



## ORIGINAL ARTICLE

# Anorexia of Aging: Assessing the Educational Needs of Primary Care Clinicians and Barriers to Optimal Care in Rural and Underserved Communities

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## Abstract

**Background:** Anorexia of aging is a common geriatric syndrome associated with many adverse health outcomes (eg, unintended weight loss, malnutrition). In the United States (US), the population is aging, but more rapidly so in rural counties where older adults account for more than 20% of the population. Compared to adults aging in urban areas, those aging in rural and underserved communities face more limited access to healthcare and social support networks and have higher rates of unintended weight loss, malnutrition, frailty, and sarcopenia. However, the educational needs of primary care clinicians who care for patients with anorexia of aging in rural and underserved areas are understudied.

**Objectives:** The goals of this needs assessment were to identify the educational needs and barriers to optimal care for anorexia of aging faced by primary care clinicians in rural and underserved areas in the US.

**Methods:** We conducted a mixed-method assessment that included an online survey (N = 73), a live polling segment at a virtual conference (N = 301), and qualitative interviews (N = 9). To meet our objectives, we focused on primary care clinicians who self-reported serving patients in rural or underserved communities in the US and asked about their perceptions, confidence, knowledge, barriers, and interest in anorexia of aging.

**Results:** Most respondents to the online survey (57.5%) indicated that 1% to 25% of their patients currently experience anorexia of aging, yet less than 15% are 'very' or 'extremely' confident in their ability to identify the condition. When asked if they currently use standardized screening tools to assess appetite and risk for weight loss in older patients, many respondents said 'never' (32.9%) or 'rarely'

(27.4%). Most respondents (80.8%) correctly identified insufficient protein intake as the underlying dietary deficit in sarcopenia; however, only 11% were aware of current recommendations for dietary protein intake in older adults. Moreover, only a quarter of respondents (24.7%) correctly identified ghrelin as a gastrointestinal hormone that is elevated in the fasting state and markedly lower in anorexia of aging.

More than half (52.1%) of respondents said that limited knowledge about anorexia of aging is the greatest barrier to management. Most were extremely (42.5%) or considerably interested (37%) in learning more about the condition. Response patterns to the live polling segment largely mirrored those of the online survey. Major themes that emerged from the qualitative interviews included: 1) Anorexia of aging is a major issue and is relatively prevalent in rural communities; 2) The underlying cause of unintended weight loss is often hard to identify and manage; 3) The terminology around anorexia of aging is confusing; and 4) Insufficient education and knowledge gaps exist regarding management of anorexia and unintended weight loss.

**Conclusion:** Our needs assessment revealed a wide range of gaps and barriers to timely identification and optimal management of anorexia of aging in rural primary care. The needs and barriers identified in this study can help inform future educational initiatives on anorexia of aging designed specifically for primary care clinicians who practice in rural and underserved communities.

## Keywords

Anorexia of aging, Rural health, Rural healthcare, Needs assessment, Primary care clinicians, Primary care, Family medicine, Rural and underserved areas, Geriatrics, Geriatric

## Introduction

Anorexia of aging (also known as geriatric anorexia) is a clinical syndrome commonly defined as loss of appetite and/or decreased food intake in late life [1]. Appetite is a major determinant of health in older adults, and the development of anorexia in late life is an early sign associated with many adverse health outcomes, including unintended weight loss, malnutrition, susceptibility to infections, sarcopenia, frailty, poor quality of life, and death [1-8]. Anorexia of aging is relatively common among geriatric populations, estimated to affect up to 25% of those in community settings, 62% in hospitals, and 85% in nursing homes [7]. Yet, the condition is believed to be frequently underrecognized and undertreated in routine practice, possibly because many factors affect appetite in older age (physiologic changes, comorbidities, medications, social factors, etc), and thus anorexia may be dismissed as a normal part of aging [4,6,9].

In the United States, the overall population is aging in both urban and rural (nonmetropolitan) areas, but more rapidly so in rural counties where older adults (65 years or older) now account for more than 20% of the population [10]. It is well-documented that adults living in rural and underserved areas face unique challenges, such as limited access to healthcare services and social support networks, that contribute to health disparities in many diseases, including cancer, infectious diseases, cardiovascular disease, and mental health [11-13]. Moreover, compared to older adults living in urban settings, those living in rural and underserved areas have higher rates of unintended weight loss, malnutrition, frailty, and sarcopenia—all of which have been linked to anorexia of aging [14-17]. However, the educational needs of primary care clinicians who care for patients with anorexia of aging in rural and underserved areas are understudied.

## Objectives

The goals of this needs assessment were to identify the educational needs and barriers to optimal care for anorexia of aging faced by primary care clinicians who practice in rural and underserved communities in the United States. Sharing the results of this needs assessment may help guide the development of future educational initiatives for healthcare professionals involved in identifying and managing anorexia of aging among older adults who live in rural and underserved communities.

## Methods

We conducted this needs assessment using a mixed-method approach that included an online survey, a live polling segment at a virtual conference, and qualitative interviews. To meet our objectives, we focused on primary care clinicians who had self-reported serving in rural or underserved communities in the United

States and asked about their perceptions, confidence, knowledge, barriers, and interest in anorexia of aging. This project was led by Rural Medical Education (RME) Collaborative, a division of Talem Health, an accredited provider of continuing medical education (CME). RME Collaborative is dedicated to addressing healthcare gaps and needs in rural and underserved communities by providing relevant CME/CE programs.

## Online survey

We developed an online quantitative survey using SurveyMonkey. After internal testing, we distributed the survey from January through June 2022 via email to RME Collaborative's proprietary database of over 10,000 US-based clinicians, with a focus on primary care, family medicine, and internal medicine. We specifically focused on clinicians who self-reported serving patients in rural or underserved communities, which included a significant proportion working in primary care. Additionally, we used the 2013 Rural-Urban Continuum Code (RUCC) to classify geographic locations [18]. Clinicians practicing in areas designated as RUCC 4-9 were categorized as rural, whereas RUCC 1-3 locations were considered urban.

The survey consisted of 16 multiple-choice questions that asked clinicians about their: 1) Demographics (degree, specialty, years in practice, US geographic region, whether they serve patients in rural or underserved areas, and their primary practice setting); 2) Perceived prevalence of anorexia of aging and confidence in their ability to identify the condition; 3) Current use of standardized screening tools to assess appetite and risk for weight loss among older adults; 4) Knowledge of the underlying dietary deficit in sarcopenia, current recommendations for dietary protein intake in older adults, hormone alterations in anorexia of aging, quick screening tools to assess appetite and risk for weight loss among older adults in the clinic, and the efficacy of dietary interventions in anorexia of aging; and 5) Greatest barrier to managing anorexia of aging and level of interest in learning more about the condition.

The goals of the survey were communicated to participating clinicians as providing RME Collaborative with valuable insights into their experience and educational needs to guide future educational activities on anorexia of aging in rural primary care. The estimated completion time of the survey was 5 minutes. Several follow-up reminders were sent via email to encourage participation. Clinicians were not offered any financial incentives to complete the survey.

## Data analysis

Responses were exported from SurveyMonkey and sorted by first name, last name, and email address to ensure there were no duplicates. We also excluded the responses of clinicians who indicated that they did not

serve patients in rural and underserved communities. Responses were analyzed by calculating basic descriptive statistics (total number, percentage). Percentages were calculated by dividing the number of responses for each choice by the total number of respondents for each question item.

Missing responses within the survey were handled by excluding incomplete data from the specific analyses.

### Live polling segment

To maximize the number of responses from the intended audience (ie, rural US-based primary care clinicians), we administered a short version of the online survey to 311 attendees of the 2022 Rural Health Clinical Congress (RHCC) Spring virtual meeting during a live 15-20-minute polling segment. Organized by RME Collaborative, RHCC is a free virtual live, multi-topic CME/CE event designed specifically for primary care clinicians who serve patients in rural and underserved communities in the United States.

After explaining the goals of the study, a rural health expert moderator posed the questions to attendees, and a virtual technology platform (Conexiant, formerly known as BroadcastMed) was used to collect real-time answers. Data were analyzed using the same approach described earlier for the online survey. Attendees were not offered any financial incentives to participate in the polling segment.

### Interviews

To gain a more in-depth understanding of the educational needs of rural clinicians on the topic of anorexia of aging, we conducted 9 semi-structured qualitative interviews. Potential interviewees were randomly selected from attendees of the 2022 RHCC Spring virtual meeting. All these attendees were clinicians who had self-reported serving patients in rural or underserved communities, aligning with the focus of the needs assessment.

An interview guide was developed by the interviewer, a pharmacist with extensive experience in rural CME/CE, in collaboration with the moderator of the 2022 RHCC Spring virtual meeting. The guide was designed to standardize the conversation across interviews while allowing flexibility for open-ended discussions. Topics included current knowledge and experience related to anorexia of aging, practice barriers, and the challenges clinicians face when managing unintended weight loss in the elderly. The open-ended format encouraged clinicians to share their experiences and insights in-depth.

The interviews were conducted virtually (over Zoom) and lasted 30-45 minutes. Interviewees were informed that the purpose of the interviews was to gather insights into their experiences managing anorexia in the aging population, particularly in rural and underserved

settings. They were also briefed on how their feedback would help inform the needs assessment and future educational programs. The anonymity of their responses was emphasized. An honorarium of \$150 was given to each participant.

### Data analysis

The interviews were analyzed using a thematic approach. A prespecified plan was in place to identify recurring themes and insights related to the challenges of managing anorexia in aging populations. Key themes were extracted around knowledge gaps, practice barriers, and care strategies.

## Results

### Online survey

**Responder demographics:** Of 80 respondents to the online survey, 73 (91.3%) indicated that they serve patients in rural and underserved communities, and their responses were included in the data analysis.

By profession, nurse practitioners were the largest group of respondents (38.4%), followed by physicians (MD, 30.1%), nurses (RN/BSN/MSN, 17.8%), physician assistants (PA/PA-C, 8.2%), pharmacists (PharmD/RPh, 4.1%), and others (1.4%). Family medicine was the most common specialty (46.6%), followed by internal medicine (31.5%), psychiatry/mental health (8.2%), pediatrics (5.5%), obstetrics/gynecology (4.1%), pharmacy (2.7%), and others (1.4%). More than half of respondents (52.1%) had more than 20 years of experience in practice, 21.9% had 11-20 years, 13.7% had 6-10 years, and 12.3% had 1-5 years of experience.

By geographic region in the United States, respondents indicated that their practice was located in the Northeast (26%), Southeast (24.7%), Midwest (23.3%), West (16.4%), or Southwest (9.6%).

The primary practice settings of respondents included Federally Qualified Health Centers (19.2%), Rural Health Clinics (13.7%), private practices (rural, 11%; non-rural, 5.5%), government facilities (11%), hospitals (rural or community-based, 11.0%; non-rural, 8.2%), integrated health systems, (4.1%), home health (2.7%), locum tenens (2.7%), universities/academia (2.7%), pharmacies (2.7%), urgent care/retail health clinics (1.4%), long-term care facilities (1.4%), mental health/substance abuse centers (1.4%), and others (1.4%).

**Responses to perception, confidence, knowledge, barriers, and interest questions:** Responses to survey questions aimed at understanding rural primary care clinicians' perceptions of the prevalence of anorexia of aging, current use of screening tools, knowledge and confidence in identifying and managing the condition, barriers to care, and interest in learning more, are summarized in [Table 1](#).

**Table 1:** Online survey results: Rural US-based primary care clinicians' perceptions on anorexia of aging.

Question	Answer Choices	N (Percentage)
What proportions of your patients are currently experiencing geriatric anorexia (anorexia of aging)?	None	11 (15.1)
	1% to 25%	42 (57.5)
	26% to 50%	7 (9.6)
	51% to 75%	5 (6.9)
	76% to 100%	1 (1.4)
	Unsure	7 (9.6)
How confident are you right now in your ability to identify geriatric anorexia (anorexia of aging)?	Not at all confident	14 (19.2)
	Somewhat confident	37 (50.7)
	Neither confident nor unconfident	12 (16.4)
	Very confident	7 (9.6)
	Extremely confident	3 (4.1)
How often do you currently use standardized screening tools to assess appetite and risk for weight loss in your older patients?	Never	24 (32.9)
	Rarely	20 (27.4)
	Sometimes	16 (21.9)
	Frequently	11 (15.1)
	Always	2 (2.7)
Your patient is an 81-year-old woman who lives at home on her own. During her most recent clinic visit, you notice her muscle mass has decreased. When you ask about it, she mentions that lately she has not been hungry and is not eating as much. Your patient's reduced appetite may be related to her sarcopenia, which is directly related to insufficient intake of:	Fat	1 (1.4)
	Carbohydrates	5 (6.9)
	Fiber	0 (0)
	Protein*	59 (80.8)
	I don't know	8 (11)
Based on current recommendations, what is the recommended dietary protein intake in older adults?	0.5 grams of protein per kilogram body weight/day*	8 (11)
	2 grams of protein per kilogram body weight/day	26 (35.6)
	4 grams of protein per kilogram body weight/day	16 (21.9)
	6 grams of protein per kilogram body weight/day	7 (9.6)
	I don't know	16 (21.9)
Which of the following hormones secreted by the gastrointestinal tract is elevated in the fasting state and markedly lower in geriatric anorexia (anorexia of aging)?	Ghrelin*	18 (24.7)
	Cholecystokinin	4 (5.5)
	Leptin	20 (27.4)
	Glucagon-like peptide	6 (8.2)
	I don't know	25 (34.3)
A four-question validated tool that can be used to assess appetite among older adults and identify those who are at risk for future weight loss is:	Geriatric Nutritional Risk Index (GNRI)	26 (35.6)
	Mini Nutritional Assessment (MNA)	6 (8.2)
	Simplified Nutritional Appetite Questionnaire (SNAQ)*	16 (21.9)
	Malnutrition Universal Screening Tool (MUST)	3 (4.1)
	I don't know	22 (30.1)
Which of the following diets has been shown to have beneficial effects on geriatric anorexia (anorexia of aging)?	Paleo diet	6 (8.2)
	Mediterranean diet*	32 (43.8)
	Atkins diet	8 (11)
	Keto diet	5 (6.9)
	I don't know	22 (30.1)

What do you consider to be the greatest barrier to managing anorexia of aging (i.e, decreased appetite and unintended weight loss in older adults)? (select ONE)	Distance or travel-related barriers	4 (5.5)
	Shortage of specialists	3 (4.11)
	Limited knowledge about this disorder	38 (52.1)
	Lack of available guidelines for management	14 (19.2)
	Lack of available therapeutic options	7 (9.6)
	Lack of validated screening tools	3 (4.11)
	Treatment-related side effects	0 (0)
	Lack of time/competing priorities	4 (5.5)
Which of the following best describes your level of interest in learning more about geriatric anorexia (anorexia of aging)?	Extremely interested	31 (42.5)
	Considerably interested	27 (37)
	Slightly interested	13 (17.8)
	Not at all interested	2 (2.7)

Online survey (N = 73): Rural US-based primary care clinicians' perceptions, confidence, knowledge, barriers, and interest in anorexia of aging; \*Correct answer

Most respondents (57.5%) indicated that 1% to 25% of their patients currently experience anorexia of aging, yet less than 15% indicated they are very (9.6%) or extremely (4.1%) confident in their ability to identify the condition. When asked if they currently use standardized screening tools to assess appetite and risk for weight loss in their older patients, most respondents said never (32.9%) or rarely (27.4%), and only 21.9% of respondents correctly identified SNAQ (Simplified Nutritional Appetite Questionnaire) as a quick (4-question) validated tool to assess appetite and risk for weight loss among older adults.

The vast majority of respondents (80.8%) correctly identified insufficient intake of protein as the underlying dietary deficit in sarcopenia; however, only 11% were aware of current recommendations for dietary protein intake in older adults. Moreover, only a quarter of respondents (24.7%) correctly identified ghrelin as a gastrointestinal hormone that is elevated in the fasting state and markedly lower in anorexia of aging, and less than half (43.8%) were aware that the Mediterranean diet has been shown to have beneficial effects on anorexia of aging.

More than half (52.1%) of respondents said that limited knowledge about anorexia of aging is the greatest barrier to managing it, followed by a lack of available guidelines for management (19.2%). The vast majority were 'extremely' (42.5%) or 'considerably' interested (37%) in learning more about the condition.

### Live polling segment

**Responder demographics:** A total of 301 attendees, all of whom were clinicians who reported serving patients in rural or underserved communities, participated in the live polling segment at the 2022 RHCC Spring virtual meeting.

By degree, nurse practitioners were the largest group of respondents (39.5%), followed by physicians (MD/

DO, 30.6%), nurses (RN/BSN/MSN, 12.6%), physician assistants (PA/PA-C, 7%), pharmacists (PharmD/RPh, 6%), and others (4.3%). Family medicine was the most common specialty (64.8%), followed by internal medicine (17.9%), pharmacy (6%), pediatrics (4.7%), obstetrics/gynecology (3%), psychiatry/mental health (2.3%), and other (1.3%).

The primary practice setting of respondents varied greatly and included Federally Qualified Health Centers (15.9%), Rural Health Clinics (14%), private practices (rural, 12.3%, non-rural, 10.3%), government facilities (8.6%), hospitals (rural or community-based/Critical Access Hospitals, 8%; non-rural, 5%), universities/academia (5%), pharmacies (3%), mental health/substance abuse centers (2.7%), urgent care/retail health clinics (2.7%), integrated health systems (2%), locum tenens (2%), correctional facilities (1.3%), Indian health services/tribal clinic (1.3%), patient-centered medical homes (1.3%), managed care organizations (1%), long-term care facilities (0.7%), health information technology companies (0.3%), home health (0.3%), and others (2.3%).

**Responses to perception, confidence, knowledge, barriers, and interest questions:** As shown in [Table 2](#), response patterns to perception, confidence, knowledge, barriers, and interest questions in the live polling segment were similar to those of the online survey.

### Interviews

We interviewed 9 primary care clinicians (4 physicians, 4 nurse practitioners, and 1 physician assistant) who practice in rural and underserved communities in 8 different states in the United States. Their primary practice settings included Federally Qualified Health Center (4), rural health clinic (3), Critical Access Hospital (1), and rural hospital (1).

### Key challenges, knowledge gaps, and practice

**Table 2:** Live polling results: Rural US-based primary care clinicians' perceptions on anorexia of aging.

Question	Answer Choices	N (Percentage)
What proportion of your elderly patients are currently experiencing geriatric anorexia?	None	29 (14.3)
	1% to 25%	88 (43.3)
	26% to 50%	30 (14.8)
	51% to 75%	15 (7.4)
	76% to 100%	5 (2.5)
	Unsure	36 (17.7)
How confident are you right now in your ability to identify geriatric anorexia?	Extremely confident	3 (1.6)
	Very confident	28 (13.8)
	Neither confident nor unconfident	34 (16.7)
	Somewhat confident	89 (43.8)
	Not at all confident	49 (24.1)
How often do you currently use standardized screening tools to assess appetite and risk for weight loss in your older adult patients?	Never	84 (40.4)
	Rarely	58 (27.9)
	Sometimes	37 (17.8)
	Frequently	21 (10.1)
	Always	8 (3.8)
Your patient's reduced appetite may be related to her sarcopenia, which is directly related to insufficient intake of:	Protein*	159 (76.4)
	Fiber	4 (1.9)
	Carbohydrates	12 (5.8)
	Fat	10 (4.8)
	I don't know	23 (11.1)
Based on current recommendations, what is the recommended dietary protein intake in older adults?	0.5 grams of protein per kilogram body weight/day*	31 (14)
	2 grams of protein per kilogram body weight/day	71 (32)
	4 grams of protein per kilogram body weight/day	38 (17)
	6 grams of protein per kilogram body weight/day	11 (5)
	I don't know	71 (32)
Which of the following hormones secreted by the gastrointestinal tract is elevated in the fasting state and markedly lower in anorexia of aging?	Leptin	58 (27.5)
	Ghrelin*	49 (23.2)
	Cholecystokinin	47 (4.7)
	Glucagon-like peptide	30 (14.2)
	I don't know	27 (30.4%)
A four-question validated tool that can be used to assess appetite among older adults and identify those who are at risk for future weight loss is:	Geriatric Nutritional Risk Index (GNRI)	78 (34.1)
	Simplified Nutritional Appetite Questionnaire (SNAQ)*	40 (17.5)
	Mini Nutritional Assessment (MNA)	20 (8.7)
	Malnutrition Universal Screening Tool (MUST)	17 (7.4)
	I don't know	74 (32.7)
Which of the following diets has been shown to have beneficial effects on anorexia of aging (geriatric anorexia)?	Mediterranean diet*	111 (49.1)
	Paleo diet	19 (8.4)
	Atkins diet	19 (8.4)
	Keto diet	15 (6.6)
	I don't know	62 (27.5)

What do you consider to be the greatest barrier to managing anorexia of aging (i.e, decreased appetite and unintended weight loss in older adults)? (select ONE)	Limited knowledge about this disorder	110 (48.7)
	Lack of available guidelines for management	36 (15.9)
	Lack of time/competing priorities	24 (10.6)
	Lack of available therapeutic options	23 (10.2)
	Distance or travel-related barriers	16 (7)
	Shortage of specialists	9 (4)
	Lack of validated screening tools	6 (2.7)
	Treatment-related side effects	2 (0.9)
Which of the following best describes your level of interest in learning more about anorexia of aging (geriatric anorexia)?	Extremely interested	93 (40.6)
	Considerably interested	97 (42.4)
	Slightly interested	36 (15.7)
	Not at all interested	3 (1.3)

Live polling segment (N = 301): Rural US-based primary care clinicians' perceptions, confidence, knowledge, barriers, and interest in anorexia of aging; \*Correct answer

**barriers:** All clinicians said that anorexia and unintended weight loss is a “major issue” among their older patients. A common theme was that the condition is relatively prevalent among the elderly in rural communities, where a large proportion of the population is aging. The underlying cause of anorexia is often hard to identify and manage, with potentially dire consequences, especially for patients who live in nursing homes or long-term care facilities and are more likely to be forgotten (“they literally waste away”).

Notably, during the interviews, some clinicians relayed that they find the terms “anorexia of aging” and “geriatric anorexia” confusing, and they do not usually use these terms in clinical practice. Instead, the condition is more commonly known or understood to be “unintended weight loss in the elderly.”

Another major theme was that all clinicians felt that they lacked knowledge or training on how best to assess and manage patients who experience unintended weight loss. Several clinicians described uncertainty about how to use nutritional supplements and available medications to treat these patients. Finally, all clinicians expressed a need for education on anorexia of aging and unintended weight loss.

## Discussion

To the best of our knowledge, this is the first needs assessment conducted specifically to identify the educational needs and barriers to optimal care for anorexia of aging faced by primary care clinicians who serve patients in rural and underserved communities in the United States. Our quantitative and qualitative analyses revealed a wide range of gaps in the identification and management of anorexia of aging and unintended weight loss in rural primary care, along with interest among clinicians to participate in educational initiatives and training on how to identify and treat patients with this common, yet challenging condition.

Most clinicians who participated in the study reported that a substantial percentage of their older adult patients currently experience anorexia of aging. However, only a minority of clinicians indicated that they are confident in their ability to identify the condition. Potential causes for this confidence gap include limited overall knowledge about anorexia of aging, the overlap with and difficulty distinguishing anorexia of aging from other common age-related conditions (eg, physiologic decline in food intake, malnutrition, frailty, sarcopenia), and the lack of a consensus definition for anorexia of aging [4,6,19,20].

Several standardized screening tools are available to assess appetite in older adults [21]. However, our survey results indicate that many primary care clinicians in rural and underserved communities rarely or never use these tools in routine clinical practice, and many are not specifically aware of SNAQ as a quick (4-question) and simple validated screening tool [22]. Suboptimal screening for appetite loss coupled with confusion about terminology to describe the condition (ie, anorexia vs. unintended weight loss) may mean that many patients with anorexia of aging are identified only after substantial weight loss has already occurred with potentially devastating consequences on quality of life, morbidity, and mortality.

Primary care clinicians who were interviewed for this study reported that anorexia and unintended weight loss in the elderly are common in rural settings and described challenges in identifying the underlying cause of the problem. This is unsurprising given the large number of factors that may contribute to anorexia in older adults (dental problems, comorbidities, social isolation, depression, polypharmacy, etc), and that many of these factors are more common in rural areas. Thus, multiple factors that may contribute to anorexia are likely to coexist in the same patient, making management more complex [6,23]. The shortage of specialists in geriatrics can complicate management even more [24].

The pathophysiology of anorexia of aging is still not completely understood, but several biological factors are believed to be involved, including alterations in gastrointestinal hormones, such as ghrelin and cholecystokinin [8]. Many clinicians who participated in this study were not aware that lower postprandial ghrelin levels have been implicated as a potential underlying mechanism for anorexia of aging [25]. This gap in knowledge indicates a need to improve clinicians' understanding of the complex hormonal networks that regulate appetite in aging during health and disease, especially as new drugs targeting these pathways (eg, ghrelin agonists, cholecystokinin antagonists) are being developed for clinical use [26].

Our survey results showed that most clinicians are aware that inadequate protein intake in older age can result in sarcopenia. However, many were not aware of current recommendations for dietary protein intake in older adults [27,28], or that the Mediterranean diet has been shown to have beneficial effects [29,30]. These gaps in knowledge may hinder the ability of clinicians to provide optimal nutritional counseling to older patients in rural areas, many of whom also face unique challenges in regard to food security due to higher rates of poverty, distance from stores and food assistance, and less access to transportation [31].

Finally, clinicians who were interviewed for this study described their uncertainty about how to use nutritional supplements and available medications to treat older patients with anorexia and unintended weight loss. This uncertainty is to be expected given the lack of effective US Food and Drug Administration (FDA)-approved medications for this condition. Current guidelines recommend avoiding prescription appetite stimulants or high-calorie supplements for the treatment of anorexia in older adults. Instead, clinicians are encouraged to optimize social supports, discontinue medications that may interfere with eating, provide appealing food and feeding assistance, and clarify patient goals and expectations [32]. These recommendations may be more difficult for primary care clinicians to implement in resource-limited rural and underserved communities, highlighting the need for additional support and education to address common barriers and challenges.

## Limitations

The study design relied on clinicians to self-report serving patients in rural and underserved communities. Therefore, there may have been variability in the samples used in the analyses. In addition, rural and underserved communities are heterogeneous in terms of socioeconomic, demographic, and cultural factors [11], which makes it difficult to generalize the study results. A previous study reported that Black older adults who reside in rural areas experience higher rates of social isolation than their urban counterparts [33]. Therefore, differences by race and ethnicity in

the prevalence and impact of anorexia on the health of older adults should be explored in future studies.

## Conclusions

Our needs assessment revealed a range of gaps and barriers to timely identification and optimal management of anorexia of aging in rural primary care. Many primary care clinicians who serve patients in rural and underserved communities reported gaps in their confidence to identify the condition, suboptimal use and knowledge of standardized screening tools, as well as confusion around terminology. Our study also revealed challenges in identifying the underlying cause of unintended weight loss and knowledge gaps regarding the pathophysiology of anorexia of aging and current nutrition recommendations for older adults. The educational needs and barriers to optimal care identified in this study can help inform future educational initiatives on anorexia of aging designed specifically for primary care clinicians who serve patients in rural and underserved areas.

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## Statement of Equal Authors' Contribution

All authors have contributed equally to this publication.

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