Elderly patients in a dentist's office – falls

(Pacjent starszy w gabinecie stomatologicznym – upadki)

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Abstract – Introduction. Elderly people represent a significant and growing group of patients using dental treatment. Ageing is associated with the deterioration of the balance control system and reduced ability to compensate in situations leading to the destabilization, which results in falls. Injuries associated with falls can cause physical impairment, disability, and even death.
Aim of the study. The aim of the present study was to draw attention to the problem of falls in the specific setting of the dental surgery.
Selection of material. The authors have reviewed the literature for the period 1993-2018. concerning falls of elderly people in the dental office.
Conclusions. Falls suffered by elderly patients treated in dental surgeries can be prevented through: 1.Creating a well-organized, friendly environment, and taking into consideration architectural solutions in the immediate surroundings of the surgery and all rooms available to elderly patients. 2. Gathering detailed information on the current health status of the patient, and his/her impairments and used medications, with particular consideration of risk factors for loss of balance. 3.Reducing stress associated with visits to the dentist. 4.Ensuring professional comprehensive medical care at each stage of dental treatment.

Key words **-** ageing, the elderly, falls, geriatric dentistry.

Streszczenie – Wstęp. Osoby starsze stanowią znaczącą, coraz liczniejszą grupę pacjentów korzystających z leczenia stomatologicznego. Wraz z wiekiem dochodzi między innymi do pogorszenia sprawności systemu kontroli równowagi i zmniejszenia zdolności do kompensowania sytuacji prowadzących do destabilizacji czego konsekwencją są upadki. Urazy spowodowane upadkami są przyczyną niepełnosprawności, inwalidztwa a nawet śmierci.
Cel pracy. Celem pracy jest zwrócenie uwagi na problem upadków osób starszych w specyficznych warunkach gabinetu stomatologicznego.
Dobór materiału. Autorzy dokonali przeglądu piśmiennictwa za okres 1993-2018r. dotyczącego upadków osób starszych w gabinecie stomatologicznym.
Wnioski. Zapobieganie upadkom w grupie senioralnej w gabinecie stomatologicznym powinno polegać między innymi na: 1. Zapewnieniu prawidłowych, przyjaznych warunków środowiskowych uwzględniających przede wszystkim rozwiązania architektoniczne dotyczące najbliższego otoczenia gabinetu oraz wszystkich pomieszczeń z których może korzystać starszy pacjent. 2. Uzyskaniu wyczerpujących danych dotyczących aktualnego stanu zdrowia pacjenta, jego ograniczeń i stosowanych leków, ze szczególnym uwzględnieniem czynników ryzyka utraty równowagi.3. Minimalizacji stresu związanego z wizytą stomatologiczną. 4. Zapewnieniu profesjonalnej, szeroko pojętej opieki ogólnomedycznej na każdym etapie terapii stomatologicznej.

Słowa kluczowe – starzenie się, osoby starsze, upadki, gerostomatologia.

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I. INTRODUCTION

As the society is ageing, elderly people represent a significant and growing group of patients using dental treatment. In 2017, the population of people aged 60 years and older in Poland exceeded 9 million, which was over 24% of the total population. The proportion of elderly people in the total population of Poland increased between 1989 and 2016 by almost 10 percentage points [1]. Forecasts indicate that the proportion of senior people in the general population will continue to increase.

Ageing is associated with specific problems. Falls occur at any age, but are much more frequent and have much more serious consequences in the elderly [2]. As ageing progresses and the involutional changes accumulate, the basic functions of the body deteriorate, pathologies intensify, multiple diseases develop, and elderly patients need to use more medications. All these factors deteriorate postural control and reduce the ability of the body to regain balance. Consequently, the incidence of falls increases [3]. Falls in the elderly have serious consequences, including injuries and fractures. These lead to disability, dependence on other people, and even death, and are therefore considered as a part of Major Geriatric Syndromes. Because of their medical and economic consequences, falls remain a serious public problem [4].

The aim of the present study was to draw attention to the problem of falls in the specific setting of the dental surgery.

II. FALLS AMONG THE ELDERLY – DEFINITION, EPIDEMIOLOGY, RISK FACTORS

A fall is defined in medicine as an event which results in unexpected, unintentional change of posture due to loss of balance occurring while walking or doing other activities, where a person falls on the floor, ground or other lower-level surface without the involvement of extrinsic forces [5].

Epidemiology

At least 30% of community-dwelling people aged over 65 years fall each year [6]. However, this is an underestimated figure, because older people who live alone often do not inform anyone about the fall if it had no serious consequences.

In 2015, about 1.2 million Poles from this age group experienced falls [7]. Half of them had more than one fall, and the incidence of falls is higher in the elderly who live in nursing homes (50-67%) and those who are hospitalized (20%) [8,9,10,11]. The number of falls increases with age. Every second elderly person aged over 80 years falls at least once a year [11]. About 20% of older people who have one fall experience post-fall syndrome, which is characterised by increased fear of falling, and paradoxically increases the risk of further falls [12].

Falls are also the sixth most common cause of mortality in the elderly population, and the major cause of mortality associated with accidents. Each year about 40,000 elderly people die due to falls or complications related to falls [13,14].

Risk factors for falls

The National Institute for Clinical Excellence (NICE) identified as many as 400 risk factors for falls [15]. They are generally classified as intrinsic factors (related to the body, mainly poor health status) and extrinsic factors (environmental hazards).

Intrinsic factors

As mentioned before, ageing is an important risk factor for falls, and the number of falls and risk factors increase with age. The locomotor function in elderly people is generally deteriorated, which is primarily due to the simultaneous deterioration of the function of the nervous and skeletomuscular systems, although it has not been clearly explained to what extent it may be related to the natural ageing process, and to what extent these changes should be considered a pathology [16]. Pathologies associated with the ageing of joints reduce the range of movements, and in addition degeneration primarily affecting the hip joints, knee joints, and lumbar and cervical spine intensify the loss of locomotor function and cause disability. The progressing imbalance in calcium metabolism, oestrogen deficiency and reduced level of physical activity in elderly people have negative effect on bone microarchitecture. Decrease in bone mass and density leads to osteopenia and, in more advanced cases, to osteoporosis, which is associated with a higher risk of fractures as a result of a fall. As many as 90% of fractures of the proximal femoral head and vertebra is associated with osteoporosis [17,18]. Elderly patients suffering from painful inflammatory diseases, for example rheumatoid arthritis or ankylos-

ing spondylitis, are a group at increased risk of falls and osteoporosis-related fractures [19].

The loss of postural balance resulting in a fall can be a consequence of vertigo, which is common in the elderly population and is associated with damage to the vestibular system, post-traumatic syndromes, metabolic diseases, vertebrobasilar insufficiency, other cardiovascular diseases, side effects of medications, diseases of the lower limbs, or mental diseases [20, 21]. Another important cause of vertigo in elderly patients is orthostatic pressure drops, including orthostatic hypotension, which results from the impaired adaptation of the circulatory system to a sudden change of posture. Regaining the upright posture stimulates the accumulation of blood in the lower areas of the venous system, which causes a deficit of blood inflow to the heart, a decrease in cardiac output and a drop in blood pressure. The risk of acute orthostatic hypotension increases during the use of antihypertensives, anti-Parkinsonian drugs, nitrates, neuroleptics, and as a result of dehydration, blood loss or adrenocortical insufficiency. Chronic orthostatic hypotension, on the other hand, results from disturbed mechanisms regulating blood pressure and dysfunctions of the vegetative nervous system [22,23].

The involutional changes that predispose patients to falls also include those directly related to the nervous system, such as slower neural conductivity and longer reaction time, as well as the disrupted integration of motor and sensory reactions impairing the stability of the centre of gravity [24].

Gait and balance disorders are also more common in the elderly population. They affect 35% of people aged 70 years and older, and are an important risk factor for injuries [25,26]. Gait pattern changes in old age. Older people take shorter steps, walk more slowly, and raise their feet to a lower level. All this contributes to stumbles and falls.

In the elderly population the incidence of falls is higher in women, while in the younger population the incidence of falls in men and women is comparable [27,28].

A fall can be a non-specific symptom of many diseases, including acute ones, e.g. myocardial infarction, gastrointestinal bleeding, pneumonia, urinary tract infections, and exacerbations of a chronic disease, including cardiac insufficiency and diabetes. Many observational studies have confirmed a higher risk of falls in elderly patients with hypertension [29]. Hypertension aggravates age-related impairment of baroreceptors function, blood pressure control when re-establishing the upright posture, and contributes to the impairment of vision and hearing induced by vascular changes. This leads to changes in the autoregulation of the cerebral circulation, with increased sensitivity to sudden drops in blood pressure. Complications related to hypertension, such as cardiac and cerebral ischaemia or cardiac insufficiency, lead to episodes of syncope that are often followed by a fall. Additional risk may be associated with antihypertensive medications [30,22]. As for the already mentioned pharmacotherapy, it should also be noted that with the age the number of drugs prescribed to patients increases, and polypragmasy is associated with increased risk of falls in older people [31]. Elderly patients use large amounts of prescribed medications, and additionally parapharmaceuticals (often without consultation with a doctor, in connection with multiple morbidity), and potential drug interactions are a very important risk factor for falls. Rosenthal et al. reported that the risk of falls is 3-fold higher in patients who take more than three medications [10]. Meta-analyses have revealed that the risk of falls is higher in patients treated with diuretics, class 1a antiarrhythmics (disopyramide, procainamide, quinidine, ajmaline, prajmalin), digoxin and psychotropic drugs, as well as anti-depressants and neuroleptics [30,32].

Falls are also regarded as a serious problem in patients suffering from cognitive impairment and dementia, and are experienced by 70-80% of patients per year, which is twice more often than in the elderly without cognitive impairment [33]. In addition, the risk of falls increases with the impairment of sensory perception. Age-related visual impairment, cataract, glaucoma, diabetic retinopathy or hypertensive retinopathy, slower adaptation to sudden changes in lighting and hearing loss, especially in noisy environments, increase the risk of falls [34,35].

The risk of falls is also higher in people with sarcopenia, additionally contributing to injuries, more severe disability, and dependence on other people. Sarcopenia is the loss of active muscle mass, muscle strength and fitness, which may develop alone or be related to inappropriate diet, strenuous lifestyle, or diseases such as diabetes, cardiac insufficiency or COPD [36].

The risk of falls is also higher in patients with frailty, which additionally increases the need for long-term care, and increases mortality. Frailty is a geriatric syndrome characterised by significant physical and mental vulnerability, disorders of movement, balance, physical fitness, muscle strength, endurance, intellectual performance, immunity, and nutrition. Its clinical manifestations include low level of physical activity, weakness, fatigue, unintentional weight loss, weakened handshake and slow gait [36].

As demonstrated in the above-mentioned reports, falls and their risks in elderly people are multifactorial. There are also many intrinsic factors less specific for old age, which are beyond the scope of this article.

Extrinsic factors – environmental hazards

Environmental factors are not related to the ageing process and concern the immediate environment of the elderly. Most of these factors are modifiable.

In the event of sudden tripping or slipping, elderly people, compared to younger ones, have a lower ability to re-establish the upright posture and counteract destabilizing forces that move the centre of gravity outside the secure point of support. Studies conducted in care institutions revealed that the risk of falling is increased by environmental conditions unsuitable for the elderly, including: wet floors, slippery floors, damaged surfaces, moving rugs, thresholds, steep and uncomfortable stairs, absence of handles and handrails, inadequate intensity of lighting, inadequate height of beds, improper aids, unsuitable footwear, fast changes in the immediate environment of the patient (which is particularly important in hospitals and outpatient clinics), and architectural solutions that do not consider designs friendly to this age group [5,38].

Consequences of falls

Regardless of their cause, falls in the elderly lead to injuries and disability. About 10% of falls result in wounds, burns, concussions and intracranial haematomas. About 5-6% of falls lead to fractures, including the most serious for the elderly, and life-threatening, fracture of the proximal femoral head [37,38]. Regardless of the treatment method, about 10% of patients with proximal femoral head fracture die in the first month following the fall, and the mortality rate increases to 20-52% within a year [37]. Immobilization of the patient further increases the risk of systemic complications. Major complications include cardiorespiratory failure, pneumonia, thrombophlebitis, and pulmonary and cerebral embolism [37].

The past-fall syndrome mentioned before develops in some patients who experienced a fall. Its consequences include reduced level of physical activity and overall fitness caused, for example, by progressive muscle weakness and accelerated involutional bone changes, which increases the risk of further falls in a self-perpetuating mechanism [12]. The described processes also affect the mental status of the patient and lead to the gradual loss of independence.

In the context of the high risk and serious consequences of falls in the older population, it is important to consider the organization of work in dental surgeries where elderly patients are treated.

Dental surgery design

Prevention of falls in the dental surgery should involve the identification and elimination of all possible modifiable risk factors, and high awareness of the health-related limitations of the elderly patient.

Studies have demonstrated that approximately 60% of falls occur during walking, more than 27% when standing up or sitting down, and the most common direct causes include: slipping, rushing and sudden movements, and environmental hazards, e.g. uneven surfaces [38]. In order to create a senior-friendly dental surgery the following problems should be considered:

1. Because of the previously mentioned limited physical fitness of older people, dental surgeries should be established on the ground floor level, and if impossible, in a building with a lift.
2. For people using wheelchairs, a wheelchair accessible entrance to the dental surgery is necessary, preferably with an automatic door opening system.
3. Stairs used by older people must have even steps, with adequately spaced landings, and must have handrails (preferably installed on both sides) with a slightly rough surface, which ensures better grip. In addition, extension of the handrail by about 0.3 m before the first step and beyond the last step, and the contrasting marking of the first and last steps will be a preventive measure.
4. Thresholds should be eliminated, and if this is not feasible, or individual surgeries are located on different levels, thresholds should be clearly marked.
5. Floors should have an anti-slip surface, kept dry and cleaned between the scheduled visits of patients. Door mats and carpeting by the entrance door should be properly secured to the floor.
6. The space of the entire surgery where patients move around (this also applies to the space along the walls, often used by visually impaired patients), should be cleared of obstacles (electric cables, goods delivered from the stockroom, open cabinets or waste bins).
7. Preferably, the toilet should be located at a short distance from the dental surgery. Diuretics used by older patients increase urinary urgency, and therefore patients need to use the toilet frequently and without delay. Toilets adapted for use by older patients should have special handles and rails installed to allow support. The toilet bowl should be installed slightly above the standard level, and the floor surface should prevent slipping, even if slightly wet. The toilet door should have an uncomplicated lock-

ing system that can be opened from the outside by medical personnel in emergency situations in order to provide prompt first aid after a fall or in other situations. An alarm bell could also be installed to improve safety.

8. The temperature in individual rooms should be uniform and moderate.
9. To prevent the risk of falling it is important to ensure bright lighting in each room where the patient is staying. Darker areas should have additional lighting installed. The light source must not be dazzling, and the intensity of light should be similar in all rooms since older people have problems with accommodation, and uneven lighting levels may exacerbate visual disorders and orientation in space [5,34]. When examining an elderly patient, the mouth mirror should be positioned adequately to prevent glaring.
10. Furniture in the waiting room should be stable (e.g. chairs or tables with wheels should not be used). Chairs for older people should have backrests and arm supports.
11. The dental surgery must not be cluttered. Excess medical equipment and furniture makes getting around difficult.
12. Dentists and trained medical staff should make older patients feel safe. A visit to the dentist in a rushed atmosphere does not make patients feel relaxed. A friendly, calm and personalized approach to the patient reduces stress and risky behaviour, including sudden movements.
13. The dental chair should not have a slippery cover, so as to prevent the risk of the patient slipping and falling. During the treatment the dentist should avoid sudden and extreme repositioning of the patient's head to the left or right side. In patients with degenerative changes in the cervical spine and impaired blood flow in the vertebral arteries this may result in dizziness or syncope.
14. Moreover, rapid postural changes, e.g. when the patient is leaving the dental chair after completed treatment, or gets up from the chair in the waiting room when called by the dentist, may cause sudden hypotension (orthostatic hypotonia). Hypotension may trigger vertigo and consequently lead to a fall. Prevention of this problem should involve relaxation of the patient and very slow change from the sitting to the standing posture, or from reclining to sitting, and then upright. In addition, bending and straightening the feet in the plantar and dorsal direction has a positive effect on the peripheral circulation and heart rate of the patient. [22,23]
15. Some patients treated by dentists use a wheelchair. The dental surgery has to be large enough to ensure manoeuvring, so that the wheelchair can move into the surgery without obstacles. If possible, the patient should be treated when sitting in the wheelchair to prevent accidents related to impaired mobility, and falls in particular.

III. CONCLUSIONS

The identification and understanding of the risk factors, causes and possible consequences of falls in older patients can significantly increase the vigilance of medical staff and have a positive effect on the reorganization of dental surgeries where older patients are treated. The prevention of falls in elderly patients at the dental surgery should involve:

- Creating a well-organized, friendly environment, taking into consideration architectural solutions in the immediate surroundings of the surgery and all rooms available to elderly patients.
- Gathering detailed information on the current health status of the patient, his/her impairments, and used medications, with particular consideration of risk factors for the loss of balance.
- Reducing stress associated with visits to the dentist.
- Ensuring professional comprehensive medical care at each stage of dental treatment.

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