

Innovative methods and techniques for the prevention of falls in the elderly people

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Abstract

Falling and injury is currently one of the most serious situations that elderly people face. The gravity of this situation is given by the fact that the vast majority of elderly people also have other medical problems, sometimes they have multiple problems that can be the cause of falls or that worsen after a fall and an injury, minor or serious. The problem of falls is also important for the medical system, because it involves a large number of specialists for providing medical assistance, performing operations and recovering from traumas suffered by the elderly.

In this paper, the situation of falls is analyzed and some innovative methods and techniques are proposed for the prevention of falls and fall protection.

Keywords: elderly, fall, prevention.

1. Introduction

Falls are one of the first causes that affect older people. The definition used by the World Health Organization (WHO), regarding falls, is that they are "sudden, unintentional changes in position, resulting in the body being located at a lower level than at the initial moment" (WHO, 2017). The World Health Organization estimates that a number of approx. 646,000 people a year worldwide die due to falls.

Currently, against the background of the increase in life expectancy of the population, scientific discoveries in the medical field and medical technology, the situation of accidents and deaths due to falls has become a "public health problem, and the drugs administered to the elderly are one of the factors of risk associated with falls" (Marineci, 2019). So these falls, of elderly people, are considered a "real public health problem".

Specialists focused on developing strategies to reduce the number of falls, and when falls occurred, they sought to eliminate the consequences of falls. This situation is very important for the periodic evaluation of the drugs that must be administered to people, the identification and rational use of those drugs that predispose to falls. In this sense, a number of specialists believe that drugs represent "a modifiable risk factor". From here, a series of close collaborations between doctors and pharmacists emerged, in order to find the right medical and treatment solutions that would really contribute to reducing falls.

2. Analysis of the situation of falls

Any analysis of falls must begin with the fact that they are the leading cause of injury and death in people over 65 years of age. From the medical statistics developed by WHO, it is estimated that in a year, approx. 25% of people over this age fall at least once. This results in a real medical problem, "a veritable geriatric syndrome" (Marineci, 2019), where falls occur as a result of limitations, which affect several areas, leading to the decompensation of patients' abilities.

In the scientific research, great importance must be given to the problems that arise due to falls, because all the situations that the elderly go through come from them, and the medical staff very often face new situations, aggravated by the general state of the patient, the diseases he has or the treatments he is given.

The main problems that arise are:

- a). Affection of the lower extremities, which produce: instability, insecurity, stiffness in walking, etc.
- b). Sensory: vision disturbances, hearing impairment.
- c). Affective: depression, anxiety.

All of these can compromise a person's ability to maintain body position, predisposing to falls. Most falls result in bruises, scratches, minor trauma, scares, which do not require special medical care and do not require hospitalization. From the statistical data it follows that approx. 10% of falls that require a visit to the emergency room are for: 59.6% fractures, 20.9% superficial injuries, 8.7% head trauma. Diagnosed fractures after a fall are as follows: 27.5% hip fractures, 19.8% wrist fractures, 7.2% arm fractures. (Hartholt et al., 2011). In addition to the suffering caused to the elderly person who falls, falls are also a problem at the level of society because the costs associated with caring for people following falls are very high. Some of the factors that predispose to falls also belong to the patients. Among them, the most important are the following: history of falls, weakness, gait and balance impairments, administration of substances that act on the central nervous system.

A number of other factors favoring falls in the elderly are the following: visual impairment, polymedication, depression, orthostatic hypotension, functional limitations, age over 80 years, female sex, low body mass index, urinary incontinence, cognitive impairment, arthritis, diabetes and untreated pain. The more risk factors a person has, the greater the risk of falling. Other external factors are the following: inappropriate lighting, steps without hand-current support, obstacles in the direction of travel, slippery surfaces, etc.

However, many of these factors are modifiable and health professionals can intervene on them. The importance of studying falls is given by their immediate consequences, as in the case of fractures, trauma and immobilization, but also by the long-term consequences. Many older people suffer from osteopenia and osteoporosis, which make bones less resistant to the shock of falls and can break. Fractures limit mobility and often lead to bed rest. Trauma-related pain limits movement, and lack of movement leads to decreased muscle tone, which adds to the loss of muscle mass characteristic of the elderly. This leads to a difficult situation, as in a "vicious circle". The elderly person who falls becomes less and less able to carry out daily activities. The anxiety caused by the possibility of falling causes social isolation. All these limitations lead to a decrease in the quality of life of the elderly person.

3. Methods of preventing falls

Falls can be fatal or non-fatal, they can be avoided by several methods and these must be known and generalized at the level of the elderly. The main methods of preventing falls, generally accepted by Geriatrics specialists, are the following (SAG, 2010):

a). Practicing physical exercises. A number of specialists believe that exercise is "the best way to prevent falls among people who live alone". From the studies published by the American Geriatrics Society, in 2010, it was found that elderly people who exercise regularly are less likely to fall, to injure themselves, that is, by practicing physical exercises, the chances of fracture are reduced. These exercises can be:

- Refreshing and maintenance gymnastics for the elderly, (Youtube, 2021).
- Fitness, which includes a greater number of exercises, from gymnastics to light running.
- Swimming and simple walking through the water. Swimming is recommended for elderly people who know how to swim. Simple walking through the water, in a shallow or medium depth pool (therapy pool) or walking through the sea water, close to the shore, at a shallow depth, have special effects on the state of health.
- Qi-Kung (Energetic Gymnastics of Chinese origin), which contains positions, limb and body movements, breathing techniques, self-massages and relaxation techniques (Qi-Kung, 2018).

Among these, a great emphasis is placed on leg exercises. Elderly people who suffer from leg pain, who have had fractures, have difficulty moving the leg or have difficulty moving, need to do a series of specialized exercises for the ankle, legs and hips to reduce the number of falls.

The specialist doctor must question, find out and even observe what kind of exercises the patient practices, to determine if they are correct and appropriate for her age.

b). Home security. This is one of the most important for the elderly, who are more prone to falling. In their home, safety must be a priority, to reduce the risk of falling. First of all, the floor must be covered with anti-slip coverings (carpets, carpets), which allow easy movement in the house. Some of these materials can reduce the shock of falls, depending on the thickness or the material from which it is made. Then, all the places with corners or sharp edges (furniture) must be arranged as far as possible from the access corridors where people normally move (bedroom, living room, bathroom, kitchen). It is really necessary to give up those pieces of furniture, which can be dangerous in case of falls.

c). Appropriate footwear. It must be suitable for the exterior and interior of the home. Outdoor footwear, especially for winter conditions, for slippery or icy areas, must be non-slip. For housing, as well, it is recommended to wear special slippers with anti-slip soles.

d). Vitamin D treatment. Elderly people, who regularly undergo medical tests and find that they have lower vitamin D content in their blood, should focus their diet on those foods rich in vitamin D content.

e). Healthcare interventions. In some healthcare interventions, there is a risk of injury to the elderly, causing acute pain, intolerance to certain medical activities (treatments, massages) or infection.

- Risk of injury. This refers to increased activity and should include massage to eliminate leg fatigue.

- Acute pain. This may be related to fatigue, and in order to reduce dizziness and headaches, it is necessary to explain the causes of headache and dizziness, the various side effects, due to the large amounts of drugs used.
- Intolerance to activities. In order to determine this situation, the elderly must be questioned about the way and type of activities they usually carry out. From here, certain conclusions can be drawn regarding certain changes that people must make, in order to avoid those activities that cause them discomfort or present certain health risks.
- Risks of infection. The presentation of the situations that present the risk of infection is necessary to maintain the immunity status of the elderly person. In this sense, it must be explained to people what hygiene is appropriate for their age; what is the healthy diet, even taking into account other ailments from which he suffers and explaining the need to consume products that contain adequate minerals and vitamins.

4. Modern information methods

Considering the situation of falls, it is considered that the most important thing is for elderly people to be informed and even trained, by the family doctor, the geriatric specialist doctor or the specialist doctor for the ailments from which the person suffers, in order to prevent falls. The main fall prevention methods that can be used for the elderly are the following:

- Information through direct communication with the patient.
 - Information through printed materials.
 - Information through means of communication via mobile phone and internet.
- a). Information through direct communication with the patient. In the case of the family doctor, considering the fact that he interacts with the elderly, at least once a month, when they come to pick up their prescriptions, information about the prevention of falls is easy to achieve, based on systematized information, short in duration (2-3 minutes). Even if some people are reluctant to new information, to those that require them to change certain attitudes and behavior, still the family doctor has a direct influence on his patients, and the trust they have in him is very important for the transmission of information about preventing falls.
- b). Information through printed materials. Both the family doctor and the specialist doctors, from different fields, can inform and transmit to the patients printed informative materials (posters, leaflets) about the prevention of falls, their effects on the state of health and about the difficulty of recovery. These materials can be printed and distributed as part of national information and documentation campaigns, among doctors and the population.
- c). Information through means of communication via the Internet and mobile telephony. Considering the development of the Internet, mobile communications and applications that can facilitate communication, it can be appreciated that a family doctor, who can constitute a group of patients, elderly people, on the "Whatsapp" application, for the mobile phone, tablet or for the electronic computer, (Whatsapp, 2022). Many exercises are found and explained in several languages (English, Romanian) on the Youtube pages. On this audio-video information channel, a series of specialists (doctors,

trainers, instructors) present gymnastics, medical recovery, Qi-Kung exercises. Some films show simple, complex or over-specialized exercises, such as Qi-Kung, for certain conditions. The main problem is that of the language of communication, usually in English, then finding the exact video material, the presentation film of the respective exercises. Use of this channel is free.

5. Innovative techniques and technologies for preventing falls

In recent years, several techniques and technologies have been invented, which can be used to prevent falls or to mitigate them. Considering the fact that many of these new products are relatively expensive, and some of the elderly cannot afford to buy them, we also consider a series of accessible products and materials. Apart from the price of the products, another problem is the fact that people, in general, dress in such a way that when they go on the street (for a walk, shopping or visiting), they try to dress as elegantly as possible, which does not mean that these clothes and shoes offer them protection against falls. This is where the discrepancy between elegance and protection appears and remains a difficult problem to solve and to convince people to look for safety and not protection. Among the easiest products to purchase are: hip protectors, elbow and knee protectors, anti-shock gloves, head protection helmets and others. The most expensive products are exoskeletons, which have not yet begun to be widely used.

a). The protections for the hip. The hip protector reduces the chances of hip fracture to a greater extent by providing good protection against falls. These have many shapes and types, which can provide protection for the hip (the simple ones) or for the hip and lumbar area, (TeckStar, 2022).

b). Protections for elbows, knees and wrists. Protections for elbows, knees and wrists can be used when the weather conditions are unfavorable and the elderly person has to move outside and at this moment there is a risk of falling. The use of these protections reduces the risk of fractures, but they can be considered as "displaced", to be worn by the elderly, but they have different models and affordable prices, (Funride, 2022).

d). Head protection helmet. Headphones for the elderly have different shapes and models, (Fruugo, 2022). Even if such a helmet is effective and protects the head during a fall, however, their use has not become widespread, because they are considered unsightly.

e). The exoskeleton. They began to be used in military structures, to reduce the effort of the military regarding the weight they have to carry on the battlefield. Other models, with civil application, are used for recovery after operations, for re-education of walking, in specialized medical recovery centers. But the price of these devices is very high, which practically makes it impossible for elderly people to purchase and use those (Latodis, 2022). The problem is to make exo-skeletons from composite materials, resistant, light and affordable.

The use of exo-skeletons for moving on the street, in shops or institutions, will raise a series of inherent problems for those who use them, but all of these can be easily overcome, and the effect of their use will be one that will significantly reduce falls.

Conclusions

The problem of falls concerns a growing number of people, from those with positions of responsibility in medical institutions, but also from the families of elderly people who want

to offer them protection.

For specialists in this field, a series of measures are required as follows:

- Training of family doctors, to inform elderly patients, regarding the prevention of falls. For this, it is necessary to organize national, regional or county symposia, in collaboration with the associations of family doctors, to which all family doctors are invited and participate.

- Organization of a national information and documentation campaign, among geriatric specialist doctors, about modern methods of preventing falls. The campaigns can be launched with the support of the "Ana Aslan" Foundation from Bucharest and with the help of commercial companies that distribute sanitary materials and medicines, directly interested in promoting the products they sell.

- Organization of an information campaign for citizens through mass media. This campaign can be generalized, at the level of the national mass media, but also at the regional and county level. The main problem being that of the financial resources necessary to finance the messages transmitted through these channels.

The organization of social day centers, which meet the conditions described above, for information and communication, in addition, elderly people can interact and socialize with each other.

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