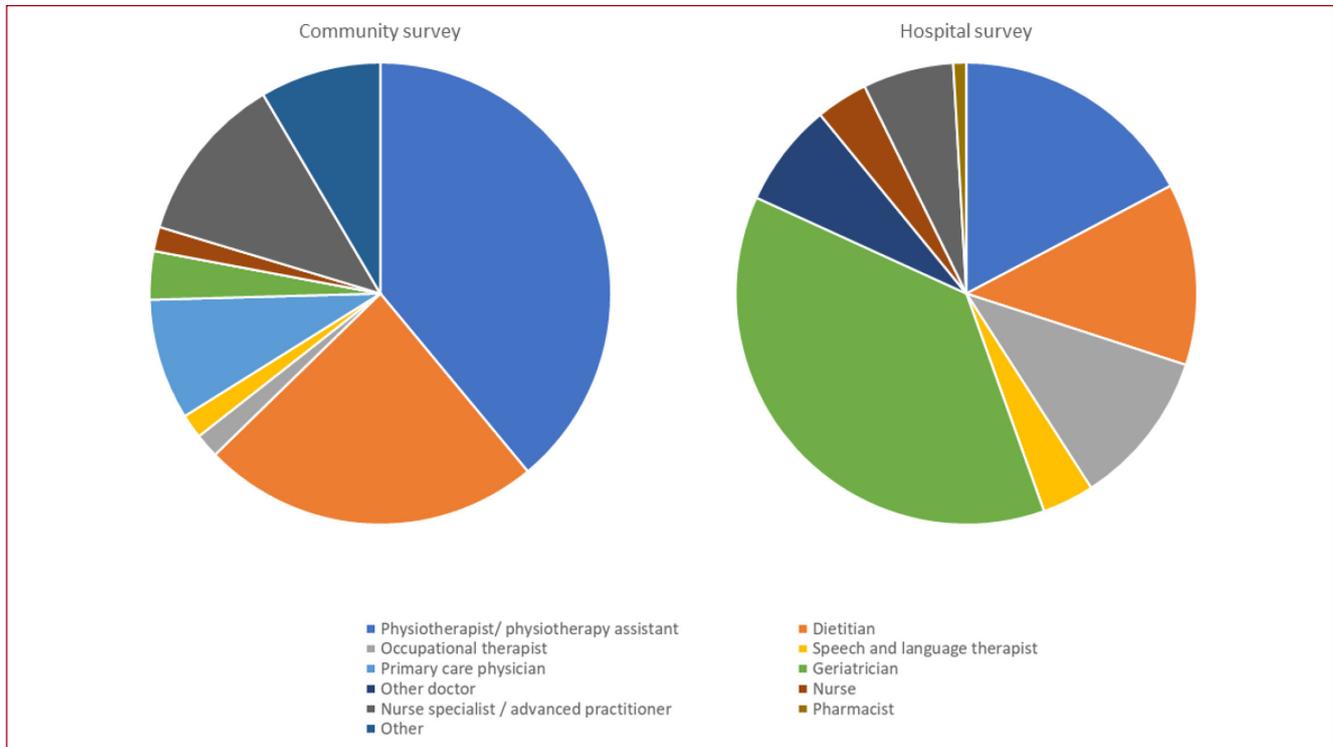


Figure 1. Professional role of survey respondents.

| Prompt for nutritional screening* | Community survey (n=59) | Hospital survey (n=110) |
|-----------------------------------|-------------------------|-------------------------|
| All patients are screened | 24 (41) | 91 (83) |
| Above a threshold age | 1 (2) | 6 (5) |
| Above a frailty score threshold | 6 (10) | 2 (2) |
| Below a threshold weight or BMI | 11 (19) | 6 (5) |
| Diagnosis of sarcopenia | 5 (8) | 4 (4) |
| Not routinely screened | 10 (17) | 4 (4) |
| Ad-hoc prompting | 17 (29) | 0 (0) |
| Screening tool used* | | |
| MUST | 40 (68) | 94 (85) |
| PA Nutrition Checklist | 2 (3) | 1 (1) |
| MNA | 0 (0) | 2 (2) |
| Other | 3 (5) | 1 (1) |
| No response | 14 (24) | 13 (12) |

*multiple responses allowed. MUST: Malnutrition Universal Screening Tool. MNA: Mini Nutritional Assessment. PA: Patients Association. BMI: Body Mass Index

Table 1. Prompts for nutritional screening and what screening tools are used (n, %).

| Community survey (n=59) | | Hospital survey (n=110) | |
|--|---------|--|---------|
| Advice sheets | 39 (66) | Advice sheets | 12 (11) |
| Recommend nutrient dense meals | 13 (22) | Request high protein menu | 16 (15) |
| Recommend additional snacks | 18 (31) | Recommend additional snacks | 34 (31) |
| Recommend food fortification | 27 (46) | Request high calorie menu | 16 (15) |
| Prescribe oral nutritional supplements | 30 (51) | Prescribe oral nutritional supplements | 36 (33) |
| Recommend nourishing drinks or supplements | 20 (34) | Use high-contrast crockery | 16 (15) |
| | | Identify those requiring additional support at mealtimes | 40 (36) |
| | | Other | 5 (5) |

Multiple responses allowed.

Table 2. Interventions deployable before specialist referral (n, %).

| Trigger | Community survey (n=59) | Hospital survey (n=110) | |
|-----------------------------|-------------------------|-------------------------|---------|
| BMI <18.5kg/m ² | 22 (37) | 27 (25) | |
| BMI >30kg/m ² | 4 (7) | 9 (8) | |
| Weight below a local cutoff | 4 (7) | 6 (5) | |
| MUST score of 1 or more | 12 (20) | 16 (15) | |
| MUST score of 2 | 30 (51) | 38 (35) | |
| Diagnosis of sarcopenia | 7 (12) | 10 (9) | |
| Diagnosis of frailty | 7 (12) | 11 (10) | |
| Poor food intake | 27 (46) | Before admission | 24 (22) |
| | | During admission | 33 (30) |
| Not known | 10 (17) | 2 (2) | |

Multiple responses allowed. MUST: Malnutrition Universal Screening Tool. BMI: Body Mass Index

Table 3. Triggers for onward referral and professions to whom referrals are made (n, %).

MUST was used in the majority of cases. Only two hospital respondents reported that the choice of screening tool depended on the severity of frailty of the patient. Responses are shown in Table 1.

Nutritional screening practice – community

In community settings, 24 (41%) respondents reported that all patients underwent nutritional screening. Where a prompt or trigger for nutritional screening was used, this was most commonly low weight or low BMI, or *ad hoc* cues such as poor oral intake. Very few respondents reported that the presence of frailty or sarcopenia were sufficient to prompt nutritional screening in either setting. Within the community setting, 7 out of 8 (88%) respondents working within care homes reported that all patients received nutritional screening in contrast to the wider community responses. Again, responses are shown in Table 1.

Triggers for referral and interventions deployable prior to dietetic assessment

Table 2 shows the range of interventions that teams were able to deploy whilst waiting for further assessment from dietitians and other professionals once a nutritional issue had been identified. Additional support at mealtimes, oral nutritional supplements and additional snacks were most commonly mentioned in the hospital survey, whereas advice sheets and prescription of oral nutritional supplements were most commonly mentioned in the community survey.

Table 3 shows the referral triggers reported by respondents. For both community and hospital settings, elevated MUST scores and inadequate food intake were the most common triggers for referral, although the MUST score required to trigger referral varied between respondents. Few respondents noted frailty or sarcopenia as being sufficient to trigger a referral on their own. In hospital, 63/96 (66%) of

| Professions referred to | Community survey (n=59) | Hospital survey (n=110) |
|--|-------------------------|-------------------------|
| Primary care physician | 16 (27) | 0 (0) |
| Geriatrician | 8 (14) | 11 (10) |
| Dietitian | 41 (69) | 92 (84) |
| Speech and Language Therapist | 9 (15) | 20 (18) |
| Specialist Nurse | 5 (8) | 5 (5) |
| Other | 1 (2) | 0 (0) |
| Not known | 0 (0) | 15 (14) |
| Professions making referrals | | |
| Primary care physician | 31 (53) | 0 (0) |
| Geriatrician / other physician | 6 (10) | 47 (43) |
| Ward nursing team | 0 (0) | 85 (77) |
| Practice nursing team | 9 (15) | 0 (0) |
| District nursing team | 17 (29) | 0 (0) |
| Specialist nursing team | 13 (22) | 0 (0) |
| Care home staff | 14 (24) | 0 (0) |
| Speech and Language therapist | 15 (25) | 22 (20) |
| Physiotherapist | 17 (29) | 11 (10) |
| Occupational therapist | 13 (22) | 11 (10) |
| Advanced nurse practitioner / nurse specialist | 18 (31) | 15 (14) |
| Dietitian | 11 (19) | 13 (12) |
| Other | 4 (7) | 0 (0) |

Multiple responses allowed

Table 4. Professions to whom referrals are made, and who makes the referrals.

respondents confirmed the existence of an agreed referral pathway; 12 (13%) stated such a pathway did not exist and 21 (22%) were unsure. We did not interrogate the existence of referral pathways in community settings.

Referral for further assessment

Table 4 gives information on which professionals referrals were made to, and which team member was responsible for making the referral. The majority of referrals were to dietitians, but there was evidence of a multidisciplinary approach to referral and assessment, with doctors, speech and language therapists and nurses also involved in receiving referrals. Three respondents noted that they were unable to access any dietitian support in the community.

Barriers and opportunities for improving nutritional intervention and assessment – free-text responses

Themes from hospital respondents

Seventy-one (65%) of respondents contributed free-text comments on barriers and opportunities in the hospital

setting. Four key themes were evident, covering education, culture, processes and resources. A lack of training and a lack of awareness of when a referral was indicated were key educational issues highlighted. Culture-related issues included the perception amongst some team members that nutrition was the dietitians' problem to solve, and the failure of anyone in the team to take responsibility for nutrition. In addition, the perception that oral nutritional supplements were the solution to all nutritional problems was highlighted.

Opportunities to improve processes that were highlighted by respondents included improving measurement and recording of weight, pulling through previous weight measurements on electronic records, the need for standard tools to assess and record food and fluid intake, and the need for tools better suited to assessing nutrition in people with sarcopenia or frailty than the MUST tool. Other barriers to the delivery of good nutritional care in hospital highlighted were the lack of access to food at ward level (including the ability to heat food), lack of lists of interventions to try whilst waiting for dietetic input, and the need for more family or volunteer input at mealtimes. Resource constraints

highlighted included competing tasks, a lack of staff numbers and time, a lack of dietitians, difficulty accessing adaptive equipment (e.g. cutlery) for some patients, and difficulties accessing high calorie food and drinks.

Themes from community respondents

Forty-eight (81%) of community respondents contributed free-text comments. Similar themes were identified by community respondents to those identified by hospital respondents; education and training of all MDT members on screening and initial advice, education on what resources are available to support nutrition in the community, and training on how to offer food-focussed advice rather than prescribing oral nutritional supplements. The need for a culture shift so that nutrition was everyone's business was also identified; along with a concern that a fatalistic approach to conditions in old age may militate against effective responses to malnutrition.

Opportunities to improve processes identified by community teams included broadening the criteria for dietetic referral, including sarcopenia and frailty as reasons for referral, use of electronic referral processes, better recording of weight, and integration of dietitians into community MDTs. Other barriers identified specific to the community were the lack of incentives for nutrition screening and management, and a need for ways to support families to deliver nutrition care, for example app-based software solutions. As with hospital-based staff, a lack of staff time, lack of dietitians and GPs, and a lack of equipment (e.g. scales and dynamometers to support community-based assessment and monitoring) were also identified by community teams.

Discussion

Our survey illustrates current UK NHS practice in nutrition screening, initial management and referral pathways for teams caring for older people with sarcopenia or frailty. In hospitals, nutritional screening was undertaken most commonly using the MUST tool with most respondents reporting that all patients were screened in line with national guidance. In the community, only a minority of respondents reported that their organisation screened all patients and the range of tools used was wider. For both settings, weight and inadequate food intake were key drivers of referral for further assessment and management, with the presence of frailty or sarcopenia being used as a reason to refer for only a minority of respondents. A wide range of staff were able to make onward referrals when nutritional issues were identified, and a wide range of multidisciplinary team members were involved in responding to such referrals. Although a range of different interventions were reported as being deployed prior to referral (including prescription of oral nutritional supplements), each individual intervention was reported by only a minority of respondents.

Current nutrition screening tools and processes for older people tend to emphasise low weight / low body mass index.

Although important, such tools are likely to miss many people with frailty or sarcopenia who could potentially benefit from nutritional intervention, either because a 'normal' BMI in older people may be inappropriately low, because of weight loss within the normal range of BMI, the need for a weight history¹² or because of low protein intake or overall suboptimal diet quality¹³. This is a particular challenge when attempting to identify patients with sarcopenic obesity – a combination associated with worse outcomes than sarcopenia or obesity alone¹⁴. In addition, more patients are assessed remotely (e.g. by telephone) in the community, and this mode of assessment, combined with a lack of equipment to measure weight, suggests that weight-based approaches may miss patients who could benefit from nutritional intervention. Our survey results suggest that there may be a need to broaden the remit of screening tools for identifying nutritional issues in older people, and also to broaden referral criteria for specialist assessment by dietetic staff and others. In support of this broader approach to identifying malnutrition, the Global Leadership in Malnutrition (GLIM) consensus criteria recommend taking into account weight loss even when not underweight, concomitant illness and reduced food intake, and muscle mass as well as overall weight¹⁵. All of these criteria align with concepts that are central to sarcopenia and physical frailty.

Recent systematic reviews have suggested that increasing protein intake (though dietary modification or supplementation) is a helpful adjunct to resistance training for sarcopenia¹⁶, but the place of protein supplementation or more complex standalone nutritional interventions for sarcopenia in the absence of resistance training is not currently established¹⁷. For frailty, multicomponent interventions including both exercise and nutritional intervention have evidence of efficacy¹⁸ and good examples exist of how such an approach can be implemented in practice¹⁹. Conversely, the effectiveness of oral nutritional supplements (ONS) alone for older people with frailty is not established, with a recent systematic review funded by the UK National Institute for Health and Care Research (NIHR) finding little evidence that ONS improved outcomes for people living with frailty and malnutrition²⁰. Our findings reinforce the need to ensure that training and referral pathways do not focus solely on ONS and instead encompass a 'food-based' approach to nutritional support.

Implementing changes to care, or conducting large, pragmatic trials of nutrition-based interventions for frailty and sarcopenia, both demand a clear understanding of what usual care comprises. Our findings suggest that there is considerable heterogeneity, both in terms of what interventions are already offered, and which team members are involved in referral, assessment and providing advice. Whilst the breadth of professions involved is heartening, interventions that focus on staff training or that seek to modify referral pathways will need to encompass a broad range of staff groups to be effective. Embedding dietitians at

the heart of multidisciplinary teams²¹ is one way to deliver effective nutritional care; however this depends on sufficient resources (money, people and time) being made available – a challenge referred to by several of our respondents.

The strengths of our survey included UK-wide geographic coverage involving a large number of healthcare organisations, and responses gathered from a wide range of professions in both hospital and community settings. There were some limitations. Not all healthcare organisations were covered, and practice within a single organisation may differ between different teams or departments. The questionnaires were tailored to community and hospital audiences, and so may not be directly comparable. Coverage of some professions was less comprehensive than others, and we did not collect detailed information on how each service was configured or on which patient groups each service focussed. It is possible that not all respondents interpreted the questions in the same way, and surveys are unable to pick up nuanced thinking on complex topics; future qualitative work could usefully explore the reasons underlying our findings in more detail. We did not attempt to explore how dietitians approach the management of sarcopenia and frailty after referral, or whether this professional group assessed patients for frailty or sarcopenia; this issue, whilst important, requires separate work to interrogate the practice of this professional group in detail.

Limited work has been reported previously on characterising usual care for nutrition screening and management for older people with sarcopenia or frailty. A recent survey of dietitians in Australia and New Zealand²² found that there was limited attention paid to frailty when older people were screened for malnutrition, but because malnutrition was the focus of the survey, it could not interrogate whether the obverse was also true. Most dietitians in this survey did however report using high-energy diets, high-protein diets, dietary education counselling and ONS when managing clients living with frailty.

Our findings suggest a number of potential avenues to improve pathways of nutritional care for older people living with sarcopenia or frailty. Firstly, screening tools need to move beyond finding people who are underweight to encompass those with low muscle strength or mass, or unplanned weight loss when not yet underweight. A case could be made for those with sarcopenia or frailty automatically fulfilling the criteria for further nutritional intervention – and thus for measurement of sarcopenia and frailty to form part of a combined assessment of nutritional status. Screening, particularly in the community setting, needs to be delivered to all older people seen by the multidisciplinary team as a core part of any comprehensive assessment. Secondly, there is a need for nutrition to become part of the scope of practice for all members of the multidisciplinary team. This in turn will require better training, better advice and guidance to non-dietetic team members, clear criteria for who should be referred for specialist dietetic assessment,

and mechanisms for local monitoring of processes. Finally, good care will require appropriate resources – sufficient staff time and tools to screen patients and deliver nutritional care, provision of portable scales and dynamometers in the community, availability of aids and food within hospitals, and sufficient dietetic capacity to address more complex nutritional challenges and to support and educate the wider workforce.

Future research has a role in evaluating innovative models for delivery of nutritional care to older people with sarcopenia and frailty but should also seek to evaluate new or existing ingredients of care – whether this be new screening tools, dietary supplements, complex dietary modification interventions or adjunctive therapies to improve appetite. All such research requires a baseline understanding of the landscape of current care, and we anticipate that the findings from this study will therefore inform a broad range of future research and practice development.

Ethics approval

As per current UK guidance, research ethics approval was not required as these surveys did not entail contact with patients.

Acknowledgements

MDW and AAS acknowledge support from the NIHR Newcastle Biomedical Research Centre. The authors all acknowledge support from the British Geriatrics Society secretariat, particularly Jo Gough.

References

1. Cruz-Jentoft AJ, Sayer AA. Sarcopenia. *Lancet* 2019;393:2636-46.
2. Clegg A, Young J, Iliffe S, Olde Rikkert M, Rockwood K. Frailty in elderly people. *Lancet* 2013;381:752-62.
3. Moore SA, Hrisos N, Errington L, Rochester L, Rodgers H, Witham M, et al. Exercise as a treatment for sarcopenia: an umbrella review of systematic review evidence. *Physiotherapy* 2020;107:189-201.
4. Lopez P, Pinto RS, Radaelli R, Rech A, Grazioli R, Izquierdo M, et al. Benefits of resistance training in physically frail elderly: a systematic review. *Aging Clin Exp Res* 2018;30:889-99.
5. Parker SG, McLeod A, McCue P, Phelps K, Bardsley M, Roberts HC et al. New horizons in comprehensive geriatric assessment. *Age Ageing* 2017;46:713-21.
6. Ellis G, Gardner M, Tsiachristas A, Langhorne P, Burke O, Harwood RH et al. Comprehensive geriatric assessment for older adults admitted to hospital. *Cochrane Database Syst Rev* 2017;9:CD006211.
7. Ni Lochlainn M, Cox NJ, Wilson T, Hayhoe RPG, Ramsay SE, Granic A, et al. Nutrition and Frailty: Opportunities for Prevention and Treatment. *Nutrients* 2021;13:2349.
8. LACE study group, Achison M, Adamson S, Akpan A, Aspray T, et al. Effect of perindopril or leucine on physical performance in older people with sarcopenia: the LACE randomized controlled trial. *J Cachexia Sarcopenia Muscle* 2022;13:858-871.
9. Kirwan RP, Mazidi M, Rodríguez García C, Lane KE, Jafari A, Butler T, et al. Protein interventions augment the effect of resistance exercise

- on appendicular lean mass and handgrip strength in older adults: a systematic review and meta-analysis of randomized controlled trials. *Am J Clin Nutr* 2022;115:897-913.
10. Van Elswyk ME, Teo L, Lau CS, Shanahan CJ. Dietary Patterns and the Risk of Sarcopenia: A Systematic Review and Meta-Analysis. *Curr Dev Nutr* 2022;6:nzac001
 11. Khor PY, Vearing RM, Charlton KE. The effectiveness of nutrition interventions in improving frailty and its associated constructs related to malnutrition and functional decline among community-dwelling older adults: A systematic review. *J Hum Nutr Diet* 2022;35:566-582.
 12. Smith A. Potential barriers to effective MUST implementation. *Br J Commun Nurs* 2014;19 suppl 11:S28
 13. Robinson S, Granic A, Cruz-Jentoft AJ, Sayer AA. The role of nutrition in the prevention of sarcopenia. *Am J Clin Nutr* 2023 Aug 30:S0002-9165(23)66113-1. doi: 10.1016/j.ajcnut.2023.08.015. [Online ahead of print]
 14. Batsis JA, Villareal DT. Sarcopenic obesity in older adults: aetiology, epidemiology and treatment strategies. *Nat Rev Endocrinol* 2018;14:513-517
 15. Cederholm T, Jensen GL, Correia MITD, Gonzalez MC, Fukushima R, Higashiguchi T et al. GLIM criteria for the diagnosis of malnutrition - A consensus report from the global clinical nutrition community. *Clin Nutr* 2019;38:1-9.
 16. Kirwan RP, Mazidi M, Rodríguez García C, Lane KE, Jafari A, Butler T et al. Protein interventions augment the effect of resistance exercise on appendicular lean mass and handgrip strength in older adults: a systematic review and meta-analysis of randomized controlled trials. *Am J Clin Nutr* 2022;115:897-913.
 17. Nunes EA, Colenso-Semple L, McKellar SR, Yau T, Ali MU, Fitzpatrick-Lewis D, Sherifali D, Gaudichon C, Tomé D, Atherton PJ, Robles MC, Naranjo-Modad S, Braun M, Landi F, Phillips SM. Systematic review and meta-analysis of protein intake to support muscle mass and function in healthy adults. *J Cachexia Sarcopenia Muscle* 2022;13:795-810.
 18. Sun X, Liu W, Gao Y, Qin L, Feng H, Tan H et al. Comparative effectiveness of non-pharmacological interventions for frailty: a systematic review and network meta-analysis. *Age Ageing* 2023;52:afad004.
 19. Allied Health Professionals Network Wales. Allied Health Professionals making an impact in cardiovascular and respiratory disease. Case study 9. Available from: <https://www.ahpnw.nhs.uk/media/1150/case-studies-cvd.pdf> [Accessed 21st November 2023]
 20. Thomson KH, Rice S, Arisa O, Johnson E, Tanner L, Marshall C et al. Effectiveness and cost-effectiveness of oral nutritional supplements in frail older people who are malnourished or at risk of malnutrition: a systematic review and meta-analysis. *Lancet Healthy Longev* 2022;3(10):e654-e666.
 21. British Dietetic Association. The impact of dietitians in the multidisciplinary practice team within primary care. <https://www.bda.uk.com/resource/the-impact-of-dietitians-in-the-multidisciplinary-practice-team-within-primary-care.html>. [Accessed 21st November 2023]
 22. Roberts S, Gomes K, Rattray M. Dietitians' perceptions of identifying and managing malnutrition and frailty in the community: A mixed-methods study. *Nutr Diet* 2023;80(5):511-520.

Supplementary Material

Questionnaire 1:

Nutrition care pathways for hospital inpatients with Sarcopenia or Frailty

Thank you for completing this survey, developed jointly by the British Geriatrics Society Sarcopenia and Frailty research special interest group, and the British Dietetic Association Older People's group. Your responses will be used to better define current care for patients with sarcopenia or frailty, and highlight where further research is needed to develop more effective dietary and nutritional intervention for patients with sarcopenia or frailty.

1. **What Trust or care organisation do you work for?**
Free text
2. **What is your role within the organisation?**
Consultant geriatrician
Trainee geriatrician
General practitioner
Dietitian
Nurse
Physiotherapist
Occupational therapist
Speech and language therapist
Pharmacist
Health care assistant
Other physician
Surgeon
Other (please specify)
3. **What is the setting for your main clinical work?**
Emergency Department
Acute medical admissions unit
Acute geriatric medicine admissions unit
Frailty assessment unit
General geriatric medicine ward
Subacute / rehab geriatric medicine ward
Bed-based Intermediate care unit
Orthogeriatrics ward
Other medical ward
Other surgical ward
Other (please specify)
4. **Which patients have nutritional screening?**
All patients (regardless of frailty or sarcopenia status)
All patients over a cut-off age
Patients identified as having at least mild frailty (CFS 4-5 or equivalent)
Patients identified as having at least moderate frailty (CFS 6 or equivalent)
Patients identified as having severe frailty (CFS 7-9 or equivalent)
Patients below a weight cutoff, regardless of frailty
Patients diagnosed with sarcopenia
No patients have nutritional screening
5. **What nutritional screening is done (Please tick all that apply)**
MUST
PA Nutrition Checklist
MNA
Other (please specify)
6. **How often is nutritional screening undertaken during a hospital stay?**
Free text
7. **Does the choice of screening tool used vary depending on the severity of frailty? If so, how are the screening tools applied?**
Free text
8. **Do you have an agreed pathway to follow for when someone is identified as being at nutritional risk (including having sarcopenia or frailty):**
Yes
No
Don't know
9. **What triggers activation of that pathway?**
BMI <18.5
BMI >30
Weight below a local cut off
MUST of 1 or more
MUST of 2
Diagnosis of sarcopenia
Diagnosis of frailty
Poor food intake before hospitalisation
Poor food intake during hospitalisation
Other (please specify)
10. **What interventions are the ward team (nursing, medical, therapists) able to deliver as part of this pathway before further assessment by dietetic staff?**
Advice sheets
High protein menu
Additional snacks / snack rounds
High calorie menu
Oral nutritional supplements
Use of contrasting crockery (e.g. blue plates)
Identification of those requiring additional support at mealtimes (e.g. red tray scheme)
Other (please specify)
11. **If a referral for further assessment is made, who is the patient referred to? (please tick all that apply)**
Geriatrician
Dietitian
Speech and language therapist
Specialist nurse
Other (please specify)
12. **Who makes the referral for further assessment?**
Medical team
Ward nursing team
Speech and language therapist
Physiotherapist

Occupational therapist
 Advanced nurse practitioner / nurse specialist
 Dietitian
 Other (please specify)

- 13. If you are a dietitian, are you able to refer patients you suspect of having frailty or sarcopenia for further multidisciplinary assessment. If so, what is the mechanism?**

Free text

- 14. Please describe how you think nutritional assessment and intervention for older people might be improved at your organisation. What prevents thorough nutritional assessment in secondary care?**

Free text

Questionnaire 2

Nutrition care pathways for community-dwelling people with Sarcopenia or Frailty

Thank you for completing this survey, developed jointly by the British Geriatrics Society Sarcopenia and Frailty research special interest group, and the British Dietetic Association Older People's group. Your responses will be used to better define current care for patients with sarcopenia or frailty, and highlight where further research is needed to develop more effective dietary and nutritional intervention for patients with sarcopenia or frailty.

- 1. What Trust or care organisation do you work for?**

Free text

- 2. What is your role within the organisation?**

Consultant geriatrician
 Trainee geriatrician
 General practitioner
 Dietitian
 District nurse
 Practice nurse
 Advanced nurse practitioner/specialist nurse
 Physiotherapist
 Occupational therapist
 Speech and language therapist
 Pharmacist
 Health care assistant
 Other (please specify)

- 3. What is the setting for your main clinical work?**

GP practice
 Care home
 Community rehabilitation / assessment team
 Hospital at Home team
 Outpatient clinic
 Day Unit / Day Hospital
 Intermediate care
 Other (please specify)

- 4. Which patients have nutritional screening?**

All patients (regardless of frailty or sarcopenia status)

All patients over a cut-off age
 Patients identified as having at least mild frailty (CFS 4-5 or equivalent)
 Patients identified as having at least moderate frailty (CFS 6 or equivalent)
 Patients identified as having severe frailty (CFS 7-9 or equivalent)
 Patients below a weight cutoff, regardless of frailty
 Patients diagnosed with sarcopenia
 No patients have nutritional screening
 Other (please specify)

- 5. What nutritional screening is done (Please tick all that apply)?**

MUST
 PA Nutrition Checklist
 MNA
 Other (please specify)

- 6. Does the choice of screening tool used vary depending on the severity of frailty? If so, how are the screening tools applied?**

Free text

- 7. What triggers referral for further assessment?**

BMI <18.5
 BMI >30
 Weight below a local cut off
 MUST of 1 or more
 MUST of 2
 Diagnosis of sarcopenia
 Diagnosis of frailty
 Poor food intake

- 8. If a referral for further assessment is made, who is the patient referred to? (please tick all that apply)**

GP
 Geriatrician
 Dietitian
 Speech and language therapist
 Specialist nurse
 Other (please specify)

- 9. Who makes the referral for further assessment?**

GP
 Geriatrician
 Practice Nursing team
 District nursing team
 Specialist nursing team
 Care home staff
 Speech and language therapist
 Physiotherapist
 Occupational therapist
 Advanced nurse practitioner / nurse specialist
 Dietitian
 Other (please specify)

- 10. What interventions are the usual care team (e.g. GP, nursing team) in the community able to deliver before further assessment?**

Advice sheets

Nutrient dense meals
Additional snacks
Food fortification
Homemade nourishing drinks or supplements
Prescribed oral nutritional supplements
Other (please specify)

11. If you use advice sheets, what are the key pieces of advice that they contain?

Free text

12. Please describe how you think nutritional assessment and intervention for older people might be improved in your organisation. What prevents thorough nutritional assessment in primary care and community settings?

Free text