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Application of the MDT Clinical Teaching Model in Screening for Geriatric Sarcopenia and Nutrition Intervention Education

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Abstract: *Objective:* To investigate the effectiveness of the multidisciplinary team (MDT) clinical teaching model in screening for sarcopenia and nutrition intervention education among the elderly. *Methods:* Sixty undergraduate medical students undergoing clinical internships in the geriatrics department of a hospital from June 2024 to May 2025 were randomly assigned to a control group (n=30) and an observation group (n=30) using a random number table. The control group received conventional bedside teaching, while the observation group underwent MDT-based teaching. Post-internship assessments compared both groups on theoretical knowledge, clinical practice skills, and clinical reasoning. *Results:* The observation group achieved significantly higher scores than the control group in both basic theoretical knowledge (83.40 ± 10.03 vs. 72.24 ± 11.64, $P < 0.05$) and clinical practice assessment (89.81 ± 5.87 vs. 76.73 ± 6.48, $P < 0.05$). 2. Scores for the observation group in "comprehensiveness of problem analysis", "accuracy of evidence-based decision-making", "multidisciplinary integration ability", and "risk prediction and complication management ability" were (20.58 ± 1.87), (22.44 ± 1.18), (22.28 ± 1.53), and (23.21 ± 1.46) points, respectively, all significantly higher than the control group's (18.83 ± 1.95), (20.21 ± 1.36), (19.56 ± 1.74), and (21.02 ± 1.37) points, respectively, with statistically significant differences ($P < 0.05$). *Conclusion:* The application of the MDT clinical teaching model in screening for sarcopenia and nutrition intervention education among the elderly demonstrated significant efficacy, effectively enhancing students' understanding of sarcopenia-related knowledge and comprehensive diagnostic and therapeutic capabilities.

Keywords: MDT teaching model; Sarcopenia in the elderly; Screening; Nutritional intervention; Medical education

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1. Introduction

Sarcopenia is a syndrome characterized by progressive decline in muscle mass and function, with a high prevalence among the elderly population [1]. Research data indicate that the prevalence of sarcopenia in individuals aged 60 and above ranges from approximately 10% to 20%, rising to as high as 50% in those aged

80 and above [2]. Older adult sarcopenia not only leads to reduced muscle strength, slowed walking speed, and impaired balance but also increases the risk of falls and loss of independence, severely impacting quality of life and placing a heavy burden on family caregivers [3].

Early screening and effective nutritional interventions are key measures to delay the progression of sarcopenia and improve the quality of life and health status of older adults. Through early screening, individuals at high risk for sarcopenia can be identified promptly and provided with targeted nutritional interventions, thereby slowing disease progression and improving muscle mass and function in patients [4]. Therefore, there is an urgent need in geriatric clinical education to enhance students' mastery of multidisciplinary knowledge regarding sarcopenia screening methods and nutritional interventions. However, traditional bedside teaching models often focus primarily on single-discipline knowledge transmission, making it difficult to comprehensively cover the multidisciplinary knowledge system involved in geriatric sarcopenia. This results in students having an incomplete understanding of the disease. Furthermore, the limited scope of bedside teaching scenarios deprives students of opportunities to integrate knowledge and skills within complex real-world clinical settings, hindering the development of practical clinical competence and problem-solving abilities. The multidisciplinary team (MDT) model represents an innovative medical philosophy and practice approach. Introducing MDT into medical education not only addresses the shortcomings of traditional teaching methods but also provides students with more comprehensive and systematic knowledge and skills training. In recent years, this model has gained widespread application and promotion in clinical settings. Research by Tang Yiping et al. revealed that the liver cancer MDT teaching model, through multidisciplinary collaboration, real-case-driven learning, and structured feedback mechanisms, significantly enhances clinical interns' comprehensive clinical abilities and critical thinking skills [5]. A clinical trial by Wang Long et al. demonstrated that applying the MDT teaching model in standardized residency training systematically cultivates physicians' clinical reasoning abilities, enabling more comprehensive analysis and decision-making when confronting complex clinical issues [6]. This study aims to conduct a clinical trial to thoroughly investigate the effectiveness of the MDT clinical teaching model in screening for sarcopenia and delivering nutritional intervention education among the elderly. The findings are reported as follows.

2. Materials and methods

2.1. General information

Sixty undergraduate medical students undergoing clinical internships in the geriatrics department of a certain hospital from June 2024 to May 2025 were selected. All participants had completed foundational courses in internal medicine and nutrition, possessing a certain level of medical theoretical knowledge. Inclusion criteria: voluntary participation in the study; no record of failing clinical internships. Participants were randomly assigned using a random number table to a control group (n=30, 18 males, 12 females, mean age 22.3±1.2 years) and an observation group (n=30, 20 males, 10 females, mean age 22.5±1.1 years). Baseline characteristics showed no significant differences between groups ($P > 0.05$), ensuring comparability.

2.2. Methods

2.2.1. Control group

Traditional bedside teaching (TBT) was implemented. Upon admission, geriatric teaching physicians conducted instruction following a "theoretical lecture + bedside demonstration" protocol. Theoretical instruction involved textbook explanations and PowerPoint presentations to teach students about sarcopenia definitions, diagnostic criteria,

and nutritional intervention principles. Bedside teaching utilized typical cases to demonstrate sarcopenia screening and nutritional assessment procedures, with students participating only as observers and asking one-way questions.

2.2.2. Observation group

Implemented an MDT-based teaching model (MDT-T), with specific measures as follows:

Formation of multidisciplinary teaching team: An MDT teaching team comprising physicians from Geriatrics (2), Clinical Nutrition (1), and Rehabilitation Medicine (1) was established. Team members collaboratively developed standardized teaching protocols based on their respective expertise and experience.

Case introduction and group discussion: Carefully selected cases of geriatric sarcopenia complicated by conditions such as diabetes and chronic heart failure were distributed to students in advance. Students conducted group discussions based on the case materials to formulate preliminary treatment plans.

Interdisciplinary deep dive: Geriatrics physicians thoroughly explain sarcopenia diagnostic criteria and introduce common screening tools with application methods. Clinical nutritionists demonstrate how to develop personalized nutrition plans based on patient specifics. Rehabilitation physicians guide resistance training protocols and teach home intervention strategies, ensuring students grasp key rehabilitation principles for sarcopenia patients.

Scenario simulation and feedback: Standardized patients simulate communication scenarios with sarcopenia patients. Students practice doctor-patient communication techniques in groups. Instructors provide individualized feedback on each group's performance, highlighting strengths and areas for improvement to enhance communication skills.

2.3. Observation indicators

Basic theoretical knowledge score: Following the internship, a comprehensive closed-book assessment will evaluate both groups of students on their mastery of geriatric sarcopenia knowledge. The assessment covers five sections: disease recognition, high-risk population identification, pathological mechanisms, evaluation methods, and nutritional intervention principles. Each section is worth 20 points, totaling 100 points.

Clinical practice skills: On-site assessments evaluated students' proficiency in: Standardized geriatric sarcopenia screening procedures; Accuracy of nutritional assessments; Rationality of nutritional intervention plan development; Patient communication skills. Each criterion was scored out of 25 points, totaling 100 points.

Clinical reasoning: The modified Critical Thinking Dimensions Inventory (CTDI-CV) is used to evaluate students' abilities in problem analysis, evidence-based decision-making, multidisciplinary integration, and risk prediction. Each dimension is worth 25 points, with a maximum total score of 100 points.

2.4. Statistical methods

Data analysis was performed using SPSS 26.0. Quantitative data are expressed as mean ± standard deviation (Mean ± SD). Intergroup comparisons were conducted using independent samples *t*-tests, while categorical data were analyzed using chi-square ($\chi 2$) tests. A P value < 0.05 was considered statistically significant.

3. Results

3.1. Comparison of basic theoretical knowledge assessment scores between groups

Students in the observation group demonstrated significantly higher scores than the control group in assessments

of basic theoretical knowledge regarding geriatric sarcopenia, including disease awareness, identification of high-risk populations, pathological mechanisms, assessment methods, and nutritional intervention principles. These differences were statistically significant ($P < 0.05$), as shown in **Table 1**.

Table 1. Comparison of basic theoretical knowledge assessment scores between groups (Mean ± SD, points)

Group	Disease awareness	Identification of high-risk populations	Pathological mechanisms	Assessment methods	Nutritional intervention principles	Overall score
Control group (*n*=30)	14.52 ± 2.13	14.85 ± 2.34	13.26 ± 2.51	15.06 ± 2.23	14.55 ± 2.43	72.24 ± 11.64
Observation group (*n*=30)	16.24 ± 1.86	16.51 ± 2.03	16.81 ± 2.02	17.04 ± 1.93	16.80 ± 2.19	83.40 ± 10.03
t	3.332	2.935	6.035	3.677	3.767	3.978
P	0.002	0.004	<0.001	0.001	<0.001	<0.001

Students in the observation group demonstrated significantly higher scores than the control group in the following areas: standardization of geriatric sarcopenia screening procedures, accuracy of nutritional assessments, rationality of nutritional intervention plan formulation, and physician-patient communication skills. These differences were statistically significant ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of clinical practice assessment scores between groups (Mean ± SD, points)

Group	Screening procedure compliance	Accuracy of nutritional assessment	Rationality of the intervention plan	Communication and coordination skills	Overall score
Control group (n=30)	19.29 ± 1.55	17.86 ± 1.69	19.52 ± 1.51	20.06 ± 1.73	76.73 ± 6.48
Observation group (n=30)	21.26 ± 1.67	22.05 ± 1.73	23.32 ± 1.34	23.18 ± 1.13	89.81 ± 5.87
t	4.736	9.489	10.310	8.270	8.194
P	<0.001	<0.001	<0.001	0.001	<0.001

3.3. Comparison of clinical reasoning scores between the two groups

Students in the observation group scored significantly higher than those in the control group in "Comprehensiveness of Problem Analysis", "Accuracy of Evidence-Based Decision-Making", "Multidisciplinary Integration Ability", and "Risk Prediction and Complication Management Ability", with statistically significant differences ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of clinical reasoning scores between groups (Mean ± SD, points)

Group	Comprehensiveness of problem analysis	Accuracy of evidence-based decision-making	Multidisciplinary integration ability	Risk prediction and complication management
Control group (n=30)	18.83 ± 1.95	20.21 ± 1.36	19.56±1.74	21.02±1.37
Observation group (n=30)	20.58±1.87	22.44±1.18	22.28±1.53	23.21±1.46
t	3.548	6.684	6.429	5.991
p	0.001	<0.001	<0.001	<0.001

4. Discussion

Amidst China's accelerating demographic aging, the prevalence of sarcopenia among the elderly continues to rise annually. Early screening coupled with effective nutritional interventions—ensuring adequate protein and vitamin D intake—is crucial for slowing sarcopenia progression. This places heightened demands on the clinical capabilities of geriatric practitioners [7]. They must not only possess keen awareness to identify high-risk populations for sarcopenia and master standardized screening tools and assessment methods, but also provide targeted, feasible nutritional guidance to patients and their families. However, under traditional teaching models, students' understanding of sarcopenia remains confined to a single-discipline perspective, often resulting in fragmented knowledge systems that fail to comprehensively grasp the key points of sarcopenia diagnosis and treatment.

The MDT teaching model offers a comprehensive, systematic learning platform through interdisciplinary theoretical integration and case-based practice. During the theoretical integration phase, students not only learn the basic definitions and diagnostic criteria of sarcopenia but also gain an in-depth understanding of the complex pathophysiological mechanisms of sarcopenia in the elderly [8]. During the case practice phase, students organically integrate knowledge from different disciplines through participation in real-case discussions and analysis, forming a complete knowledge system. This enables students to understand sarcopenia from multiple angles, thereby enhancing their comprehensive analysis and judgment capabilities regarding the disease [9].

The study findings revealed that the observation group students achieved significantly higher scores than the control group in basic theoretical knowledge assessments, clinical practice evaluations, and clinical reasoning ability assessments ($P < 0.05$). Analysis indicates this advantage primarily stems from the comprehensive strengths of the geriatric sarcopenia MDT teaching model: (1) The MDT teaching model provides students with a comprehensive and systematic learning framework through interdisciplinary theoretical integration and case-based practice. Under this multidisciplinary integration mechanism, students not only learn the fundamental definitions, diagnostic criteria, and complex pathophysiological mechanisms of sarcopenia, but also organically combine knowledge from different disciplines to form a complete knowledge system. This enhances their comprehensive analytical and judgmental abilities regarding geriatric sarcopenia. (2) The MDT teaching model creates an immersive learning environment through role-playing and real-world scenario practice, enabling students to fully hone their practical skills and collaborative abilities in simulated clinical settings. During role-playing sessions, students assume roles such as geriatricians, nutritionists, and rehabilitation therapists. By simulating actual diagnostic and treatment processes, students not only become familiar with the responsibilities and workflows of each discipline but also learn how to communicate and collaborate effectively with healthcare professionals from other fields [10]. In real-world practice, students participate in multidisciplinary team (MDT) outpatient rounds, gaining firsthand experience with multidisciplinary collaboration in clinical settings. This deepens their understanding of patient needs and disease progression, enhancing their clinical skills and problem-solving abilities. (3) The MDT model emphasizes comprehensive disease assessment from the perspective of geriatric syndromes. Students learn to analyze problems from multiple disciplinary viewpoints, better understand the connections and interactions between disciplines, and thus grasp the overall process of disease onset and progression. This enhances their clinical reasoning abilities and decision-making skills.

5. Conclusion

In summary, the MDT-based geriatric sarcopenia screening and nutritional intervention education program enables

students to comprehensively master the key points of sarcopenia diagnosis and treatment through interdisciplinary knowledge integration, practical collaboration, and clinical reasoning training. This enhances their overall response capabilities in complex clinical scenarios, providing an effective pathway for cultivating multidisciplinary medical professionals capable of meeting the demands of an aging society.

Disclosure statement

The authors declare no conflict of interest.

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