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Comprehensive Geriatric Assessment in Frail Older People: Thoughts on Application

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Comprehensive Geriatric Assessment in Frail Older People: Thoughts on Application

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【Abstract】 As China enters an ageing society, the number of elderly people is rising sharply, resulting in a continuous increase in the cost and burden of caring for the elderly. Frailty is an important cause of loss of self-care ability and elderly care problems in elderly people, which means that frailty is associated with a decline not only in physiological functions, but in multiple areas as well, such as mental ability and socioeconomic functioning, and is considered an important geriatric syndrome that affects the quality of life of the elderly. Comprehensive Geriatric Assessment (CGA) is a multi-dimensional and multidisciplinary assessment process or model specifically for elderly patients. As a core tool in geriatric medicine, it uses a multidimensional and multi-disciplinary approach to assess the physical condition, functional status, mental health and social environment status of the elderly, and accordingly a treatment plan is developed to maintain and improve the functional status of the elderly and enhance their quality of life to the most extent. However, the use of CGA is not entirely consistent in China and abroad. This paper reviews the existing studies on frailty in the elderly, analyses the advantages and shortcomings of CGA used in frail elderly patients, and finds that interventions for frail patients at home and abroad have been valued increasingly. The development of domestic interventional studies on frailty is still in the initial stage, and most of these studies use a design of a randomized controlled trial with a sample of chronic disease inpatients. In contrast, such studies have been widely carried out abroad, in which CGA has been applied to the management of cancer patients and patients in the perioperative period besides chronic disease patients and frail community-dwelling older people. The frailty status in the elderly can be scientifically and comprehensively assessed by the CGA, and based on which targeted interventions can be implemented to prevent or delay the development of frailty, but it is generally time-consuming, and there are many difficulties in the management of the assessment recipients. In the future, it is necessary to advance the clinical application of CGA, or develop a more rapid, comprehensive and authoritative tool based on CGA for frailty assessment in the elderly, so as to provide comprehensive and personalized medical services and health guidance for frail elderly population through standardised assessment.

【Key words】 Frailty syndrome; Frailty assessment; Comprehensive geriatric assessment; Aged; General practice; Review

The elderly population in China reached 88.21 million in 2000, representing an aging trend in Chinese society^[1]. The seventh national census showed that the total number of people aged ≥ 60 years in mainland China was 264 million, accounting for 18.7% of the total population, of which those aged ≥ 65 years totaled 190 million, accounting for 13.5% of the total population^[2]. During the 20 years of rapid social development in China, the proportion of elderly population has increased by 8.4%, and the last decade has clearly surpassed the previous one. With the deepening of population aging, the elderly bring a series of social problems due to decreasing physical strength and endurance, among which the elderly problem and care burden are particularly prominent^[3]. The frailty that accompanies aging is an important cause of loss of self-care and elderly care problems in the elderly population, and its incidence increases with age, causing a variety of adverse events, including falls, infections, readmission to hospital, and even death^[4]. The frailty not only implies the decline of physiological functions, but also covers the decline of multiple domains such as psychological, socioeconomic, and somatic functions, which can also cause the weakening and imbalance of functions in all levels of the human body, or even the loss of functions in one or all domains. As a result, debilitation has become a recent global research hotspot. Studies have shown that timely intervention and prevention can effectively improve or even reverse frailty and delay the onset of death in the elderly by 3% to 5%^[5]. Comprehensive geriatric assessment (CGA), as a multidisciplinary assessment of the health and functional status of elderly patients, can capture the frailty of the elderly in a multidimensional manner, so that a greater degree of intervention and support can be given^[6], ultimately achieving the goal of healthy aging and active aging (physical and psychological health and good social adaptability of the elderly, extension of healthy life expectancy and harmony with society as a whole). In this paper, we review the application of CGA in the frail elderly population at home and abroad, analyze the advantages and shortcomings of the application of CGA technology in frail elderly patients, in order to provide clinical workers and researchers with reference measures to prevent or slow down the occurrence of frailty in old age.

1 Current status of frailty

1.1 Concept of Frailty Frailty was first mentioned in a cross-sectional study of community-dwelling older adults in the late 1960s, and the concept of frailty was formally introduced at the American Federation of Aging Conference in 1978^[7]. FRIED et al^[8] provided a potentially standardized definition of frailty, stating that frailty is a complex

symptom characterized by impaired stress resistance due to decreased function of different organs^[9]. The impaired stress resistance due to the decrease in the function of different organs, i.e., increased vulnerability and reduced stress resistance of the organism^[9]. Because of this, the occurrence of debilitation makes the body more susceptible to a range of problems such as cognitive impairment, falls, and urinary incontinence^[10]. Currently frailty is more considered as an important geriatric syndrome that affects the quality of life of the elderly.

1.2 Assessment scales for frailty There are numerous assessment scales for frailty, and the article by BUTA et al^[11] in *Ageing Res Rev* summarized 67 frailty assessment scales, 9 of which were highly cited, including the Frailty Phenotype (FP), Frailty Index (FI), Gill Frailty Measure, Frailty/Vigor Assessment, Clinical Frailty Scale (CFS), Brief Frailty Instrument, Vulnerable Elders Survey-13 (VES-13), the FRAIL Scale, and the Winograd Screening Instrument. Among them, FRIED et al^[8] developed the FP based on the frailty cycle theory, which includes fatigue, reduced physical activity, grip strength, slowed gait speed, body mass, and the FRAIL Scale. The FP, developed by FRIED et al^[8] based on the frailty cycle theory, contains indicators for assessing fatigue, decreased physical activity, reduced grip strength, slowed gait speed, and reduced body mass, focusing on the assessment of physiological status, and is a more widely used and efficient assessment tool, as well as a frailty screening scale recommended by the CGA, which can be used to assess the level of frailty in people over 60 years of age (including the elderly with mild dementia and disability)^[12]. MITNITSKI et al^[13] developed the FI based on the theory of accumulation of health deficits, which contains 70 health deficit items for physical, psychological and cognitive conditions of the elderly, although this frailty assessment tool is more comprehensive and has the same wide clinical application, it requires a longer assessment time. Although this frailty assessment tool is more comprehensive and widely used clinically, it takes longer to assess and is less widely used clinically than the FP. In addition, the Tilburg Frailty Indicator (TFI)^[14], Comprehensive Frailty Assessment Instrument (CFAI)^[15], Groningen Frailty Index (GFI)^[16], and CGA-based Frailty Index Assessment (CGA-FI)^[17] are all scales based on the integrated model of frailty and have been Chineseized, with good reliability and validity, but they are not widely used in clinical practice.

1.3 Epidemiological findings of frailty Because there are many scales for assessing frailty, the sensitivity of each scale for assessing frailty varies widely, the methods and targets for assessing frailty are not uniform, the findings of frailty incidence vary from region to region^[11]. Since FP is relatively widely used, this paper is based on the epidemiological description of frailty^[8]. The results of a survey conducted by JingYa Yu et al^[18] on 526 cases of elderly people in the community in Chengdu showed that the prevalence of frailty and pre-frailty in the elderly was

9.3% and 45.4%, respectively. Li Xuchun et al^[19] investigated 600 elderly people in 10 communities in Haikou City by convenience sampling method, and the results showed that the prevalence of frailty was 35.8%. Ren Jingjing^[20] conducted a survey in two urban areas of Lanzhou City and sampled 459 elderly people by convenience sampling method and found that the prevalence of frailty was 10.1% and the prevalence of pre-frailty was 61.4%. In an investigative study conducted by Lei Pengqiong et al^[21] in Tianjin, 778 older adults were surveyed by a multistage randomized whole group sampling method and found that 10.5% were in the debilitating stage and 42.9% were in the pre-debilitating stage. Tian Peng et al^[22] systematically evaluated the prevalence of frailty in the last 20 years in China in 2019 and found that the prevalence of frailty was 12.2% in those aged 65-74 years, 33.2% in those aged 75-84 years, and 46.8% in those aged ≥ 85 years. MA et al^[23] randomly selected 5,844 community-dwelling older adults in China for frailty cause in a cross-sectional study, MA et al^[23] found that the overall prevalence of frailty among older adults was 9.9%, with 12.7% in the southwest, 11.1% in the north, 5.9% in the northwest, 5.0% in the south, 2.5% in the east, and 2.3% in the northeast, with higher prevalence among female than male and higher prevalence in rural than urban areas.

In a systematic review, COLLARD et al^[24] found that the prevalence of frailty among 61,500 >65-year-olds in 21 U.S. community studies ranged from 4.0% to 59.1%. In a community study conducted in Saudi Arabia, ALQAHTANI et al^[26] found that the prevalence of frailty among 486 >60-year-olds was 21.4% and the prevalence of pre-frailty was 47.3%. SANTOS-EGGIMANN et al^[28] conducted a community-based cross-sectional study in Europe and found that the prevalence of frailty was 5.8% and 8.6% among >60-year-olds in Switzerland and Sweden. Several studies have also shown a strong association between the occurrence of frailty and region, with the prevalence of frailty usually higher in poorer countries than in developed countries^[9, 29].

2 Multidimensional, integrated assessment techniques for frailty in old age: CGA

2.1 Concept and characteristics CGA is a multidimensional and multidisciplinary assessment intervention process or model specifically for elderly patients. As a core technology of geriatrics, it adopts a multidimensional and multidisciplinary approach to assess the physical condition, functional status, mental health and social environment status of the elderly, and accordingly develop treatment plans to maintain and improve the health and functional status of the elderly and maximize the quality of life of the elderly^[12]. CGA not only focuses on the existing problems of the elderly, but also screens the potential clinical problems of the elderly. CGA not only helps to detect disease risks at an early stage, prevent them before they occur and improve the quality of life, but also helps to improve the self-management effectiveness of older adults and enhance the compliance of older patients with chronic

diseases and chronic disease co-morbidity management.

2.2 Assessment content The content of CGA is not entirely consistent in China and abroad, but the general direction is basically the same, mainly containing five aspects: physical condition, functional status, psychological status, social support, and living environment^[30]. Specific assessments usually include activities of daily living, visual and hearing, oral, sarcopenia, balance and gait, falls, urinary incontinence, pain, nutrition, frailty, mental and psychological status, sleep disorders, chronic co-morbidities, multiple medications, stress injuries, social support, and home environment assessment^[12]. Although different assessment tools can be selected depending on the target population and the environment, in general, a complete set of CGA assessment can produce objective and comprehensive analysis of the overall condition of the elderly, which can be used for the future treatment and recovery of the elderly. It provides a strong directional guidance and support for future disease treatment and health recovery of the elderly.

3 Application of CGA in the assessment of frailty in the elderly

CGA can effectively assess various geriatric syndromes, and frailty is now a syndrome that has a significant impact on the quality of life of older adults, so more and more researchers are using CGA to CGA has been increasingly used to delay or even improve the frailty of elderly patients through individualized interventions.

3.1 Application of CGA to assess frailty in China In China, interventional studies based on CGA technology in frail elderly patients are fewer than those conducted abroad, and are mostly randomized controlled trials, mostly in hospitalized patients with chronic diseases. Among them, Mao Qian^[31] used CGA care protocols and found that they performed better in pulmonary rehabilitation of patients with COPD compared to traditional care protocols. In an interventional study of hypertensive patients, He Rao et al^[32] found that hypertension treatment by combining CGA outcomes improved patients' blood pressure control compliance, treatment experience satisfaction, and reduced treatment costs more than hypertension treatment alone. After developing an intervention program based on CGA in elderly diabetic patients, Ge Xurong et al^[33] found that diabetic patients with CGA-based interventions had more effective glycemic control with lower rates of hypoglycemia, shorter hospital stays, lower rates of adverse events, and better ward safety management compared to conventional diabetes care. In addition to a few researchers applying CGA technique to oncologically frail patients, some researchers have also applied the technique to elderly perioperative frail patients, but the findings need to be further validated because of the small number of subjects and the short duration of the intervention^[34]. YAO et al^[35] conducted a multicenter, randomized clinical parallel controlled study in China to investigate the prognosis of elderly frail patients in China after CGA and multidisciplinary

management, which applied multidisciplinary management strategies including rehabilitative exercise, dietary modification, multiple medication modification, TCM acupuncture, and patient education; this trial is still ongoing and has not yet produced definitive conclusions.

In addition to the traditional CGA model, some scholars in China have also applied the technology to the Internet. Wang Shuai et al^[36] built a new CGA-based intervention platform using WeChat public website and hospital website, which brings together multidisciplinary treatment forces such as geriatricians, rehabilitators, dieticians, and geriatric nurses, and by combining "general condition", "frailty assessment", "quality of life", "nutritional status", "disease and medication status of frail patients", "quality of life", "nutritional status", "geriatric syndromes", "disease and medication", "social and environmental". The results of the 7 sections of "social and environmental" assessment provide personalized and comprehensive intervention guidance for frail patients. The results showed that the patients' FI and quality of life improved after 3 months of follow-up and assessment on the platform. However, the application time of this assessment system and the set follow-up time are relatively short. Its usefulness and validity need further verification.

3.2 Application of CGA in the assessment of frailty in the elderly abroad In addition to the application of CGA in patients with chronic frailty and frail elderly in the community, many studies have applied it to oncology patients and perioperative patients. EXTERMANN et al^[37] summarized the recent progress in the use of CGA in elderly cancer patients and found that CGA can clarify the morbidity and mortality of cancer patients and can significantly improve the quality of care for cancer patients. This is consistent with the findings of KONERU et al^[38]. ELLIS et al^[39], conducted the systematic evaluation of CGA in hospitalized patients, the author searched EPOC, the Cochrane Library, DARE, Medline, EmBase, CINAHL and AARP Ageline, and summarized 22 tracking reports covering 10 315 subjects in 6 countries. The results showed that patients in the CGA group were less likely to die or deteriorate and more likely to improve cognitively than those in the usual medical care group. In contrast, HARDING^[40], in a summary of 2 clinical randomized controlled trials, 1 case-matched cohort study, and 2 experimental-like interventional studies, found that CGA in the emergency department reduced patient readmissions or re-admissions 30 d after discharge.

In a related interventional study, LEE et al^[41] conducted an interventional trial for a frail group in Korea and found that a CGA-based intervention program could potentially promote healthy aging in community-dwelling older adults with interventions including group exercise, nutritional supplementation, depression management, over-the-counter medication, and home risk reduction with a sustained benefit effect of up to 1 year. JANG et al^[42] conducted

a multicomponent frailty intervention trial for economically vulnerable older adults and found that a CGA-based continuum of care improved clinical outcomes and noted that the goal of frailty assessment for older adults was to implement individualized interventions. MAZYA et al^[43] conducted a dynamic geriatric assessment-frailty intervention trial in which the control group received usual care and humanistic care, and the intervention group received CGA-based dynamic assessment and multidisciplinary interventions in addition to usual care. After 24 months of intervention, the proportion of patients with pre-frailty was significantly higher in the intervention group than in the control group, suggesting that more patients with chronic co-morbidities changed from frailty to pre-frailty or strength in the intervention group than in the control group, but the results of this study were not statistically significant due to missing data and the short follow-up period. Future studies could use more effective data collection measures and longer follow-up periods to validate the effects of CGA in clinical applications.

In a related cross-sectional study, KOCA et al^[44] performed CGA and found that patients with atrial fibrillation were more frail compared with patients with normal heart rhythm, and therefore considered atrial fibrillation as a marker of frailty, but the difference in the results of this study was not statistically significant, probably due to the small number of patients included. BRÉCHEMIER et al^[45] conducted CGA in 418 elderly oncology patients in a French frailty clinic and found that frail patients were more dependent on others for self-care than pre-frail and healthy older adults; frail patients had lower nutritional scores and most of them were at risk for malnutrition and cognitive dysfunction. The frail patients scored significantly lower on the Short Physical Performance Battery (SPPB) than the pre-frail and healthy older adults, and the frail older adults had significant problems with multiple medications. However, since the included study subjects were elderly oncology patients, the type of tumor and oncology treatment plan would have an impact on the frailty of the patients, and the study only conducted cross-sectional comparisons, so the conclusions have strong limitations.

3.3 Advantages of CGA in assessing frailty in the elderly Based on the CGA technique, researchers can assess the frailty of the elderly scientifically and comprehensively, and based on this, provide medical interventions to appropriately delay the onset of frailty in the elderly. Domestic researchers have used CGA technology in some hospitalized frail elderly patients and found that the rational application of CGA technology can effectively shorten the number of days of hospitalization, reduce the resulting hospitalization costs, improve the emotional cognition of frail elderly patients, and provide personalized treatment plans based on the assessment results can generally improve the patients' self-management awareness and reduce the occurrence of adverse events; for perioperative frail patients can effectively improve their frail status and contribute to the quality of postoperative rehabilitation^[34, 46]. Some

researchers have also focused on combining CGA technology with the Internet to shorten assessment time and improve assessment efficiency^[35-36].

3.4 Limitations of CGA Although studies have shown that the CGA technique has many advantages, domestic studies generally have small sample sizes and short intervention times, so many of the results are less accurate and need to be further validated. The CGA technique requires a lot of labor, effort and time, and has many practical inconveniences. International researchers have conducted studies based on CGA in oncology patients and community-based frail populations, but due to the large population base and long time span, there are many difficulties in management and many missing populations. Therefore, studies on such populations are limited to cross-sectional comparisons and cannot exclude the interference of the nature of the tumor and treatment regimen, and the results need to be confirmed by more longitudinal studies^[42-43].

4 Outlook

China is now entering an aging society with an increased number of people at risk of frailty in the community^[18-23]. The occurrence of frailty greatly reduces the quality of life of older adults and significantly increases the incidence of adverse events^[4], which can pose a great challenge not only to health care workers but also to society as a whole. Currently, the occurrence of frailty has been emphasized around the world, and some randomized controlled studies have found that multidisciplinary interventions can be effective in treating and improving frailty in older adults^[30, 47-49], with exercise and nutrition considered to be the more effective approaches at present^[40, 50]. However, because intervention studies on frailty are still in their infancy, many findings need to be further validated in more ways. It is hoped that with the development of society and further research, CGA-based techniques can be developed to that with the further development of society and research, a more rapid, comprehensive and authoritative technique for frailty assessment in the elderly will be developed based on CGA technology.

We provide comprehensive and personalized medical services and health guidance to the frail elderly population through standardized assessments. At the same time, in the face of the large number of frail people in the community, we can increase the number of downward diagnosis and treatment activities to bring practical and effective measures for the elderly, and help them to achieve healthy aging, successful aging, and enjoy the silver age life. Nowadays, with the rapid development of information technology, we can promote the combination of CGA and Internet technology in addition to the traditional medical technology assessment of elderly frail patients, use modern information technology to make the complicated assessment system more convenient, and establish a comprehensive, modern and scientific frail medical system by sharing information technology and service platforms, so as to further

improve the quality of life and happiness of the elderly. At the same time, we also hope to provide more opportunities for the development of geriatrics at the national level, to promote the development of geriatrics and care, and to provide better services for the elderly.

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