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Comprehensive geriatric assessment in elderly and senile patients with cardiovascular diseases. Expert opinion of the Russian Association of Gerontologists and Geriatricians

Senile asthenia syndrome (SAS) is a geriatric syndrome characterized by age-associated decline of the physiological reserve and function in multiple systems, which results in higher vulnerability to effects of endo- and exogenous factors and a high risk of unfavorable outcomes, loss of self-sufficiency, and death. Generally, SAS is observed in elderly patients with comorbidities. In cardiovascular diseases, SAS is associated with a poor prognosis, including a higher incidence of exacerbation and death both during acute events and in chronic disease. However, SAS is often not taken into account in developing diagnostic and therapeutic programs for managing elderly patients with cardiovascular diseases (CVD). This article analyzes available scientific information about SAS, algorithms for SAS diagnosis, and the scales that may be useful in developing individual plans for management of elderly patients with CVD.

Keywords Senile asthenia syndrome; comprehensive geriatric evaluation; acute myocardial infarction; aortic stenosis; chronic heart failure

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Introduction

Due to the steadily growing elderly population in developed and developing countries and the benefits of modern medicine in treating and preventing severe heart diseases, most patients hospitalized for cardiovascular diseases (CVDs) are older than 65 years. CVDs are the most common cause of death after age 75 [1]. However, few clinical studies have evaluated the effects of frailty syndrome on cardiovascular outcomes, even when age was not an exclusion criterion. The result is a lack of scientific data on managing elderly patients with frailty syndrome and CVDs. The scientific communities regard the elderly with CVDs as a priority population for research to determine how to predict adverse outcomes and choose the best management in various clinical cases [2].

What is frailty syndrome, and why is it important to detect it?

Frailty syndrome is an age-related syndrome characterized by a reduced biological reserve. Its development is associated with depression of the various physiological systems of the body, which makes an elderly person vulnerable to any stress. The severity of frailty syndrome reflects biological age [3]. The prevalence of frailty syndrome among Europeans aged 65 and older who have no disabilities and live independently ranges from 4% to 14% [4]. Frailty is more common in patients with CVDs, and the two conditions are mutually confounding: the cardiovascular risk is higher in elderly patients with frailty syndrome, and patients with manifesting or subclinical CVDs are at higher risk of functional deterioration [5].

Clinical outcomes of CVDs in patients with frailty syndrome are associated with a higher risk of morbidity and mortality in both acute and chronic cases [6]. In the Canadian Study of Health and Aging, the adjusted 5-year risk of death was 4.8 (95% confidence interval [CI]: 3.7–6.2) among the relatively sthenic elderly patients and 7.3 (95% CI: 4.7–11.4) in frail patients [7]. In the Cardiovascular Health Study (CHS), patients with cardiac diseases had similar

correlations between preasthenia and frailty syndrome with falls, functional disorders, hospitalizations, and death within 3–7 years [8]. Finally, it has been repeatedly shown that frailty syndrome becomes a more significant predictor of dependence on assistance with aging than co-morbidity [9]. Therefore, it is necessary to distinguish between frailty syndrome, co-morbidity, and disability [8].

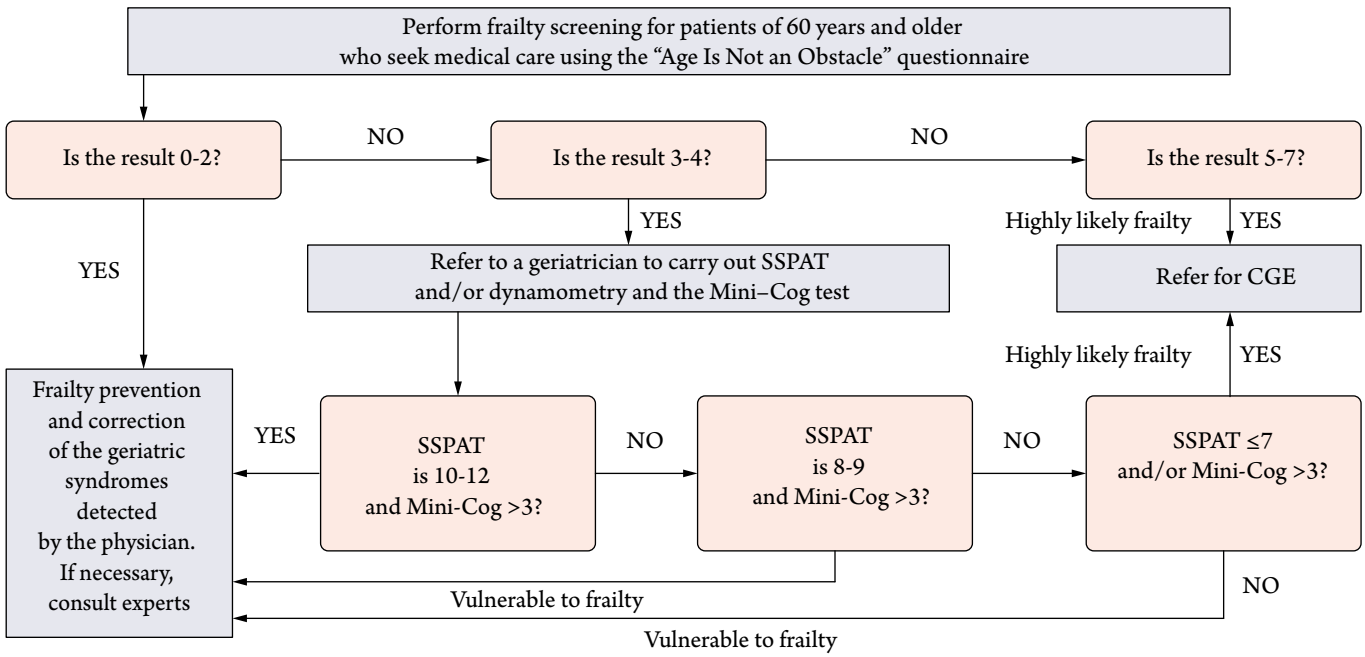
Comorbidity (multimorbid, polymorbidity) is the presence of concomitant diseases, which can affect the amount of assistance needed and the course of the disease. Co-morbidity is not always accompanied by frailty syndrome, but frailty syndrome is more common in patients with high co-morbidity. Frailty syndrome can be understood as the state preceding dependence on assistance (physical frailty) or a combination of deficiencies increasing the vulnerability of an elderly person to various external and internal factors (multidimensional frailty). Hence, frailty syndrome should be considered as a main factor associated with adverse outcomes; for this reason, its assessment can be extremely useful in clinical decision making and in the development of personal management plans.

How is frailty syndrome diagnosed?

The protocol has been developed in Russia to diagnose frailty syndrome and detect individual geriatric syndromes (Figure 1) [10, 11]. The questionnaire titled "Age Is Not an Obstacle" has been developed and validated specifically to screen patients for frailty syndrome (Table 1). It comprises seven questions related to basic geriatric syndromes. The questionnaire can be filled in by a nurse or non-medical staff (e.g., volunteers), as well as a patient [10, 11]. The Fried criteria are used in the international practice (unintentional weight loss, weakness, self-reported exhaustion, slow walking speed, and low physical activity) [9]. If the score is 3–4, it is recommended to carry out a short set of physical activity tests (SSPAT) and a Mini-Cog test [10, 11]. SSPAT includes three tests: balance, walking speed, and five chair rises. The maximum score is 12. A score of ≤ 7 is a diagnostic criterion of frailty syndrome. If a patient scores 5–7 for the screening questionnaire "Age Is Not an Obstacle," it is recommended that a multidisciplinary geriatric team perform a comprehensive geriatric evaluation (CGE). CGE is a reliable diagnostic technique for detecting geriatric syndromes, assessing the effects of co-morbidities and functional status in an elderly person, which allows evaluating the patient's general condition. The systematic use of CGE increases the likelihood that an elderly person will be able to continue living independently and having the best possible life for a longer time, including after the treatment at hospital. The main limitation is that it takes time and requires dedicated personnel. CGE is included in several scores (Multidimensional Prognostic Index [MPI]) [12] and Edmonton Frail score [13, 14]), which allow evaluating the prognosis for an elderly more accurately than the prognostic scores for individual diseases.

CGE is a multidimensional, interdisciplinary diagnostic process including assessing the physical and psycho-emotional status, functional capacity, and social problems of an elderly person, with a view of developing a management

Figure 1. Physician's Protocol



SSPAT, a short set of physical activity tests; CGE, comprehensive geriatric examination.

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Table 1. Screening questionnaire "Age Is Not an Obstacle" used to identify frailty syndrome [10, 11]

No.	Question	Possible answer
1	Have you lost weight by 5 kg or more in the past 6 months?	Yes/No
2	Are you experiencing any limitations in daily life due to impaired visual acuity or diminished hearing?	Yes/No
3	Have you had any injuries due to a fall or falls without injury in the past year?	Yes/No
4	Have you felt depressed, sad, or anxious in recent weeks?	Yes/No
5	Do you have problems with memory, understanding, orientation, or ability to plan?	Yes/No
6	Do you have urinary incontinence?	Yes/No
7	Do you have difficulties moving around the house or on the street (walking up to 100 meters or climbing one flight of stairs)?	Yes/No

Interpretation of results: each «yes» is worth 1. If the patient scored 5 or more, frailty is highly likely, and a comprehensive geriatric examination should be performed, and case management plan should be developed by a geriatrician; 3–4 – the moderate likelihood of frailty, it is reasonable to perform the short set of physical activity tests and the Mini-Cog tests in a geriatrician office; 0–2 – the patient is unlikely to have frailty syndrome.

Table 2. Identification of Seniors at Risk (ISAR) score [15]

ISAR	Yes	No
1. Before the illness or injury that brought you to the Emergency, did you need someone to help you on a regular basis?	1	0
2. Since the illness or injury that brought you to the Emergency, have you needed more help than usual to take care of yourself?	1	0
3. Have you been hospitalized for one or more nights during the past six months (excluding a stay in the Emergency Department)?	1	0
4. In general, do you see well?	0	1
5. In general, do you have serious problems with your memory?	1	0
6. Do you take more than three different medications every day?	1	0

plan aimed at restoring or maintaining the level of his/her functional activity.

The main objectives of the CGE are:

1) Identification of the main problems that can impair the functional status and quality of life
2) Definition of frailty syndrome severity
3) Development of a plan of actions aimed at resolving or eliminating such problems

CGE can be carried out in an outpatient geriatric office, geriatric department, at the patient's home. CGE involves a multidisciplinary team, including a geriatrician, geriatric nurse, social worker, exercise therapist, and other specialists (e.g., dietitian, speech therapist). A set of scores and tests carried out as part of CGE may vary depending on the place (house call, outpatient visit, inpatient treatment) and patient's condition. In order to collect the necessary anamnestic, more accurate assessment of patient's problems and the functional capabilities, and to discuss the further management plan, it is preferable to perform CGE in the presence of a family member, guardian, or caregiver. It is important to clarify the expectations and preferences of the patient and his/her family members. The duration of CGE is 1.5–2 hours. CGE is recommended for stable patients with no acute diseases.

Several scores are used internationally in emergency rooms and specialized surgical hospitals to identify frailty syndrome. The Identification of Seniors at Risk (ISAR) score includes six questions and is used to identify frailty syndrome in emergencies (Table 2). This score can help select patients who may benefit from a geriatric assessment [15]. The Green score (Table 3) has been designed to identify frailty syndrome in patients with aortic stenosis; the Essential Frailty Toolset (Table 4) is used to evaluate the prognosis of patients with severe aortic stenosis who have had transcatheter aortic valve replacement. These scores have not been validated for the detection of frailty syndrome but may be useful in specific clinical situations.

The use of these scores in routine clinical practice is problematic because their implementation is time-consuming, which is unacceptable for intensive care units [16].

In emergency situations, patient self-assessment scores or scores are based on subjective clinical evaluation by medical staff (e.g., the Clinical Frailty Scale) (Table 5) [10; 11].

Frailty syndrome should be ideally assessed on an outpatient basis, and the results should be available to hospital staff when a patient is admitted emergently. Frailty syndrome patients without disabilities can be potentially reversible or compensated to some extent by disease control, analysis of drug lists, selection of a personal diet, or specialized exercise plan. The risks of morbidity, mortality, and complications are a priori high in elderly patients with CVDs. The detection of frailty syndrome in this patient category requires careful monitoring by the medical staff and the development of a personal management plan to improve prognosis.

Table 3. The Green score [22]

Indicator	Result		Score
Albumin, g/dL	≤3.49 3.5-3.69 3.7-3.99 ≥4		3 2 1 0
Level of physical activity	Katz Index		0 – Independent 3 – Needs assistance in all six activities
Walking speed, m/sec	≤0.57 0.58-0.67 0.68-0.89 ≥0.9		3 2 1 0
Dynamometry, kg	Female: ≤7.2 7.3-11.3 11.4-15.6 ≥15.7	Male: ≤18.9 19.0-25.6 25.7-30.5 ≥30.6	3 2 1 0

Various experts should be involved in diagnostic and therapeutic decision making, and the patient's priorities and preferences should be taken into account. Detection of frailty syndrome always identifies a patient in need of close monitoring and early correction of modifiable factors to improve prognosis.

Diagnosis of frailty syndrome in various cardiovascular diseases

Chronic heart failure

The majority (80%) of patients with heart failure (HF) are over 65 years, and many are older than 80 years [17, 18].

Table 4. Essential Frailty Toolset [22]

Indicator	Result	Score
Time to rise from a chair	Less than 15 seconds More than 15 seconds Unable to complete	0 0 1
Cognitive impairment	Mini-mental (MMSE) test >24 or Mini-Cog >3 Mini-mental test < 24 or Mini-Cog <3	0 1
Hemoglobin, g/dL	Male >13; female >12 Male <13; female <12	0 1
Albumin	> 3.5 g/dL < 3.5 g/dL	0 1

Table 5. Clinical frailty scale [10, 11]

Score	Visualization	Description
1		Very Fit. People who are robust, active, energetic, and motivated. These people commonly exercise regularly. They are among the fittest for their age.
2		Well. People who have no active disease symptoms but are less fit than category 1. They may exercise often or be very active occasionally, e.g., seasonally.
3		Managing Well. People whose medical problems are well controlled, but are not regularly active beyond routine walking.
4		Vulnerable. While not dependent on others for daily help, often symptoms limit activities. A common complaint is being "slowed up," and/or being tired during the day.
5		Mildly Frail. These people often have more evident slowing, and need help in high-order instrumental activities of daily living – IADLs (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation, and housework.
6		Moderately Frail. People need help with all outside activities and with keeping house. Inside, they often have problems with stairs and need help with bathing and might need minimal assistance (cuing, standby) with dressing.
7		Severely Frail. Completely dependent for personal care, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).
8		Very Severely Frail. Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.
9		Terminally Ill Approaching the end of life. This category applies to people with a life expectancy < 6 months, who are not otherwise evidently frail.

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In addition to age, other factors worsen the prognosis for elderly patients, such as co-morbidities, geriatric syndromes [19], depression [20], cognitive impairments [21], and dependence on assistance in everyday life.

Frailty syndrome is common in patients with chronic heart failure [22]: in the neurological study, the prevalence of frailty syndrome was 7.5 times higher than in the general population [23]. Frailty syndrome is associated with a higher risk of FC deterioration and a doubling of the risk of readmissions and hospital mortality [24].

The FRAIL score is usually used in international practice to identify frailty syndrome in patients with HF. The Russian analogue is the "Age Is Not an Obstacle" score. The FRAIL score predicts medium-term institutionalization and mortality, even in hospitalized patients. Given its simplicity and high prognostic value, it is recommended to use this score to identify frailty syndrome in elderly patients with chronic heart failure (CHF). Detecting frailty syndrome can contribute to important clinical decision making through a better understanding of patient vulnerability and the risk of complications. The frailty phenotype in younger patients with HF may be partially caused by the disease and can be addressed using modern treatments, such as pacemaker implantation, cardiac resynchronization, or heart transplantation [25]. It is unclear to what extent such improvement is possible in fragile elderly patients, but these findings highlight the importance not only of improving CHF therapy, but also of performing a comprehensive assessment of frailty syndrome in elderly patients with CHF given that some geriatric syndromes may be partially reversible.

Acute heart failure

The prevalence of frailty syndrome among patients with acute heart failure (AHF) ranges from 50% to 70% [26-28], and its presence is associated with both short-term and long-term adverse outcomes. There are no recommendations for the diagnosis of frailty syndrome in elderly patients with AHF who have not previously undergone geriatric assessment [29]. Detection of frailty syndrome may be useful for risk stratification, decision making on hospitalization, and the development of personal management plans [30]. The problem of detecting frailty syndrome in AHF arises due to challenges in applying certain scores, especially the score that includes physical activity tests, and due to the lack of time and adequate conditions for the proper use of the score [30]. Given these facts, it is more convenient to use self-assessment scores or scores based on the opinion of the medical staff on patient condition, followed by an objective assessment of geriatric status after the patient is stabilized.

There is evidence of independent prognostic value of various components of the frailty syndrome phenotype in patients with HF; in particular, low physical activity and slow walking speed < 0.6 m/s are independent predictors of death and readmission. After the stabilization of symptoms, before or after the discharge from hospital, frailty syndrome can be screened using the "Age Is Not an Obstacle" questionnaire, and physical activity tests can be safely performed, if necessary. Using the Clinical Frailty Scale, scores based on CGE (multidimensional prognostic index) may be useful in patients with moderate to severe dependence on assistance in daily activity to develop a personal management plan, especially in terminal HF [31, 32].

Acute coronary syndrome

Frailty syndrome is associated with an increased number of complications, hospital mortality, and readmission rates in patients hospitalized with acute coronary syndrome (ACS). Moreover, patients with frailty syndrome are not included in most clinical trials [31, 33]. The presence of frailty syndrome is unknown to affect the management of ACS patients. There are no data evidencing whether it is possible to influence frailty syndrome as an aggravating factor and whether the treatment should be corrected in this regard. A relatively controversial issue is the use of invasive treatments of non-ST-segment elevation acute coronary syndrome (NSTE-ACS) in elderly patients with frailty syndrome. The benefits of percutaneous revascularization have been described in NSTE-ACS patients [34]. However, these data have not been verified in large randomized trials. A relationship between frailty syndrome and the occurrence of bleeding complications during hospitalization for ACS has been described [35].

Immobilization, and installation of catheters and probes, can increase a number of false-positive results in the diagnosis of frailty syndrome in elderly ACS patients. Therefore, simple scores should be used at admission that do not require much time and do not include physical activity tests. The "Age Is Not an Obstacle" score and the Clinical Frailty Scale are likely to be the most useful in this case.

A more complete diagnosis of frailty syndrome can be carried out in stable patients in 24–48 hours after the onset of ACS, which includes parameters requiring the demonstration of physical activity. This should help to make a more accurate prediction, which can aid in decision making on further treatment strategy (revascularization, rehabilitation, etc.). There is an international experience of using several scores. For example, the SHARE-FI score can be used to assess the risk of early complications, short-term, and medium-term mortality [36].

The FRAIL score, commonly used in patients with ACS and patients with CHD subjected to coronary revascularization, can adequately predict short-term and

medium-term mortality [37]. The Green score has a higher prognostic value than the Fried criteria in patients with ACS [38]. The estimation of walking speed is difficult, as it requires stable conditions and independence from assistance [39].

In general, more complex scores used to assess frailty syndrome have higher prognostic power than less complex scores. After the acute phase of ACS, it is recommended to use scores that include physical tests. However, it is not known when it is best to diagnose frailty syndrome, whether at admission, before or after discharge, or if assessing at different times would yield additional information.

Aortic stenosis

Although the FRAIL and "Age Is Not an Obstacle" scores have not been validated in patients with aortic stenosis, many geriatricians believe that they are useful for the initial evaluation of elderly and senile patients. Frailty syndrome detected using the FRAIL score is associated with high mortality in patients with aortic stenosis and a high risk of readmissions after transcatheter aortic valve replacement [40]. The Clinical Frailty Scale may also predict the risk of death after this type of surgery [41]. The Essential Frailty Toolset (Table 4) includes the cognitive function test and the estimation of hemoglobin and albumin levels. Although this score is difficult to use in elderly patients after aortic valve replacement, it has higher prognostic power than other fragility scores [42]. The Green score (Table 3) is more complex because it includes two physical tests, the Katz Index, and blood albumin. Frailty syndrome estimated by the Green score is closely correlated with annual mortality in patients with aortic stenosis who have had transcatheter aortic valve replacement [43].

Walking speed and SSPAT are the most well-studied prognostic factors in patients with severe aortic stenosis. These tests are relatively easy to use and can be performed in less than 5 minutes with reproducible results. The SSPAT findings correlate with systolic dysfunction, coronary, and cerebrovascular disorders [44]. Slow walking speed is associated with a high risk of mortality after transcatheter aortic valve replacement [45]. Co-morbidity is closely associated with frailty syndrome and is an indicator of poor prognosis in elderly patients with severe aortic stenosis [46] and a low probability of positive outcome of an aortic valve intervention [47, 48].

Conclusion

Higher life expectancy naturally increases the number of elderly and senile patients with CVD hospitalized in cardiology departments. Following specific clinical guidelines is not enough for the management of such patients. Providing quality care to these patients requires a comprehensive approach, taking into account individual characteristics, using algorithms to identify the most vulnerable patients, and developing personal examination, treatment, and follow-up plans with the involvement of related experts, nurses, social workers. The 2021 international cardiological guidelines and consensuses distinguish elderly patients with frailty syndrome and give separate recommendations [49, 50]. Thus, screening scores to assess frailty, interact with a geriatrician, and understand the role of CGE for the development of the individual management plan should be more widely used in cardiology practice.

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