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L. M. Farkhutdinova
Bashkir State Medical University, Ufa, Russia

ABOUT THE BASICS OF COMPREHENSIVE GERIATRIC ASSESSMENT

Abstract

The article covers the principles of comprehensive geriatric assessment — an interdisciplinary diagnostic procedure aimed at developing a plan of treatment, long-term monitoring and support of an elderly person. The components of a comprehensive geriatric assessment, including the determination of physical, functional, psychological and social status of the subject, are reflected. During the process of analyzing the patient's physical status, the age-related features of the functioning of various organs and systems, knowledge of which is necessary for the development of a targeted geriatric care strategy, should be taken into account. Involution of the respiratory organs is characterized by a decrease in the respiratory surface, atrophic processes in the mucous and lymphoid tissues, and an increased risk of developing bronchoobstructive syndrome. Degenerative-sclerotic changes in the cardiovascular system contribute to the development of circulatory failure, sinus node dysfunction, increased sensitivity to stress factors, orthostatic hypotension, etc. With age, the secretory function of the gastrointestinal tract decreases, and the functional ability of the liver is limited. Reducing the reserve capacity of the kidneys provokes the development of inflammatory processes and contributes to the dehydration of the body. In older people, the risk of developing diabetes, hypothyroidism and hyperparathyroidism increases. The growth of connective tissue in the blood-forming organs limits the functionality of the blood system. Age-related changes in the musculoskeletal system are characterized by a decrease in muscle mass and the development of osteoporosis. Drug therapy is also being analyzed, since polypharmacy in the elderly is associated with a particularly high risk of developing side effects of the drugs. Assessment of the functional status implies the determination of the self-service ability and the degree of a person's independence from the help of others by his/her ability to perform basic functions, activities in everyday life and instrumental activity. The psycho-emotional status is judged by the emotional background of the patient and his/her cognitive functions. Social and household status is estimated by the living conditions of an elderly person. Based on the results of a comprehensive geriatric assessment, an individual management plan is drawn up, the implementation of which is possible with the combined efforts of the geriatrician and a team of medical specialists, relatives, and social workers.

Key words: *geriatrics, comprehensive geriatric assessment, senile asthenia*

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FRAX — Fracture Risk Assessment Tool, BP — blood pressure, CGA — comprehensive geriatric assessment

* Contacts. Leila M. Farkhutdinova, e-mail: farkhutdinova@gmail.com

Old age needs so little
but needs that little so much.
Margaret Willour

Relevance

Around the world, one of the central health and social problems is the preservation of the health and quality of life of senior citizens. Physiological aging and geriatric attention are aimed at an adverse variant of this process which is senile asthenia. In Russia, this syndrome is observed in 84 % of people of elderly and senile age, while in Germany this figure is 66.4 %, Finland — 60 %, USA — 55 %, Switzerland — 50 %, Belgium — 40 %. Reduction of physical and functional activity in senile asthenia leads to the development of dependence on physical assistance in everyday life and deterioration of health prognosis. Diagnosis of senile asthenia syndrome is based on a comprehensive geriatric assessment (CGA), which, in turn, is the basis for the organization of medical care for elderly people [1, 2, 7, 9, 13, 15].

Background

For many years, it was believed that diseases in elderly people have, in the vast majority of cases, a poor prognosis. In 1943, the British physician Marjorie Warren published an article which for the first time confirmed the potential reversibility of health problems in elderly patients. According to the author, the specific needs of this group of patients, unlike young people, justify the need for a special approach in providing them with medical care, which should be carried out by a team consisting of doctors of different profiles, nurses and social workers. Marjorie Warren also proposed to divide the elderly into groups taking into account their degree of dependence on others. This approach formed the basis for a comprehensive assessment of the health of elderly patients, which was gradually improved.

In 1963, WHO proposed to divide elderly people into socially active, individually active and dependent on others, i.e. along with the physical condition to assess the ability of a person to maintain activity in everyday life. The analysis of comprehensive geriatric assessment efficacy conducted in 1993 showed that this approach can reduce mortality by 18 % and the risk of re-hospitalization — by 12 %, increase cognitive function by 41 %, and return 25 % of patients to independent living [7, 10].

Definition

Comprehensive geriatric assessment is a method of examination that includes determination of physical, functional, psycho-emotional and social status of an elderly person with the subsequent development of an action plan to improve the quality of life.

Components of a comprehensive geriatric assessment

1. Physical status

The analysis of the health status of an elderly person is based on the knowledge of age-related changes in organs and systems, which are more or less characterized by the development of dystrophic, sclerotic processes and a decrease in the reserve capacity of the body. Significant senile involution can reduce the quality of life. However, understanding the pathogenesis of body functioning in elderly patient allows to give a correct assessment of the results of his/her examination and to develop a targeted strategy of geriatric care.

The *respiratory system* with age is characterized by the development of chest deformation due to degenerative changes in the vertebral bodies and intervertebral discs, as well as by decrease in the elasticity of the lung parenchyma, which can lead to the formation of senile emphysema and a decrease in the respiratory surface by 40–45 %, contributing to dyspnea even with low physical activity. Atrophic changes in the tracheal and bronchial mucosa along with involution in lymphoid tissue significantly increase the risk of inflammatory respiratory diseases and contribute to their torpid course. The number and sensitivity

of β2-adrenergic receptors in the bronchi decrease with age, while the density of cholinergic receptors remains unchanged, and the obstructive syndrome can be the consequence not only of chronic obstructive pulmonary disease, but also cardiovascular diseases, cancer, side effect of pharmacotherapy, the impact of environmental factors, etc. Fibrosis of capillaries with an increase in brittleness provokes hemoptysis when straining and heavy coughing.

Morphofunctional state of the *cardiovascular system* is also characterized by sclerotic changes with an increase in the number of collagen fibers, a decrease in the number of elastic fibers and muscle atrophy. As a result of these processes, the vascular wall becomes rigid, blood flow and pulse wave velocity, and peripheral resistance increase, which causes senile systolic hypertension. Degenerative and sclerotic changes in the myocardium lead to a decrease in shock ejection, impaired diastolic relaxation, contributing to the development of heart failure. In the endocardium, the formation of valve calcification is possible, which is most often manifested by aortic stenosis or mitral valve prolapse. Because of fibrous degeneration in the cardiac conductive system, the number of cells generating and conducting impulses decreases (by the age of 80 years 10 % of pacemaker cells remain in the sinoatrial node from their number at a young age), which causes dysfunction of the sinus node, a tendency to bradycardia, atrial fibrillation, ventricular premature beats, various forms of blockade. With the development of sick sinus syndrome, episodes of tachy- and bradycardia are observed, which cause sudden dizziness, syncopal state and loss of consciousness.

It should be borne in mind that the elderly heart is characterized by a higher sensitivity to psycho-emotional stress, as well as to effects of factors such as alcohol, smoking, infection, intoxication, drugs, etc.

Elderly people are characterized by instability of blood pressure (BP) with fluctuations from high to low values up to orthostatic collapse, which is associated with a weakening of neurohumoral regulatory mechanisms. In this regard, the use of antihypertensive drugs, neuroleptics, benzodiazepines, antiparkinsonian agents may be accompanied by the development of orthostatic hypotension. The detection of low BP is of great clinical importance. The reduction of BP increases the risk of Alzheimer's disease, and the reduction of diastolic BP to 60 mm Hg or lower exacerbates myocardial ischemia and reduces life expectancy. It is shown that ideally selected for geriatric patient hypotensive therapy in hospital conditions after discharge from the hospital can cause severe hypotension up to cardiovascular disaster, due to the expansion of physical activity. It should be borne in mind that in elderly people, the relationship of hypertension with increased mortality has been proven for "strong" patients, while "fragile" patients have no such relationship. The impact on the quality of life of life-long therapy with antihypertensive drugs has not been studied. According to study results, BP in long-living persons is directly correlated with cognitive functions, and the decrease in BP to less than 130 mm Hg does not reduce the risk of cardiovascular disease. In this regard, the recommended figures of BP in persons under 80 years are not more than 140 mm Hg, at the age over 80 years — up to 150 mm Hg in "strong" patients and up to 180 mm Hg — in "fragile" patients [3, 6, 7].

Involution of the *digestive system* is characterized by atrophic changes throughout the gastrointestinal tract. Reducing the filamentous papillae of the tongue violates the perception of taste and reduces appetite. Decrease in secretory activity of the salivary glands along with the loss of teeth causes difficulty in the mechanical processing of food and digestive disorders in the oral cavity. There is also a decrease in secretory function of the stomach, pancreas (the mass of pancreatic tissue with age is reduced by 1.5–2 times), and violation of parietal digestion and absorption processes. All these changes contribute to weight loss with aging. An unfavorable aspect is a decrease in body weight by 6.5 % for 6 months or 5 % for 1 month. A body mass index of less than 20 kg/m^2 increases the risk of osteoporosis, while a value of 30 kg/m^2 is associated with the lowest mortality.

With age, the weight of the liver decreases, which is most pronounced in persons older than 80 years. Limitation of liver function (synthetic function, detoxification) is manifested in psycho-emotional stress, eating disorders, diet violation, the influence of adverse environmental factors, poisoning, the use of a number of drugs.

The *urinary system* is characterized by renal tissue sclerosis, which leads to the loss of 1/3–1/2 of the nephrons with age, which causes a limitation of the reserve capacity of the kidneys under stress, for example, the phenomenon of renal failure can be observed in unilateral pyelonephritis. Pyelonephritis is the main nephrological problem in geriatrics, which is facilitated by age-related disorders of the urodynamics and blood supply to the kidneys, as well as deterioration of immunity. The prevalence of pyelonephritis in the elderly increases by 4–5 times. However, the clinical symptoms of the disease are often subclinical. There are no such local manifestations as dysuria, lower back pain, and intoxication syndrome prevails — weakness, adynamia, lack of appetite, sleep disturbance, confusion, etc. Most cases of bacterial shock in acute attack of pyelonephritis are observed in elderly people.

Sclerosis of the bladder wall reduces its capacity, which causes increased frequency of urination.

The weakening of the sphincter function leads to urinary incontinence, and, indirectly, can cause the fall of an elderly person with a hasty rise, especially at night.

Patients suffering from urinary incontinence often try to limit fluid intake, which leads to dehydration, aggravating orthostatic hypotension. The risk of dehydration increases with age also due to a decrease in the feeling of thirst and appetite, a decrease in the activity of the antidiuretic hormone and the sensitivity of the kidneys to it. Severe dehydration increases the risk of falls and mortality in elderly patients. Diagnosis of this disorder at the initial stages is based on the detection of dry tongue, reduced skin turgor, orthostatic BP reduction and weight loss.

One of the main changes in *endocrine organs* is a decrease in the endocrine function of the pancreas. In this regard, age is considered as a diabetes-inducing factor (the second most important after obesity). The incidence of diabetes mellitus in persons over 60 years is 10 %, older than 80 years — 20 %, while in the population — up to 5 %.

However, the elderly age is characterized by a violation of adaptation mechanisms against hypoglycemia. For this reason, a decrease in blood sugar, which is a stress for the body, accompanied by the release of catecholamines, increases the risk of cardiovascular events — rhythm disturbances, myocardial infarction, stroke, retinal hemorrhage, etc., up to fatal. Detection of hypoglycemia is an important task in the supervision of elderly patients, and it should take into account the typical subclinical nature of adrenergic signs, such as excitement, sweating, hunger, etc., and the prevalence of neuroglycopenic symptoms — asthenia, headache, disorientation, behavioral disorders.

The decrease in blood sugar in older people not suffering from diabetes is usually associated with violations of the diet.

With age, the prevalence of hypothyroidism increases, and it occurs in 10–15 % of women older than 60 years. In this case, the clinical pattern of the disease is largely similar to age-related changes — memory loss, slowness, dry skin, etc. This disease is diagnosed by the level of thyroid-stimulating hormone, the determination of which is provided in the process of CGA.

Among endocrine pathology, parathyroid adenoma — primary hyperparathyroidism — is the third most common after thyroid diseases and diabetes (1–2 cases per 1,000 people). The peak incidence falls at the age of 60. Clinical manifestations are due to the violation of calcium and phosphorus metabolism — osteoporosis, urolithiasis, etc. One of the main laboratory signs of the disease is increased blood calcium, the determination of which is included in CGA [7, 11, 12, 17].

In *hematopoietic organs*, connective tissue grows with age, as a result, the volume of hematopoietic tissue in persons older than 70–75 years can be about 30 % of its volume in young people. Clinically, these changes are manifested in stressful situations — with intoxication, infection, psycho-emotional and physical activity, etc. Due to the limited functionality of the blood system in the elderly, leukocytosis with a shift to the left is rare, inflammatory processes are more torpid in nature. Restoration of blood cell composition after blood loss occurs twice as slow. Chronic blood loss from the gastrointestinal tract is the most common cause of iron deficiency anemia in the elderly. Atrophic processes in the gastric mucosa are accompanied by the development of B12-deficiency anemia. Tissue hypoxia also contributes to the appearance of age-related "stiffness" of red blood cells, which complicates microcirculation and tissue metabolism.

The weakened reaction of lymphocytes against mutagens provokes cancer.

With age, there are significant changes in the protein spectrum of blood plasma — there is a shift towards coarse proteins, which is associated with an increase of up to 40 % in the erythrocyte sedimentation rate after 60 years.

Age-related changes in the *musculoskeletal system* are characterized by the involution and atrophic processes in the muscles, articular apparatus, cartilage and bone tissue. Degenerative changes in skeletal muscle, or sarcopenia syndrome, leads to a gradual loss of muscle mass, the reduction of which after 50 years is 10 % every decade, with the most pronounced atrophy in the muscles straightening the trunk. Sarcopenia is accompanied by a decrease in muscle strength and walking speed, and causes a fear of fall. Degenerative and dystrophic changes in the connective tissue structures of the joint provoke ruptures of tendons and ligaments (the most frequent are ruptures of tendons of the shoulder muscles, the long head of the biceps, the posterior tibial tendon, the patellar ligament and the heel tendon). Degenerative changes in cartilage are accompanied by calcification and even ossification with the development of osteoarthritis, most often affecting the interphalangeal, knee, hip, shoulder joints and spinal joints. The main consequence of the involution and atrophy in bone tissue is osteoporosis.

After 60 years, one of the main reasons for the development of osteoporosis is a negative calcium balance, due to a decrease in the use of dairy products and a violation of their absorption as a result of a decrease in the formation of hydrochloric acid, atherosclerosis of intestinal vessels, as well as a deficiency of vitamin D, mostly formed in the skin under sunlight exposure. The lack of calcium stimulates the production of parathyroid hormone, which facilitates calcium release into the blood from bone tissue, which is accompanied by bone destruction.

Clinical symptoms of osteoporosis are a decrease in height by 4 cm or more compared to the age of 25 years or 2 cm per 1–3 years, the distance between the back of the head and the wall of 5 cm or more, and between the lower ribs and the ilium of less than 2 cm, and swelling of the abdomen. Instrumental methods for diagnosis of osteoporosis are densitometry, skeletal radiography, revealing osteoporotic fractures. For densitometry, the "gold standard" is dual-energy X-ray absorptiometry. If during the evaluation of complaints, history, physical examination and spinal radiography low traumatic fractures are not detected, the decision on therapy for osteoporosis is made on the basis of a 10-year probability of developing low traumatic fracture, which is determined according to FRAX scale (Fracture Risk Assessment Tool). The FRAX evaluation is highly recommended to people who are not able to undergo densitometry (unavailability of equipment) and in cases when densitometry revealed osteopenia. It should be emphasized that the presence of low-traumatic fractures in the history, especially multiple, is an indication for therapy regardless of densitometry and FRAX score.

The condition of the patient's *vision* is assessed by the ability to read text, drug names, and to recognize people. Capacity for *hearing* is judged by whether the subject asks again or not. It should be borne in mind that older people hear lower frequencies better.

When conducting CGA the ongoing drug therapy is also analyzed. It is important to note that polypragmasy in the elderly is associated with a higher risk of side effects due to the increased sensitivity of the body to drugs, so their number should be as limited as possible. Preference is given to drugs aimed at the treatment of the most prognostically significant diseases — coronary heart disease, hypertension, atrial fibrillation, heart failure, diabetes. In addition, elderly people are not recommended to receive generic drugs*, because their use is characterized by a higher frequency of side effects compared with original drugs.

Special attention is required for drugs, the use of which involves dose control (hypotensive, hypoglycemic), as well as drugs that are often abused by the elderly (sedatives, Corvalol, etc.).

In the process of CGA, bad habits are also clarified, especially since sensitivity to their adverse effects increases with age, the facts of harmful environmental effects, as well as working conditions in the history [3–5, 8].

* Generics may differ from the original drugs by the composition of excipients.

2. Functional status

The possibility of self-service and the degree of independence on the help of others by person's ability to perform basic functions, activities in everyday life and instrumental activity are determined.

Daily activity of the subject characterizes their ability to independently eat, dress, go to the toilet, wash, move around the room, etc.

To assess ability to perform basic functions, patient is asked to:

- put his/her hands behind the head, behind the back at waist level (ability to comb, dress, perform hygienic procedures);
- touch his/her thumb on the opposite leg when seated (ability to wear shoes, cut toenails);
- squeeze the fingers of the doctor with both hands (the ability to open doors, cans);
- hold a piece of paper between thumb and index finger (ability to select and hold objects);
- rise from a chair without the help of hands (ability of free movement).

If the subject can perform the task, 2 points are assigned, if he/she cannot — 0 points and 1 point if the task is performed with difficulty.

To test activities of daily living, the Barthel index is used, which is given in the CGA report. This scale determines the ability to eat, wash, dress, control pelvic functions, take a bath, go to the toilet, get out of bed, move, climb the stairs. Performance of each function is rated in points, the greatest number (up to 20 points) is given when the function is performed independently, 0 points — in case of full dependence on others, 5–10 points — if partial help is required. The total score from 0 to 20 means full dependence, 21–60 — severe dependence, 61–90 — moderate dependence, 91–99 — mild dependence and 100 — no dependence.

Instrumental activity of an elderly person reflects his/her ability to live independently and solve everyday problems. The CGA report contains the scale for daily instrumental activity — IADL (Instrumental Activities of Daily Living by W. B. Abrams, M. H. Beers, R. Berkow et al., 1995). It analyzes the ability to use the phone, to get to places outside the usual walking distances, to go to the grocery store, to cook, to do household chores, to take medication, to manage money. Each item is evaluated according to a 3-point system: execution — 3 points, execution with help — 2 points, failure to execute — 1 point. A total of less than 27 points indicates a decrease in instrumental activity.

Depending on the results, the need for external care, partial or permanent, at home or in a specialized geriatric institution is considered. However, the "independent" category permits the use of auxiliary aids.

3. Mental status

Preservation of the higher nervous activity of the patient is determined by his/her emotional background and cognitive functions. For this purpose, a special scale for the diagnosis of depression and dementia is used.

For identification of mood disorders there are many questionnaires, of which the most used was the scale of depression GDS-15 (Geriatric Depression Scale), including the following 15 questions:

1. Are you basically satisfied with your life?
2. Have you dropped many of your activities and interests?
3. Do you feel that your life is empty?
4. Do you often get bored?
5. Are you in good spirits most of the time?
6. Are you afraid something bad will happen to you?
7. Do you feel happy most of the time?
8. Do you feel helpless?
9. Do you prefer to stay home rather than going out and doing something new?
10. Do you feel you have more problems with memory than most people?
11. Do you think it is wonderful to be alive?
12. Do you feel pretty worthless the way you are now?
13. Do you feel full of energy and vitality?
14. Do you feel that your situation is hopeless?
15. Do you think that most people are better off than you are?

One point is credited for answering "Yes" for questions 2, 3, 4, 6, 8, 9, 10, 12, 14 and 15, as well as for answering "No" for questions 1, 5, 7, 11 and 13. A total score of 5 and above indicates probable depression.

One of the most common tests for assessing mental health is drawing a clock face with the time usually asked to mark with arrows the time 14:45 or 11:10. For the diagnosis of dementia, a Mini-Cog test is often used, consisting of three stages, which

takes 3–5 minutes. At the first stage three words (e. g., lemon, key, ball) are named and offered to remember, at the second one — it is proposed to draw a clock and to mark the time, and at the third stage — to recall three words. In Alzheimer's disease, short-term memory is affected earlier, in vascular dementia — long-term memory, and so in the first case the patient can draw a clock, but will not recall the words, in the second case — will remember the words with a hint, but will not draw the clock-face.

A brief MMSE (Mini-Mental State Examination) scale was widely used for the diagnosis of dementia. It contains 9 tasks and 30 questions evaluating cognitive domains such as orientation in time, location, memory, perception, attention and speech. The maximum score according to the test is 30 points, and a score of 27 points and below is regarded as probable cognitive deficiency.

These types of testing of mental abilities have low sensitivity to detect mild cognitive disorders. For their screening, it is recommended to use a more sensitive diagnostic tool — Montreal Cognitive Assessment (MoCA) scale, specially designed to detect moderate cognitive impairment in patients with normal MMSE results. The test evaluates 8 categories of cognitive process: Executive and visual and constructive skills, naming, memory, attention, speech, abstraction, delayed memory and orientation. The maximum score is 30 points, the threshold is 26 (if general education is less than 12 years — 25). Testing with MMSE and MoCA scales takes about 10 minutes.

It is important to emphasize that the assessment of cognitive functions of an elderly person should take place in a calm, friendly environment and requires patience and tact from the doctor.

In psychological terms, an important factor is the relationship with relatives, the lack of attention from whom can be the leading cause of the depressed condition in the elderly person, which in turn exacerbates the somatic problem. It should be noted that in contrast to the physical capabilities that decrease with aging, intellectual reserves have no age limits. The most preserved is the emotional sphere, and even a patient with dementia is able to respond to the feelings shown to them.

However, a person's perception of the world depends on his/her inner world.

Social status

As the results of studies have shown, the prevalence of senile asthenia is highest among divorced people and widowers, slightly lower in persons who have never been married, and the lowest in elderly people who are married. This syndrome is more common in rural areas.

Living conditions are important for maintaining the vitality of an elderly person. They pay attention to the comfort and safety of life — lighting, air temperature, the possibility of unhampered movement, etc. In Israel, where the gerontological society has existed since 1956, the position of a social worker is provided in each hospital, and this is a specialist with higher education who knows the legal framework, informs about possible assistance to the patient, assists in the preparation of documents.

The doctor needs to get an idea of the material well-being and the circle of persons who could provide assistance, and if necessary, provide daily care, organize leisure. In Western countries, for example, there are "grandfather gardens", where geriatric patients are given classes, and a wide range of board games and educational toys are provided.

Assessment of social status implies determination of the most adequate living conditions for the patient — living alone, with family or in a nursing home. However, it should be emphasized that by the end of the 20th century sociologists had come to the conclusion that a person should grow old in the family [2, 10, 13, 14, 16, 18].

Conclusion

Comprehensive geriatric assessment is the thorough examination of an elderly person, based on the results of which the geriatric physician makes an individual plan of patient management, including recommendations on diet, physical activity, drug and non-drug therapy, household arrangement, adaptive technologies, social support and care. The geriatric physician is aimed at bringing together a team of health care professionals, relatives and social workers, the success of which is based on a friendly and delicate attitude towards the elderly patient. "Know how to be lenient to the human weaknesses of the elderly," Vasily Sukhomlinsky wrote.

The possibility of a happy longevity, of course, primarily depends on the care of loved ones, because the elderly person especially needs an atmosphere of love and mutual understanding.

However, the preservation of the quality of life in an elderly person depends largely on the possibility of self-realization at a later age, including professional skills. The expert analysis of the so-called "demographic burden" showed its artificial aggravation. In fact, the financial return for use of labor resources of the elderly population is many times higher than the costs, and the change in the age structure of the labor force has various effective solutions. In 2002, during the second United Nations Assembly on ageing, held in Madrid, the Madrid International Plan of Action to ensure that every person has a safe and dignified old age, as well as the opportunity to participate in society as a full citizen was adopted.

Geriatrics is one of the youngest and at the same time the most humane medical specialties, which not only allows to solve the problems of longevity, but also contributes to the moral revival of society.

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