15 BALANCE AND FALLS RISK ASSESSMENT IN AN OLDER PERSON WITH OSTEOPOROSIS AND AGGRESSIVE BEHAVIOUR

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15.1 Osteoporosis characteristics

Osteoporosis is a systemic bone disease accompanied by a decrease in bone mass and damage to the microstructure. It is the most common metabolic generalized bone disease worldwide, with its progression placing a large burden on both individual and social levels. (Shen, 2022; Dempster, 2011; Old 2015) Sporosis is characterized by low bone mass and poor bone tissue microarchitecture, resulting in increased risk of bone fracture. (Kanis, 2019)

The prevalence of osteoporosis is 18.3% (five continents) and the number of associated bone fractures is increasing worldwide. (Salari, 2021) Bone fractures resulting from the progression of the disease are estimated to account for nearly 9 million cases worldwide each year. (Pisani, 2016)

These bone fractures are pronounced factors of morbidity and mortality, despite the fact that effective medical and other therapeutic options would be provided to patients diagnosed in time. In many cases, adequate treatments do not occur, either because of lack of diagnosis, lack of patient cooperation, or lack of medical care. (Clynes, 2020)

Postmenopausal changes are the most common cause of osteoporosis. At the same time, more than 30% of the members of this group and more than half of the men and premenopausal women suffer from secondary osteoporosis. In such cases, the treatment of the underlying disease (see risk factors) is also essential in order to stop the deterioration of the condition. (Lewiecki, 2021) Picture 1 shows the traditional distribution of osteoporosis, based on Chitra's and LeBoff's article.

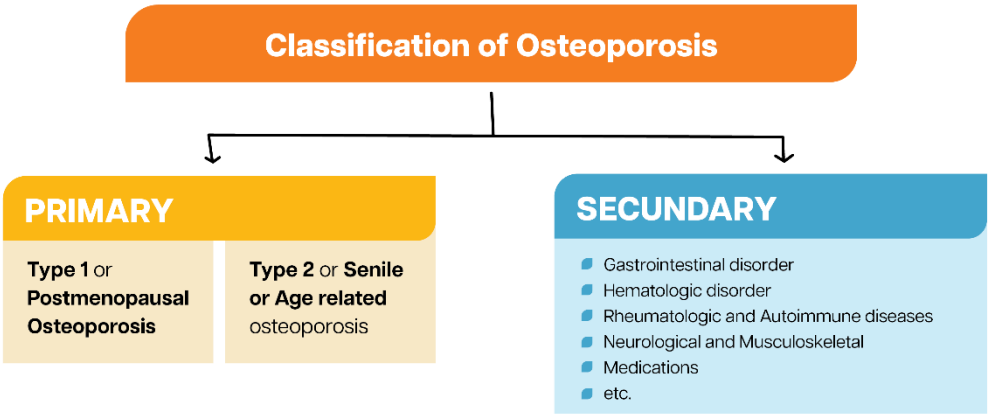


Figure 1. Osteoporosis allocation (based on Chitra, 2021 and LeBoff, 2022)

Osteoporosis may also be divided by the severity of bone involvement. Not only bone density has a direct role in the occurrence of fractures, although it is also important to know the structural resilience of bones, which is based on the results of bone density tests. (Shevroja, 2023) In many countries, the density characteristics of bone are routinely established by examining the DEXA (dual energy X-ray absorptiometry-DXA) of the hip and lumbar spine. The obtained standard deviation value can be a T-score value indicating a deviation from healthy young bone, or a Z-score indicating a deviation from the expected gender and age values. The latter is typically used in young people. (Kanis, 2019) More recently, the trabecular bone score (TBS) is also used to obtain an image of the bone strength in both primary and secondary osteoporosis. (Shevroja, 2023) Estimation of the trabecular structure has become a useful addition to traditional values. (Ganesan, 2024) However, it should be noted that research results and correlation analyses are primarily applicable to postmenopausal women, and premenopausal women should not apply the bone density criteria and guidelines.

There are four levels of severity that can be determined by measurement:

Table 1 Classification based on DEXA values according to World Health Organization Recommendation (Lewiecki, 2021)

1	T-score > -1.0 SD	normal (healthy bone)
2	T-score -1.0 and -2.5 SD	osteopenia (low bone mass)
3	T-score < -2.5 SD	osteoporosis
4	T-score < -2.5 SD and fragility fracture	severe osteoporosis

The course of osteoporosis appears in a variety of ways and is often associated with general symptoms (muscle tension, increasing pain upon exertion, percussion pain). In addition, you may have specific symptoms such as fracture pain in the bone, deformity and height loss due to these. Greasy pannicules and folds of skin may appear in the back area. The patient's posture also changes: thoracic kyphosis is increased, and there is a compensation cervical lordosis increase, and thus neck pain occurs. An increased thoracic curvature results in shoulder retraction and a rotten upper limb position. As the iliac crests and ribs approach, the functional efficiency of the diaphragm is reduced, dyspnoea and digestion problems may develop (hyatus hernia, meteroism). (Aibar-Almazan, 2022)

15.2 The role of risk factors in osteoporosis

Bone decomposition and construction throughout life, although the pace of this is changing, is ongoing. During remodelling (remodelling), the weight and mechanical resistance of the bone are adapted to the amount and extent of regular stress and other physical factors (such as direction of force). This remodelling of bones not only ensures the structural integrity of the bones, but also supports the balance of the body's mineral source (calcium, phosphorus). (Rowe, 2023) In osteoporosis, the speed of old bone breakdown (resorption) and new bone structure (formation) changes, thus the ratio of processes in relation to each other. The imbalance of remodelling leads to a decrease in the quantity of bone mass per unit, which leads to a decrease in the strength of the bones, thus increased bone fragility. (Appelman-Dijkstra, 2022) To prevent this, bones need basic mechanical stimuli and nutrient supply. Mechanical stresses are created by tendon-mediated muscle contractions, impact forces and gravity forces. (Hart, 2017)

In addition, many factors affect the implementation and control of the well-paced, properly-programmed remodelling processes. There are factors, such as age, gender, and other genetic factors, that cannot be influenced, that can cause the disease to develop. These should be considered as predictive factors, primarily by their effect on bone building processes. (Ralston, 2007) Osteoporosis is traditionally described as a female disease, but affects men. Salari et al believe that prevalence in their case is 11.7% (while in women this Picture is 23.1%). However, they are even more likely to find out the source of the problem only after the first fractures. (Volunteerly, 2017) The disease is often underestimated in men; therefore the diagnosis and treatment of the disease is also delayed. Much of the more common fractures (approx. 40%) occur in male sex, and studies have shown that men are more likely to experience new fractures after fracture and a higher mortality rate due to complications. (Bandeira, 2022)

The role of genetic characteristics may also be important due to the influence of body characteristics on the osteoporosis process. Ectomorphic individuals with a low BMI index are more likely to develop the disease compared to those with average body weight. The risk classification determined in proportion to body weight is shown in Picture 2. (Yong, 2021)

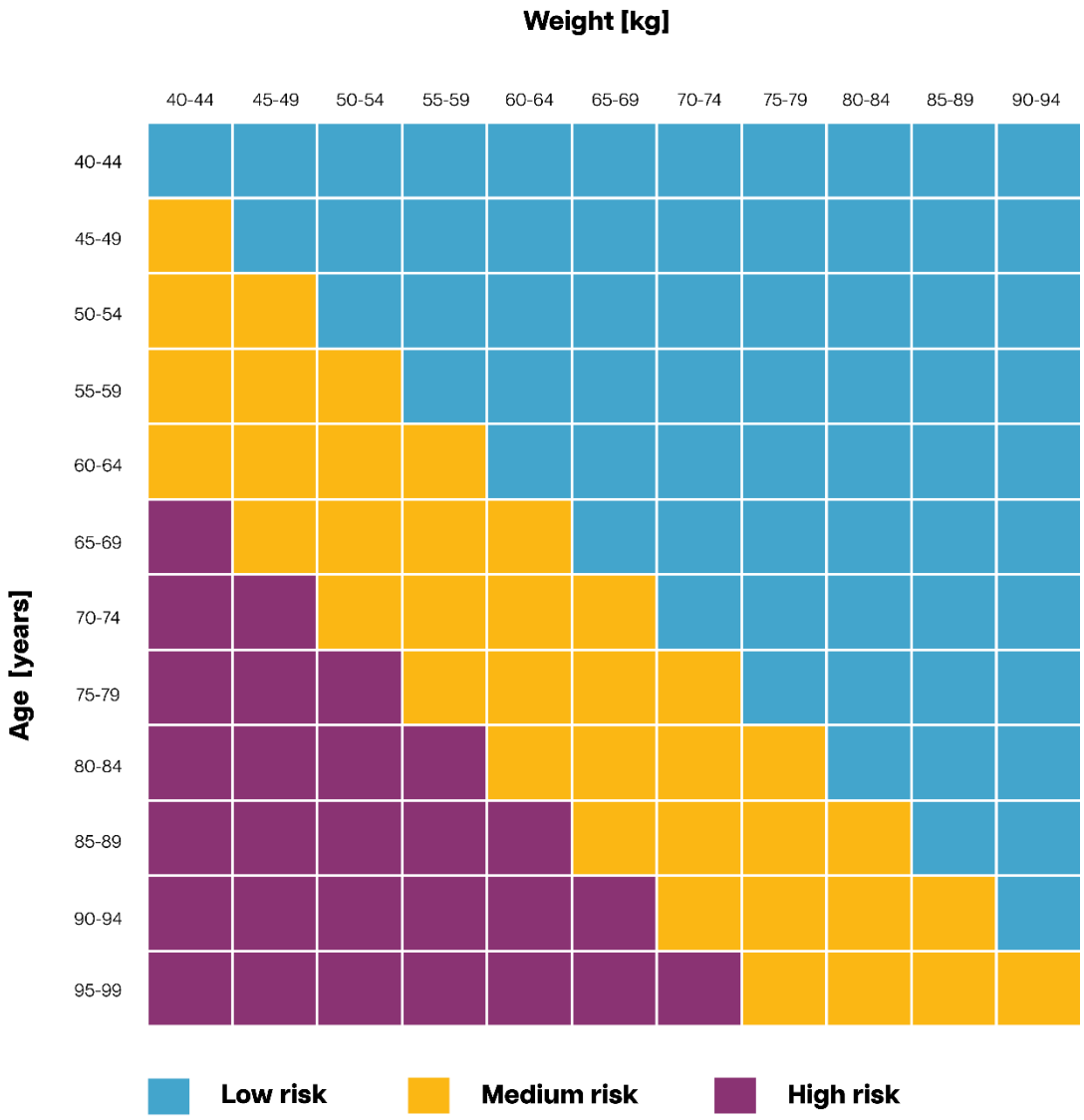


Figure 2 Body weight as risk factor for osteoporosis (Yong, 2021)

The role of lifestyle (influenceable) factors in the development or course of osteoporosis is significant. Regular smoking, drinking alcohol, and drinking large quantities of coffee (three or more) each day all negatively impact bone mass. Calcium and vitamin D consumption have long been a major concern among dietary habits, but in addition, the role of several trace elements in bone building processes (selenium, phosphorus, K2) has been prioritized. The consequences of eating disorders, malnutrition, or simply not paying attention have a negative long-term effect on bone building processes. (Bijelic, 2017; Hendrickx, 2015) Additional risk factors include long-term use of certain medications, as well as inflammatory diseases, endocrine, respiratory diseases, gastroenterological diseases. (LeBoff, 2022) Conditions to be distinguished during the diagnosis of the disease include, but are not limited to,steomalacia,

renal osteodystrophy, lymphoma, mastocytosis, osteonecrosis, infection, etc. (Ganesan, 2024; Porter, 2024)

15.3 Osteoporosis and Balance

Peace of mind is about holding the center of body weight above the support surface. The stability limit (safety boundary for body swing) depends on factors affecting the balance of individuals. Differences in any of these factors (including perception) lead to inadequate reactions and problems with balance. (Horse, 2009) Posture and balance are essential for the functional activities of daily living. Steadyness can be interpreted as a result of feedback based on somatosensory, visual, and vestibular information under intact conditions. (Pauelsen, 2020) Be able to support the body while standing, walking (vertical positions). This prerequisite is the central nervous system-controlled mechanisms of information from sensory systems, which control processes ensure that postural (postural) control is in place. This is the foundation of your ability to maintain balance. (Shanbhag, 2023) The complexity of balancing enables the fast and precise changes (via feedback) that are even needed to prevent falls. (Xing, 2023) The feedforward control also supports the responsiveness, with which the number of drops can be significantly reduced. (Pai, 2003) In addition to the previously mentioned nervous system structures and processes, the motor system also plays a significant role. The condition of the musculoskeletal system is also a significant factor in balance. Lower limb and trunk muscles weakening also affect ranges of motion, but due to loss of stability, unwanted excursions of movement are created in the trunk and extremities. Not only are they harmful to the joints, but they also negatively affect balance. Muscle imbalance results in less or no relaxation of overactive muscles that generate joint microdisposition. Altering arthrinematic movements may result in unwanted movements of the joints and variations in the range of motion, while tonic muscle antagonists are inhibited. Persistent evidence of this leads to slower uptake of propriocepceptive stimuli (sensomotor amnesia / pseudoparesis) and reduced response capabilities. As a result, deteriorating motion coordination occurs. (Varga, 2014)

The two forms of human body balancing are static balance and dynamic balance. Static balance is the ability to maintain a particular situation, while dynamic refers to a sustainable balance during movement. (Panjan, 2010)

Simpler and more complex tests are available to measure steady-state, and device measurements are also available. In everyday practice, complex or expensive tools are often not available, but it is worthwhile to determine as accurately as possible the ability to measure and develop.

Steadiness may be impaired by a variety of conditions or diseases. In addition to neurological conditions, sarcopenia is common, which affects the development of postural dysfunction regardless of gender and age. (Kim, 2020)

Muscle weakness and equilibrium disorder are common in osteoporotic patients. Steady-state changes in the uptake and processing of visual, vestibular, somatosensory stimuli also associated with normal aging occur. In addition to slowing reactions, the balance of osteoporosis patients is affected by changing postures and decreased activity. These cause a decrease in muscle strength in the trunk and lower extremities. Muscle balance deteriorates, kyphotic posture makes self-care activities more difficult (stem movements, walking speed, and walking stairs are reduced). A bent posture also causes the center of body weight to be placed forward, thus getting closer to the edge of the support surface, leading to a more unstable equilibrium position. (Hsu, 2014.; Gunay, 2020)

It may further increase the deterioration of the condition, presumably the pain has a negative effect on propriocepation and thus the ability to maintain balance. (Efstathiou, 2022) In an older age, good posture control and good balance are also limited by impairment of cognitive function. As well as slowing down reactions, they are characterised by larger swings while standing, and difficulty in carrying out dual tasks can also be observed in their case. (Liu, 2020)

15.4 Fall in osteoporosis

It is estimated that about one third (28-35%) of those over the age of 65 will fall at least once a year, and this rate increases with age. (Kalache, 2007)

Falls affect all age groups, but people over the age of 65 are particularly at risk, as they have the highest rate of bone fractures. Most of the fractures in the older age group (about 90%) are caused by falls. (Komisar, 2021) The resulting complications can be life-threatening for this age group. (James, 2017) The resulting complications can be life-threatening for this age group. (Sawers, 2018)

The background of falls has been investigated by many studies, which have concluded that falls should be thought of as multifactorial events. (Lockhart, 2005) These external influences may even depend on factors such as the customs and characteristics of each nation. There are significant differences between Western European countries in terms of the incidence of elderly falls and related impacts. (Haagsma, 2020)

From a biomechanical point of view, a fall can be characterized as a disruption of dynamic balance and the inadequacy of its restoration. (Nagano, 2022; Xing, 2023) From now on, an important role can be attributed to the nature of the fall and the activation of the defence mechanisms. (Yang, 2020) Due to the variability of fall characteristics (environmental and personal) and consequences, the methods used to estimate fall risk are also broad and varied. In addition to locomotor status, perceptual ability, the individual's coordination level and existing illnesses are also important.

Of the latter, a significant risk factor is, for example, osteoporosis and high or fluctuating blood pressure. Osteoporosis is often associated with immobility, weakness, and previous fall which increases the risk of falling.

Falls are the most common cause of injuries in the elderly, however, they do not require all fall care, approximately one in five cases lead to breakage. (Scheffer, 2008) Individuals who have fallen several times in response to better reactions and have a lower rate of serious injury. Improving reaction time and practicing how to fall can help prevent serious injury in the future in the prevention of falls. Motor learning allows patients with osteoporosis to adopt a good fall strategy when a good series of motion becomes automatic. (Phelan, 2015) Others, after a fall, even if they do not suffer a fracture, often develop fear of falling, which results in their movement becoming more limited. (Kolpashnikova, 2023)

The development of a fall is determined by the characteristics, abilities, and effects of the environment, such as extrinsic, intrinsic, and situational factors.

Examples of personal characteristics include age-related changes, lower education or solitude, cognitive impairment, sensory loss, changes in balance, walking or strength, illnesses, behavior. Environmental factors include healthcare, medical treatment, footwear, supportive devices, home/neighbourhood characteristics, drugs, medications, caregiver support. In addition, comorbidities such as diabetes, stroke, depression, Parkinson's disease. (Phelan, 2015; Xu, 2022) Dizziness (dizziness and vertigo) are very common symptoms in the history of falling. The incidence of dizziness increases with age and is slightly more common in women. Dizziness causes a feeling of general uncertainty to affect the temporary inability or weakening of balance maintenance. The most common appearance is from lying to sitting or performing tasks that involve head backwards. (Join, 2004) In case of secondary osteoporosis, the underlying disease may also contribute to the fall, such as stroke or diabetes mellitus. Neuropathy in connection with diabetes increases the risk of falling due to loss of sensation in the leg. (Repeated, 2021)

Falls associated with fracture occur most often from standing height, especially common in case of side drop (5.7 times the risk). However, hand dimming may reduce the risk of hip fracture. Hip protection supports prevention by reducing the chance of breakage by 2.2-fold. (Yang, 2020)

15.5 Bone fractures in osteoporosis

Bone fracture due to osteoporosis can cause vulnerability and even death to the elderly. In patients with multiple vertebral fractures, the risk of mortality increases by approximately 2.4-4.4-fold. (Jalava, 2003) Bone fracture occurs more frequently even at ages over 50. By 2040, it is estimated that approximately 300 million people with high risk of fractures will be among osteoporotic individuals aged 50 years and older. (This year, 2015)

In the elderly, fractures of the vertebral, hip and forearm bones are most common, and other bones may of course be affected. (Clynes, 2020) Due to advances in care, a decrease in mortality from osteoporosis is typical, but the resulting deterioration in quality of life and disability remains a problem. (Shen, 2022) The functional condition prior to fracture significantly affects the events of the subsequent period, the release of the injury. (Dempster, 2011)

In osteoporosis, fracture is due to fragility of the bone, but the strength of the bone can also play a role, as injury with a healthier bone structure can occur with increased force. (Mostly, 2016) In patients with osteoporosis, the fracture also develops a force that would not lead to injury in healthy individuals due to weakening of the bones. Therefore, in case of advanced severe osteoporosis, normal daily physical exertion is sufficient for the fracture (bending, walking, lifting light objects).

Isolated vertebral fracture can often be hidden for long periods of time, because damage to the microstructure of bone tissue and loss of bone mass does not always have specific complaints, and pain from degenerative diseases is already common among elderly patients, which is attributed to the symptoms occurring (local pain, which increases its load, sensitivity to pressure, protective muscle spasm). Mechanical and functional conditions varying as a result of breakage may cause fracture of adjacent vertebrae. Vertebral fractures are most commonly referred to as lesions, but the most important decision for the treating physician in terms of treatment is that based on the height decrease, a mild (20-25%), moderate (25-40%), or severe (≥40%) vertebrae fracture occurred. The pain usually subsides (in 4-6 weeks) and resolves within a maximum of 12 weeks, but it can also become chronic. Over time, patients may experience increased back kyphosis, chest subsidence, causing compression of internal organs and loss of appetite. In addition, sleep disturbances, self-care disorder, resulting in immobility and depression may occur. (Griffith, 2015)

While it should be emphasized due to the incidence of vertebrae involvement, the most severe is the damage caused by hip fractures. Complications that occur after a fracture (such as bronchopneumonia, deep vein thrombosis, urinary tract infections, ulcers) can cause the body to continue to break down or have fatal consequences. The risk of mortality in the period immediately following the fracture (mainly in the acute hospital period) is extremely high, then gradually reduced. This effect can last for up to 10 years by causing other chronic comorbidities to worsen. In addition, morbidity data are high in disability, vulnerability, especially in fractures of the vertebrae and hip. In the latter case, approximately half of the affected patients are unable to mobilize independently, and the high proportion of elderly patients who cannot continue to live independently after fracture. (Clynes, 2020)

In men with osteoporosis, the secondary form is more common than in women. (Vilaca, 2022) Men usually have fewer bone fractures because the prevalence of osteoporosis is also lower and their bone density is 8-10% higher than women, and their bone size is often higher. Androgen decrease is slower in men, usually after the age of 70. (Herrera, 2012) Observations have shown that men are less cooperative in drug use. (Sing, 2023)

The estimation of the risk of fracture in bones can be performed by numerous examinations and tests, but the FRAX complex questionnaire method is recommended by WHO to help determine the 10-year risk of severe fractures. This is one of the most common methods used in clinical practice. Imaging procedures are essential in diagnosing the disease and thinking about complications, but it may even be possible to integrate the results of these in the future using artificial intelligence. (El Miedany, 2020)

Patient Test Method

There is currently no approved test method in Europe that can clearly identify the presence of the risk of bone fracture in patients with osteoporosis. (Kanis, 2019)

The detection of predisposing (predisponating) factors that negatively affect the disease is important in addition to the present complaints, therefore special attention should be paid to the knowledge of variable, assistive parameters and factors during the performance of the study steps. The person's knowledge and attitude will affect his/her disease, life and the success of the collaboration. It's particularly important to win a patient in collaboration, so it's always good to behave as an equal party, a decision-making, a person who wants to know. In the case of osteoporosis patients, in addition to assessing the general condition, the risk of falling may also be an important aspect.

Algorithms and descriptions can be used for the test procedure. These aim to provide a navigating thread for a very diverse study. As you can see in the table below (Table 2), it is worth thinking about and, if possible, conducting the study based on a complex system of considerations.

Table 2 Fragility in elderly (early identification and treatment) (URL1)

Categories of Assessment for Patients Evaluated at Fall and Injury Risk.[50] See Appendix B for accompanying details and Suggested Management. See also the *BC Guideline: Frailty in Older Adults – Early Identification and Management*

History

1. Fall history

Functional review

2. Physical activity and endurance
3. Limitations in activities of daily living (ADLs)
4. Access and use of adaptive equipment

Medical review

5. Co-morbidities and risk factors
6. Medication review
7. Nutrition and hydration
8. Continence/rushing to the bathroom
9. Vitamin D intake

Social and environmental review

10. Substance use
11. Environmental and home hazards
12. Living alone and social isolation

Physical exam

Functional review

13. Mobility
14. Feet and footwear

Medical review

15. Visual acuity
16. Orthostatic/postural hypotension
17. Other system examination

A number of questionnaires are available to help with the assessment, which aim to give as complete a picture as possible of the client's condition from various aspects.

15.6 Adoption of medical history

Osteoporosis examination, as with any other medical condition, should be started with a medical history. Thorough, prudent questions can provide you with a lot of useful information about the individual's condition.

When estimating the risk of falling, it is worth taking into account the patient's age and personal characteristics, recording information on previous falls/falls history, medication habits, other medical conditions, balance abilities, activity level, physical and coordination abilities, reactivity, sensory (especially visual) adequacy and even cognitive function if possible.

Foot function (specifically in the case of polyneuropathy in diabetes mellitus) and environmental characteristics also play an important role in the development of falls.

Decreased feelings (no sensory feedback) and weakened muscles cause low leg function. (Alam, 2017) The shortening role of the anterior tibial extremity, the insufficiency of adaptation at the time of soiling, all promotes entanglement or proliferation of the leg in the soil, threshold, bench, which may be a direct cause of falls.

In determining the way forward, all the information gathered should be assessed at an individual level and used to make a decision. Since taking such a detailed medical history can take a lot of time from professionals, and despite your attention, important information may be missed, it may be worth writing a list of important areas in advance. It is very helpful to know that many questionnaires have already been completed to assist in the assessment. They are designed to give you a more complete picture of the client's condition from different aspects. Some are simpler, quicker to complete, and longer, more complex, and some include physical exams and tests. Many of them support the study with a scoring and evaluation system that can also be used to estimate a patient's risk of falling. Some of these are listed below:

- Staying Independent Checklist
- Morse Fall Scale (MFS)
- Prisma-7 questionnaire
- Fracture Risk Assessment tool
- Outpatient Falls Questionnaire
- The Activities-specific Balance Confidence (ABC) Scale
- Fall Risk Assessment Tool (FRAT)
- Self-rated Fall Risk Questionnaire (FRQ)

- Fullerton Advanced Balance scale (FAB)
- Tilburg Frailty Indicator (TFI)
- The Johns Hopkins Fall Risk Assessment Tool
- Canadian Study of Health and Aging (CSHA) Clinical Frailty Scale
- PreFIT Falls Risk Assessment Quick Reference Guide

In case of long-term cooperation, a questionnaire to measure quality of life may also be collected, for example, using the Qualeffo-31 osteoporosis specific quality of life questionnaire (van Schoor, 2006; Huang, 2006).

15.7 Physical examination

After the medical history and completion of the questionnaires, the observation examination follows, during which the form and symmetry of structures and structures must be as expected. It is also important to perform a posture and weight line examination due to changes in patient posture. In addition to measuring the necessary characteristics, such as height, weight, extent of kyphosis (with a kifometer, or wall-occiput, or rib-hip blade distance measurement), chest excursion, limb length, circumference, etc., it is also worth referring to the range of motion of certain segments. This can be done with centimeter tape, goniometer, inclinometer. You can get a picture of your muscles during traditional muscle strength and stretch tests. Other studies, such as functional tests, can be used, which are more complex, often in combination with other talents. For example: Sharman test, plank posture tests, Trunk Stability Test (TST), Unilateral Hip Bridge Endurance Test (UHBE).

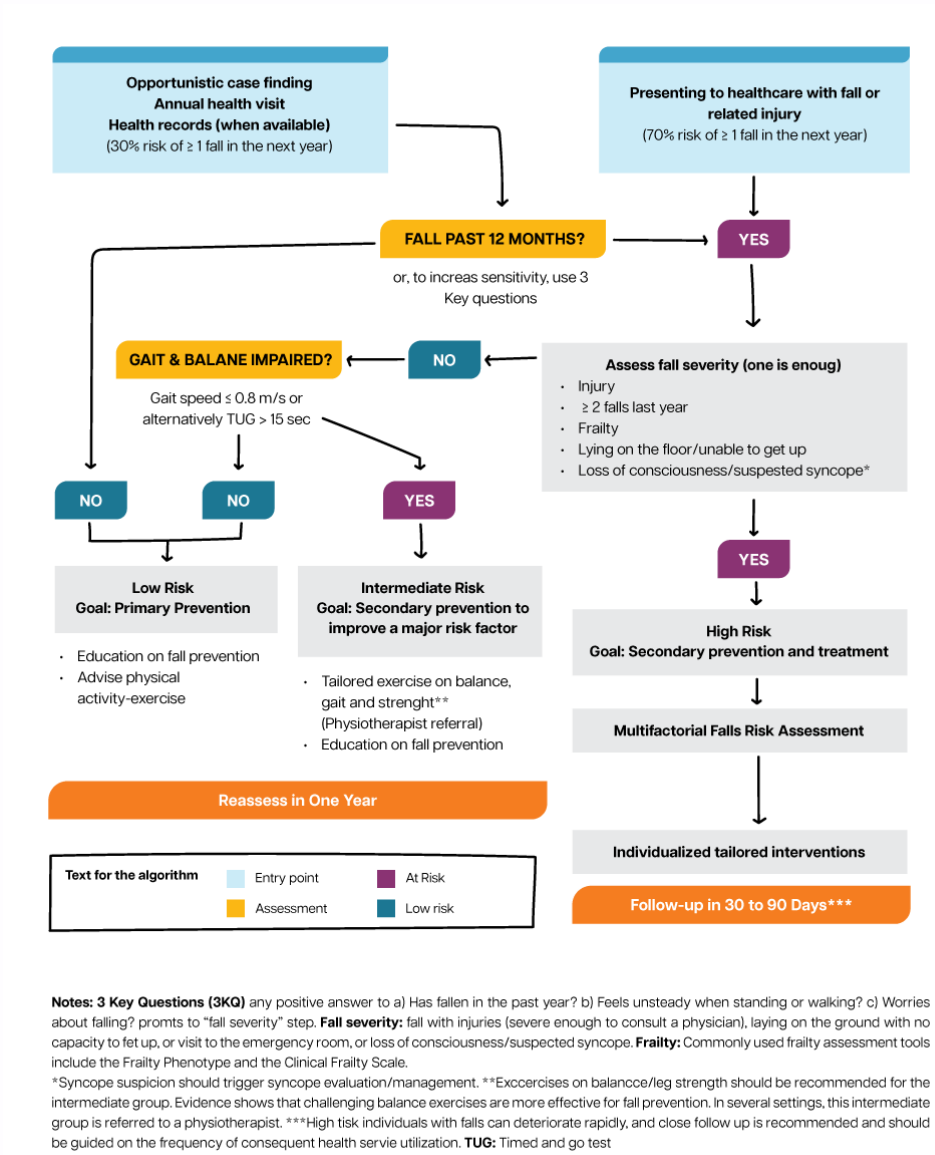
The physical examination scales combined with the questionnaire have also been compiled to determine the functional status of the patient and/or to determine the risk of falls. For example, the Fall Risk Factors STEADI study, in addition to a 12-point questionnaire, is also responsible for balancing testing to assess the risk. A variety of tests can be performed to determine balance, which can be static or dynamic balance tests. Simple, rapid tests (e.g., vertebrae test, 4-step steady state test, multidirectional access test or modified version, Modified - Physical Performance Test Multidirectional Reach, etc.) or Classifications (Functional Balance Grades), or multiple scales (e.g., Berg Balance Scale, Tinetti Balance Scale) are known. There are also more accurate studies, but the need for these tools is also more significant (for example: Clinical Test of Sensory Interaction and Balance)

This diversity allows for the most favourable, adequate examination of the patient's condition, but it is often difficult to choose, as it may not be possible to select the most appropriate ones for the purpose. In addition, it can be considered whether the conditions are appropriate, how fast, easy to perform, or evaluate the test, or if the examiner has the necessary experience to guide the implementation.

Of course, other tests can be performed as needed. This may include, for example, an examination of the reaction time, lower extremity motor Coordination Test (LEMOCOT) of the lower limb, and an analysis of the proper functioning of the foot and eyes.

The purpose of these studies is to estimate the risk of falling and breaking patients. A summary of the medical and physiotherapy test results may lead to the most accurate results. For example, classification may be aided by the algorithm below (Picture 3) which is designed to support decision making. The authors suggest asking three key questions about the fall: Has fallen in the past year?, Feel unsteady when standing or walking?, Worries about falling?

A single listed factor is sufficient for the classification of the high-risk group. Injury, two or more falls within the past year, bone fragility, tendency to faint, loss of consciousness, inability to get up from the ground. (Montero-Odasso, 2022)



Notes: 3 Key Questions (3KQ) any positive answer to a) Has fallen in the past year? b) Feels unsteady when standing or walking? c) Worries about falling? promts to "fall severity" step. **Fall severity:** fall with injuries (severe enough to consult a physician), laying on the ground with no capacity to fet up, or visit to the emergency room, or loss of consciousness/suspected syncope. **Frailty:** Commonly used frailty assessment tools include the Frailty Phenotype and the Clinical Frailty Scale.
*Syncope suspicion should trigger syncope evaluation/management. **Exccercises on balancce/leg strength should be recommended for the intermediate group. Evidence shows that challenging balance exercises are more effective for fall prevention. In several settings, this intermediate group is referred to a physiotherapist. ***High tisk individuals with falls can deteriorate rapidly, and close follow up is recommended and should be guided on the frequency of consequent health servie utilization. **TUG:** Timed and go test

Figure 3 Fall prevention and management in elderly (Montero-Odasso, 2022)

Grouping continues to be a diverse group of patients within a category. It is an important task of the physiotherapist to identify as much as possible the client's capabilities for development. Therefore, it is recommended to perform several tests from which the patient's general physical condition, coordination and balance can be obtained, etc.

The following are examples of these.

The anamnesis should usually cover issues related to body height. The difference in height can be analyzed with respect to the changes that take place over the course of 1 year (a decrease in body height of more than 0.5 cm means a risk of fracture, a decrease in body height of more than 1 cm means a risk of fracture) Another option is to calculate the **Historical Height Loss (HHL)**, during which a 5 cm decrease compared to peak height increases the risk of falling eightfold. (Moayyeri, 2008; Hillier, 2012)

Additional options for identifying hidden vertebral fractures and postural deterioration:

Wall-to-occiput distance (WOD):

Because postural compensatory changes may be present, it is important to measure the upper back. During the examination, the patient stands close to the wall so that: his back and heels rest against the wall, his head looks forward. The examiner measures the distance between the wall and the occipital protuberance.

A WOD greater than 5 cm indicates a vertebral fracture of the thoracic spine and an increase in kyphosis. (Antonelli, 2007)

The average distance over the 3 trials was used to categorize the participants into 3 groups according severity of kyphosis, including mild (≤5.0 cm), moderate (5.1–8.0 cm), and severe (>8.0 cm).

Another method for estimating the size of kyphosis is the rib-pelvis distance: during the examination, the vertical distance between the lower edge of the eleventh rib and the upper surface of the iliac crest is measured in the armpit line. Two finger widths or less means a positive test. (Wiyanad, 2018)

Vertebral fractures of the lumbar spine can cause postural changes and compensations.

The distance between the ribs and the pelvis (iliocostal distance) can be easily measured. During the measurement: positioned behind the patient, after palpating the lower ribs and the iliac crest, determine the vertical distance in the midline of the armpit (with a centimeter tape or finger width).

An RPD smaller than 2 fingers or 3.6 cm indicates a vertebral fracture in the lumbar spine.

The test can also be used for follow-up to identify changes in posture. (Abe, 2008)

Postural control examine: Pull test (retropulsion test)

Response to sudden, strong posterior displacement produced by pull on shoulders, while patient erect with eyes open and feet slightly apart.

Assessment:

0 = Normal.

1 = Retropulsion, but recovers unaided.

2 = Absence of postural response; would fall if not caught

by examiner.

3 = Very unstable, tends to lose balance spontaneously.

4 = Unable to stand without assistance

(Nonnekes, 2015)

Static balance: The 4-step balance test

In this balance test, the patient must hold four different, increasingly difficult positions for 10 seconds while standing.

The examiner can help you take the body position and then start the examination. If the patient can maintain the position without losing balance, the test is passed. You can extend your arms or move your body to keep your balance, but don't move your legs. If the test fails, it must be stopped. Patients may not use assistive devices.

Start the test with "Done, start." phrases and ends after 10 seconds when you say "Stop".

Static balance: Modified Romberg Test

With this test, we can get a general picture of the patient's static balance ability on different surfaces. In the standing position of the patient, the legs are placed 10 cm apart and the opposite elbows are held with their hands. In this case, the person focuses on a target 1-2 m away and tries to maintain his balance. The test is performed for 15 seconds or until the loss of balance occurs (falling, stepping to the side, jumping, turning, etc.), and the examiner measures the elapsed time in seconds. If the subject can hold the position for 15 seconds, the test is "passed". If the test subject is unable to hold the position for 15 seconds, he may make another trial. The test takes place in four steps under the conditions stated below.

Steps: 1. Open eyes/solid surface, 15 sec 2. Closed eyes/solid surface, 15 sec 3. Open eyes/suitable surface, 20 sec 4. Closed eyes/suitable surface 20 sec.

In addition to the "passed" or "failed" categories of the test, it also provides the opportunity to record the exact time, which is also suitable for measuring progress later in life. (Agrawal, 2011)(URL1)

Static balance and postural control: Functional reach test

The client is asked to stand next to the wall (without touching it) and extend their arms forward at shoulder height. In the case of clenched fists, the measurement is made at the 3rd metacarpal head. The patient should be asked to reach forward as far as possible without coming out. Then the horizontal distance between the starting point and the end point gives the result. You can make three attempts, and the average of the last two counts in the measurement.

Assessment:

- 25 cm or more distance - low risk of falling
- Between 15-25 cm - 2x higher fall risk compared to normal
- 15cm or less - 4x higher fall risk compared to normal
- unwilling to reach - 8x greater fall risk

Other factors may also need to be taken into account in the evaluation: e.g. hip joint, ankle joint range of motion, core muscle strength. (Duncan, 1990)

Dynamic balance: Alternative step test

Several versions of this test are performed with the patient in a standing position.

In the original test, an 18 cm, 40 cm deep and 60 cm wide step was used. At the beginning of the test, the participant stands facing the stairs with a double leg support and without walking aids. The participant should be asked to place the entire left and right leg alternately on the step as quickly as possible, 8 times on each leg. Each successful step requires the entire foot to be placed on the step and returned to the floor.

Rating: Performance for more than 10 seconds increases the risk of falling. (Tiedemann, 2018)

Dynamic balance: Timed up and go

The speed of the task is informative, but also the quality of the movement. E.g. evaluation of the Tinetti balance scale gives a clue: movement is continuous, firm (free of sway and instability), steps are symmetrical, heel placement is accurate, no trunk sway, joint positions are correct (no knee or trunk flexion or other), no gait aids, if present use them well.

An indication is given if the completion of the task is 12 seconds or more, while performance above 15 seconds indicates an explicit risk. (URL1)

Dynamic balance: Four square step test

During the test, the klines must move in pre-numbered squares created with the help of two sticks in a specific order (2, 3, 4, 1, 4, 3, 2, 1). The goal is to enter each square as quickly as possible with both feet. The patient can try the test before the measurement, then perform it twice, and the better result is evaluated.

Timing begins when the first foot touches the floor in square 2 and ends when the last foot touches the floor in square 1.

For the elderly, a result longer than 15 seconds increases the risk of falling. (Moore, 2017)

Measurement of physical condition: 5 sit to stand test

During the examination, the client sits on a chair with a back, from which he stands up and sits down as quickly as possible for 5 seconds. All this with arms crossed over his chest and without his back or legs resting on the chair. The measurement starts at the start word indicated by the client and ends with the last bottom touch. If help or support is needed to perform the test, the test stops.

Assessment: The age matched norms score are 11.4 seconds for 60-69 years age groups and 12.6 seconds and 14.8 seconds for 70-79 and 80-89 years of age group, respectively. (Melo, 2019) (Bohannon, 2006)

In another version of the test, it is necessary to perform the task of sitting down and standing up for 30 seconds, and the evaluation is based on this. (URL1)

Functional test: Pick-up-weight test

During the test, the tested person has to reach down for a bag containing a 5 kg weight and lift it up. The bag (the handle of which is 50 cm from the ground) must be lifted with one hand and placed on the table. Performance assessment: able or unable to complete the task. (Tiedemann,2008)

15.8 Physiotherapy Program

The treatment recommendations and guidelines differ slightly, but each programmer agrees that lifestyle modification is necessary due to the prevention approach at any stage of the disease. In some countries, there are pre-assembled complex programs that provide a variety of useful, understandable information about the characteristics of the disease, its consequences, treatment and prevention options, including Steadi - Older Adult Fall Prevention mentioned above, online, and accessible to patients from home.

Longer to shorter program books and brochures are also available for reference, such as the Australian Osteoporotic Refracture Prevention Services. It is useful for patients to not only get

information from the internet, but also their doctor and physiotherapist to guide the therapeutic program and answer any questions they currently have.

Whether the patient receives medication or not, it is worth giving everyone a training program, informing them of the risk factors and what they can do to slow down the progression of the disease themselves. In addition to the role of dietary habits and, if necessary, dietary supplements, smoking and alcohol cessation, as well as regular follow-up with existing underlying diseases and adherence to medical recommendations are important considerations.

The physiotherapist may be responsible for teaching adequate exercises or for encouraging proper physical activity. In the event of a motion program for patients with osteoporosis, the use of combination methods is recommended based on previously described influencers and disease-induced lesions.

Thus, it is worth setting a goal to develop the following areas and skills:

- muscle strength (primarily core, extremities)
- endurance,
- balance and coordination,
- joint mobility, muscle flexibility
- improve posture
- respiratory exercises and relaxation
- trunk and pelvis stabilization exercises
- reaction time, responsiveness, fall engineering development

Exercises should be minimized, especially in relation to balance improvement. To do this, the use of posts, handrails, or physiotherapist must always be ready to maintain trust and safety. Development should always be carried out with difficult and complex tasks that match the state of the client. In terms of balance improvement, it is best to start with retentional, small, stretchy tasks on a stable support surface first. Visual control can then be taken in a safe environment. Another possibility for improvement is the use of unstable surfaces, reduction of the support surface, or the performance of certain musculoskeletal tasks associated with the situation.

Bone is a reactive tissue, so resistance training exercises can be performed to maintain and increase bone resilience. These exercises also support normalization of weight management. In terms of its effect on bone density, different combinations of exercises appear to be sufficiently effective against individuals who do not engage in regular physical activity. Slowing

down weight loss of bone density is likely to be easier in early postmenopausal periods than in late periods. (Kemmler, 2020)

In a professional-led program, it may also be beneficial to conduct group exercises, prior assessment of abilities, and taking into account patient safety. (LeBoff, 2022) Besides weight-bearing, conditioning machine workouts, jogging, walking, yoga, pilates can also be a useful form of exercise. Physical activity as early as half an hour a day can be beneficial in improving health. (Herrera, 2012) The bone reacts best to forms of load that are at least medium-loaded, dynamic, and characterized by a short load duration. The magnitude of the load is primarily determined by the degree of reaction to the ground (the magnitude of a collision) or the degree of muscle strength. (Weaver, 2016) Based on literature recommendations, it seems that 2-3 repetitions (or 1RM 50-80% intensity) of their 5-8 repetitions per core muscle group per week are beneficial for strength training. (Rodrigez, 2022)

To slow down the rate of bone mass weight loss, it is worth considering as an additional task in any physiotherapy development. The exercise types associated with the above-mentioned stresses, whether it is stress tasks performed in a closed kinematic chain, not only the lower extremity, but also create spinal compression, thereby inducing the bone-building processes of the vertebrae. However, in many cases, spinal stress should be reduced using stabilization techniques prior to this type of training method because unintended movements or excessive loading can create harmful forces.

It is worthwhile to mark the activities requiring active participation and cooperation of the patient as a common goal. Your training program should not only report lifestyle advice, but also understand the purpose of some types of exercise in the area of physiotherapy, learn how to do them correctly.

In order to reduce the risk of falls, the treatment of possible underlying diseases and the development of individual motor skills are effective ways to reduce risk. In addition to these intrinsic factors, the review of extrinsic factors – restructuring or efficient use of the environment – also help reduce the chance of falling. These environmental modifications can be quite simple, such as wearing suitable, safe footwear that does not slip or fall out, or removing or securing loose, moving or wavy carpets. (Falaschi, 2021)

It would be essential to make the rooms clear and use additional equipment where necessary, for example: installation of handles, spa chair, toilet height placement. (Salari 2022) Certain additional measures and recommendations may be useful for elderly persons, but these fall-offs do not affect the occurrence but may affect the severity of complications and their outcome: e.g. the elderly person wears an alarm (watch/cup) or a mobile phone during the day to get help as soon as possible.

Regular balance and combinations of strength and stamina-enhancing exercises improve the physical performance of the elderly, but also support daily activity drive, cognitive function and quality of life. (Gschwind, 2013) This impact can be enhanced by exercises in the group. (Sherrington, 2017)

It is always very important to use a method adapted to the patient's condition. In the event of confirmed loss of vertebrae (and femur) stock, the patient may be worked under a lower load (e.g. sitting on a stable/unstable surface) and avoiding larger, faster dynamic exercises. Beginning with advanced osteoporosis (increased risk of fracture, severe osteoporosis), it is necessary to maintain the range of motion (ADL) necessary primarily for daily function with regard to the movement of the trunk, extreme movements are contraindicated due to the risk of fracture of the bones (vertebrae, ribs). Based on individual judgment, tasks performed in the prone position can be performed on a soft surface, and in case of deterioration, it is necessary to leave this position. In advanced cases, flexion, rotation of the trunk, exercises with weight should be carried out with caution and with little or no weight, as movements performed with normal range of motion may now lead to breakage. In such cases, manual physiotherapy techniques (mainly manual therapy and deep soft tissue treatments) should also be avoided, as these also have simple or complex forces on bone stock with reduced structure. Individuals who had few previous movements, permanent immobilization, or previous fracture were particularly at risk.

A motorised learning program aimed at improving posture is also recommended for clients to consciously and activatedly set and maintain body sites. Quality motion is always important in physiotherapy, but in osteoporotic patients, it plays a special role in supporting the normal distribution of loads to ensure even loading of structures.

The previously described principles of physiotherapy for diagnosed osteoporosis are included, but the most important is prevention, by maximizing peak bone mass in youth and then maintaining it as long as possible during aging. At any stage of life, it is worthwhile to make efforts for the health of the bones according to age, including persistent and regular physical activity.

15.9 COMMUNICATION

In this lesson you will learn *how to communicate with a low educated elderly man who shows elements of provocative and aggressive behaviour*. We will show how to establish a relationship with an elderly person, how to behave with them when they are provocative or aggressive, which communication methods can help the physiotherapist to carry out the examination or treatment. The rules of communication with a person with low education (restricted code, redundancy, feedback). How to anticipate, recognise and manage tantrums.

The number and proportion of older people in society is increasing. However, there is no common definition of who is considered older. From this perspective, age is not the most important factor for people living in developing countries, but rather the loss of previous social roles or the decline in active participation in community life (WHO; 2018). In Western culture, people over the age of 60 or 65 are usually considered old. In health surveys, the minimum age of old age is increasingly set at 65. This age coincides with the retirement age in some countries. However, old age cannot be considered as a single age stage; subgroups are usually distinguished, such as young elderly (65-74), middle-aged (75-84) and elderly (over 85) (Zizza et al., 2009), because the different age subgroups may have different

characteristics. In fact, it is not possible to treat the elderly as a single homogeneous group, rather the diseases of old age can homogenise them, for example sensory impairment, dementia, etc. Advancing age in itself increases rather than reduces differences between individuals.

15.10 ASPECTS OF COMMUNICATION WITH OLDER PEOPLE

We should evaluate the aspects of communication with older people in the light of the above considerations. Below we describe communication problems and possible solutions that may apply to larger groups of older people, but are not typical of all older people. The following problems can make it difficult to properly assess and treat older people:

- polymorbidity is common, i.e. several somatic diseases and mental disorders may be present at the same time, which makes diagnosis and treatment much more difficult.
- with increasing age, cognitive and sensory problems become more common, making communication more difficult.
- some conditions can cause language difficulties, such as stroke or Parkinson's disease.
- the level of health awareness may be generally lower among the elderly, due to possible lower education and poorer access to information.
- the level of social support may be lower due to the prevalence of loneliness, which can cause problems in many areas.
- many older people may have financial problems, which may influence decisions about recommended treatments and lifestyle changes, among other things.
- some older people may find it more difficult to access treatment due to mobility difficulties and limitations.
- ageism: discrimination against older people. Stereotypes and prejudices about old age can make it difficult to care for older people. Such a stereotype might be that older people always present their complaints in a long and complicated way, that they only go to the physiotherapist to talk, that all older people already have some kind of mental decline so that they do not understand the physiotherapist's explanations, and so on. These ideas can be significant barriers to the physiotherapist-patient relationship.
- trying to hide symptoms. Older people often feel ashamed of their complaints and symptoms and may try to hide them. There may be several reasons for this, for example, the social perception of certain symptoms is very negative, or the need to meet social expectations,

or the fact that the patient does not want to lose their job. They may be afraid of being admitted to hospital or a nursing home, but there may also be cultural reasons.

- infantilisation, i.e. treating an adult like a child. This sadly common communication error can manifest itself, for example, in the childish tone of voice used by health professionals, oversimplified communication, lack of adequate patient information, and exclusion of the patient from decisions about their own treatment and future.

- we can talk about triadic communication not only in the case of child patients, as many elderly people are accompanied to the health care facility, e.g. to the physiotherapist, because they need help or because they are worried about them. In a situation where a relative or companion is present in addition to the patient, the physiotherapist may have specific communication difficulties. It can sometimes be difficult to structure a conversation that is going in different directions, to manage different levels of concern and expectations, and to manage the emotional dynamic between patient and carer. (Pilling, 2020; Tarbuck, 2016)

How should a physiotherapist communicate with older people? Because the problems are complex, so are the solutions.

Creating the right environment

- in the waiting room and examination room, there should be chairs that are easy for older people to sit on and get up from. Chairs with straight backs and armrests can be more useful than reclining chairs.

- there should be handrails in the waiting room, examination room and toilets

- there should be adequate lighting in the examination room and we should minimise background noise; this can help communication with older people with sight and hearing loss.

Longer consultations

Consultation, examination and treatment of older people may take longer than usual. They may find it more difficult to move around, they may be slower to get dressed and undressed, and due to their multiple illnesses, their complaints and symptoms may be more severe than, for example, a middle-aged patient.

Establishing a partnership

The first step in building a partnership is the right approach! Avoid using titles such as 'uncle' and 'aunt'. Ask the patient what they would like to be called. Adults with capacity are subject to the same legislation and therefore the same communication recommendations, regardless

of their age. Therefore, if an older person's capacity has not been restricted by law, he or she has the same right to information and participation in decisions about his or her own treatment as anyone else.

Symptomatic communication

As some older people try to hide their complaints and symptoms, the physiotherapist must actively seek to uncover those problems that the patient may not have talked about. This can be facilitated by creating a trusting atmosphere and by the physiotherapist asking specific questions about the most common problems experienced by older people.

Communicative aspects of sensory problems

If the physiotherapist is unaware that the patient has these hearing or vision problems, it is best to ask at the beginning of the session. In the case of hearing loss, it can help if the physiotherapist looks at the patient, leans in a little closer, speaks at a sufficient volume (but never shout!), with clear pronunciation, at a normal, usual pace or a little slower than that. It is worth supplementing your speech with non-verbal signs and visual aids (e.g. pictures, demonstration tools) to help understanding. As much information as possible should be given in writing. In the case of visual impairment, always ask the patient to use their glasses. In the case of sensory impairment, it is particularly important to check that the patient has understood what has been said.

Appropriate level of assistance

Independence is important to many older people, so the physiotherapist should avoid over-care. The easiest way to do this is to ask the older person how much help they need. At the same time, the physical therapist should not hesitate to offer help if he sees that the older person needs it.

Respect cultural differences

Older people's health behaviors and attitudes to illness may be different from those of the younger generation. They may tend to regard many symptoms as a natural part of ageing. There may also be differences in treatment, for example, we may cling to treatments that seem tried and tested but are now considered outdated or even wrong. The physiotherapist should ask questions about all this.

Appropriate assessment of depression and suicide risk in old age

The risk of suicide is extremely high in old age, the physiotherapist needs to be aware if the patient is experiencing symptoms of depression, and if there is any indication that there is a risk of suicide, appropriate steps need to be taken, professional help should be sought and referral to a specialist should be made.

(Pilling, 2020., Tamparo & Lindh, 2017., Tarbuck, 2016., Pék, 2004.)

15.11 ASPECTS OF COMMUNICATING WITH AN AGGRESSIVE PATIENT

Anyone who has recently visited a healthcare facility - even as a patient - has almost certainly encountered a patient who behaves in an impulsive and sometimes downright aggressive manner. This phenomenon has become very common and is a growing problem for healthcare workers. Research and scientific articles published on the subject agree that healthcare workers are often unprepared to deal with such situations. When aggression and provocative behaviour in an elderly person is combined with a low, limited communication code, a very complex and complicated communication situation arises.

It is important to check what may be behind the provocative behaviour, as knowing this will help us to resolve the situation appropriately. *Pushy, aggressive behaviour can have several causes:* for some it is in their nature and habitus, for others it is the accepted behaviour associated with their position, while in some cases it is the result of illness and a vulnerable situation. Aggressive behaviour can be triggered by fear, insecurity, anxiety, frustration, pain or even communication difficulties - for example, differences in the level of communication between the physiotherapist and the patient. Of course, the patient's alcohol consumption or possible mental illness does not make the situation any easier for the physiotherapist. Dissatisfaction with the situation can often be a legitimate reason for aggressive behaviour - for example, failure of previous treatment, long waiting times, lack of information - but also the patient's lack of self-confidence and insecurity, which he tries to attribute to the seemingly vulnerable health professional. In this situation, it is important not to 'put on the gloves' as this will only exacerbate the argument, but a dispassionate, objective attitude may also further anger the patient if he is looking for an excuse to engage in a verbal duel. (Pilling, 2020.)

Some suggestions for the physiotherapist to overcome communication problems with a provocative or aggressive patient.

The carer's view of the conflict situation. A healthcare worker should start from the basic position that *temper management is also part of their job.* It is almost natural for a healthcare worker to come into contact with tense, nervous people again and again, as they deal with sick people who experience strong emotions on a daily basis. It is therefore worthwhile approaching the tense, irritable patient or their relatives with *a professional and helpful attitude*. If you take all the anger on yourself and react hostilely, you yourself will experience a lot of tension. On the other hand, those who try to help the patient calm down in this situation help both the patient and themselves.

Escalation techniques

- it is important to maintain *a calm and professional demeanour*, even in the face of provocation. Avoid mirroring the patient's aggression. A calm tone is often the key to resolving the situation (if we remain calm ourselves, this usually has an effect on the other party and helps to reduce their tension).

- basic courtesy and small, attentive gestures (e.g. offering the patient a seat) can also help reduce tension.

- practicing *active listening*, *acknowledging the patient's feelings and concerns without judgement*, is very helpful. Active listening means trying to understand the speaker's message and the feelings associated with it. In practice, this means listening quietly, maintaining appropriate eye contact, adopting an open posture, and encouraging the speaker with comments at appropriate points (indirect agreement: I see, I understand; open-ended questions). If we have the opportunity, it is worth letting them talk about their complaints, give their opinion, which we can confirm and accept.

- it is especially important *not to interrupt the speaker*. Do not interject with counter-arguments, even if we feel that we strongly disagree with something the patient has to say.

- *keep your distance!* Being too close to someone can increase their tension. (On the other hand, it can also be dangerous because it makes it easier for them to reach us). Therefore, keep a sufficient distance (at least 1-2 metres) from people who are tense and angry.

- *set clear and calm boundaries for acceptable behaviour.* Explain how the patient's behaviour is interfering with the examination. Express your frustration, but try to maintain a calm environment and make the patient understand the importance of this. Instruct the patient to maintain a civilised tone if the language is rude or offensive to others.

Communication strategies

- Use clear, concise language and avoid medical jargon. Repeat key information as necessary.

- Keep your speech focused on the reason and purpose of the examination and its benefit to the patient's health.

- If possible, offer the patient choices to help them regain a sense of control.

- Only one person should speak to the patient at a time! For a person in a narrowed state of consciousness, stimuli coming from many directions are difficult to process and threatening, which increases their tension. Even if there are several people in the room, only one person should speak to the victim at a time.

Anticipating and recognising tantrums

- Pay attention to the *patient's non-verbal cues*. Look for clenched fists, increased muscle tension or changes in facial expression.

- Look for rising volume, changes in tone, verbal threats or insults as *possible signs of an impending outburst.*

- *What to avoid*: telling the patient to calm down; using a superior, commanding tone; criticising and belittling the patient; ignoring the patient's problems, questioning the legitimacy of their feelings, trivialising them.

Treating tantrums

- If a tantrum occurs, calmly explain that you will not be able to continue the examination until the patient regains his or her composure.

- Suggest a short break to allow the patient to rest in a private room, if available.

- If the situation escalates, seek help from a colleague or security staff for your own safety and that of the patient.

4 steps for dealing with a tantrum

Stage 1: Ignore. Ignore the first hurtful word or sharp phrase and remain calm and polite. This can often be a solution in itself. If you still want to respond, give short, neutral answers.

Stage 2: Assertive responses without confrontation. In a conflict situation, expressing your understanding by mirroring the patient's feelings ("I can see that he is very tense!") or trying to identify the reason ("What made him so angry?") reduces the level of tension and we can move closer to a solution. It is important to note that understanding does not mean agreement, but at the same time attention and empathy are central to working with the patient. Expressing regret ("I'm sorry you had to wait so long") is often a magic word, let's add a short, objective statement of our own position with a concise explanation (really just 1-2 sentences!). "I'm sorry you had to wait so long. I couldn't see you earlier because a patient with a serious condition needed more time to be seen.) In our communication we should always try to work towards a solution and cooperation.

Level 3: Assertive responses with confrontation. An objective description of the situation, stopping verbal aggression, redirecting the conversation in a constructive direction.

Stage 4: Getting out of the situation. If someone feels unsafe, leave the room and seek help.

By following these tips, the physiotherapist can create a less confrontational environment and possibly complete the examination or treatment. Remember that calmness, setting boundaries and clear communication are crucial when dealing with a provocative or aggressive patient.

(Pilling, 2020, Hills & Joyce, 2013, Beech & Leather, 2006)

15.12 COMMUNICATING WITH A PATIENT WITH LIMITED EDUCATION

Appropriate verbal code. Use simple, short sentences and familiar words. Avoid complex medical terminology and complicated explanations that require background knowledge.

Redundancy. Repeat key information in different ways to ensure understanding. In addition to verbal information, provide other forms of information such as pictures, diagrams and demonstrations,

Feedback. Encourage the patient to ask questions and give feedback during the examination.

Congruence. Ensure that your verbal and non-verbal communication is consistent.

(Pilling, 2020, Pease & Pease, 2017)

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