4 POSTURAL AND MUSCULOSKELETAL PROBLEMS OF THE VISUALLY IMPAIRED, FOCUSING ON THE SHOULDER GIRDLE AREA

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4.1 Occurrence characteristics of shoulder joint harms

Shoulder pain is a complaint that occurs in middle-aged, active, working people, and can place a significant barrier on the performance of daily activities. In most cases of shoulder pain, no clear structural abnormality is found, which can be confirmed by imaging (physiotherapy). However, several factors are usually involved, and the pain syndrome negatively affects functional abilities and becomes recurrent or chronic in up to half of the cases. The prognosis of diseases associated with shoulder pain is very varied; only about half of the new onset cases become asymptomatic within half a year of my start-up. (Masters, 2007) Data on the prevalence of shoulder pain vary, as it is not always reported as a diagnosis in the health care system due to its variable severity and duration. In addition, the data differ significantly due to country case definitions, economic differences, health system deviations, etc. (Luime, 2004) However, it is agreed that lesions associated with shoulder pain, as with other degenerative processes, show an increasing tendency. This is likely to be explained by an increase in age and years at work. (Lucas, 2022) Based on some data, its 1-year prevalence can reach 55% (Lowry, 2023), *with a maximum* life prevalence of up to 70% (6.7-66.7%), making it estimated to be the third most common musculoskeletal complaint in the world (Luime, 2004, Singh, 2015). As a result, shoulder pain is a significant financial burden to the patient and his family, as well as to individual countries due to the loss of work and the burden of the health care system. (Eubank, 2021)

The diagnosis of these disorders, which are associated with a different functional status and impair quality of life, is based primarily on the results of clinical examinations. The sparing at the onset of shoulder pain may result in a further increase in the loss of range of motion. An upset muscle balance in any age group slows and complicates the rehabilitation of the shoulder joint.

The predictability of expected rehabilitation results is an important consideration for professionals working in the clinic, as these can be used to determine common treatment goals with the patient. Understanding the structure and function of the shoulder structures and

complex interpretation of complaints and circumstances is essential for this and the most appropriate physiotherapy program.

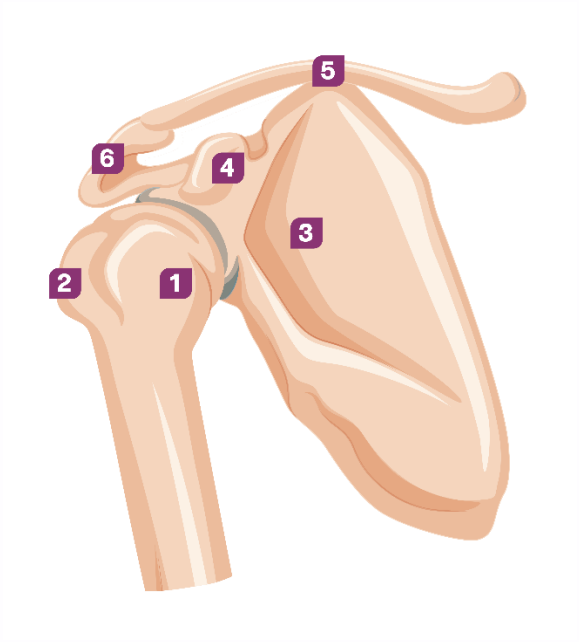
4.2 Functional aspects of shoulder structure

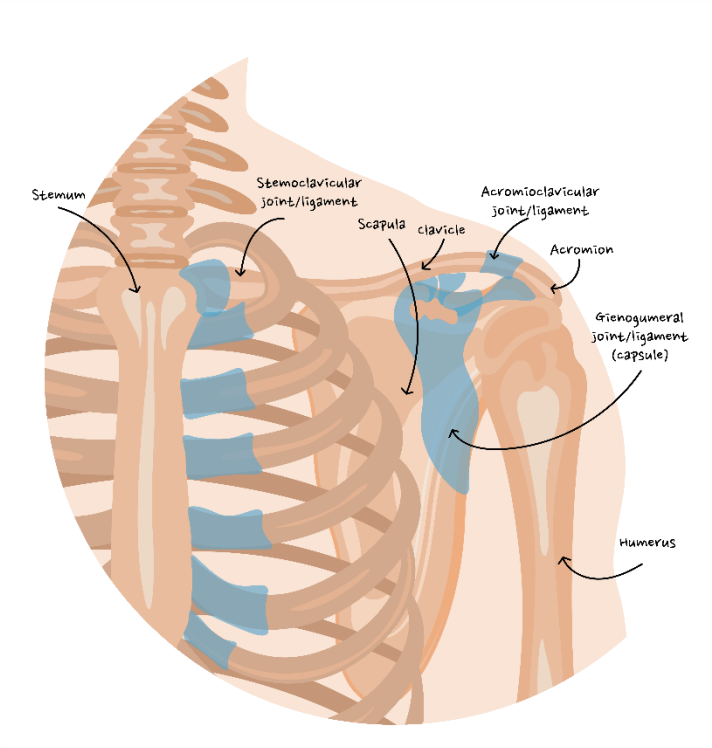
Only a third/quarter of the glenohumeral joint head (caput humeri) is covered by the shallow joint trench provided by the scapula (cavitas glenoid) and the fibrous element attached to it (labrum glenoid). This makes the shoulder joint one of the most mobile joints in the human body. However, due to the known anatomy, ensuring proper head position is highly dependent on the passive and active elements. The role of the labrum in the proper functioning of the shoulder joint is unquestionable. It is also involved in promoting stability by increasing the surface (deepening and widening), centralizing the head and supporting the maintenance of intra-articular pressure. (Almajed, 2022) Passive stability in the shoulder is primarily due to the combined effect of non-contrast elements. In the lower part of the joint capsule, the integrity and mobilization of the fascia (recess) contained therein are conditions for full-motion displacements (especially in the elevation directions). However, the case can only provide static stability independently with its relative loose and strengthening tapes (ligamentum glenohumerale, coracohumerale). Otherwise, stabilizer muscles support this task. Therefore, the role of static stabilizers is to eliminate the gravity effect, most often in the neutral position of the upper limb (e.g. carrying a bag). The work of contractile elements (e.g. supraspinatus, biceps, triceps brachii) increases proportionally to the load and weight bearing. The dynamic stabilizer aids in eliminating superior translational forces and pulling the head into the acetabulum during movement (primarily during abduction). (Maruvada, 2024) These muscles are primarily the members of the rotator cuff (m. subscapular, supraspinatus, infraspinatus and terres minor) and the long head of the biceps Brachii. The reduced work of these structures results in differences in joint arthricokinetic movements, which can cause excessive and abnormal movements and undesirable forces in the joint. Rotator cuff members have a variable role in centralizing the head during movements, but their task increases during mid-travel and load movements, as well as during closed kinematic chain exercises. (Gombera, 2015)

A subacromial, subdeltoidal envelope located near the joint is important for proper functioning, whereby reducing friction in the tendons (m. deltoid, rotator cuff) they contribute to more efficient working of the muscles. Acromion, coracoacromial ligament, and process coracoideus form the coraco-acromial curve creating a channel for the supraspinatus. When lifting the upper limb, the supraspinatus tendon will slip medially by sliding the layers of the bursa here. The channel is rigid, thereby any space-sparing process (increase in the diameter of the structures) affects the mobility of the supraspinatus tendon. (Kapandji, 2019)

However, the latter structures often become involved (inflammation, pain, adhesions, calcification) alone or in connection with other shoulder problems, limiting the extent and/or strength of shoulder joint movements. Their role is also being evaluated in relation to their effect on the regeneration of rotator cuff involvements. **(**Klatte-Schulz, 2022)

The biceps brachii tendon originates from the supraglenoid bulb and the upper part of the labrum glenoid. At the sulcus bicipital, the humerus is flexed, causing the tendon to be subjected to significant mechanical action during muscle contraction. Repetitive traction, friction and movement of the tendon during rotation of the glenohumeral joint often causes inflammation. The long head tendon has a rich sympathetic nerve network in the upper third, which leads to the development of an inflammatory and then chronic degenerative process. (Manpreet, 2024) The tendon is secured by a transverse ligamentous structure and the biceps ring, which stabilizes the tendon in the bicipital fissure under normal conditions. (Nakata, 2011)





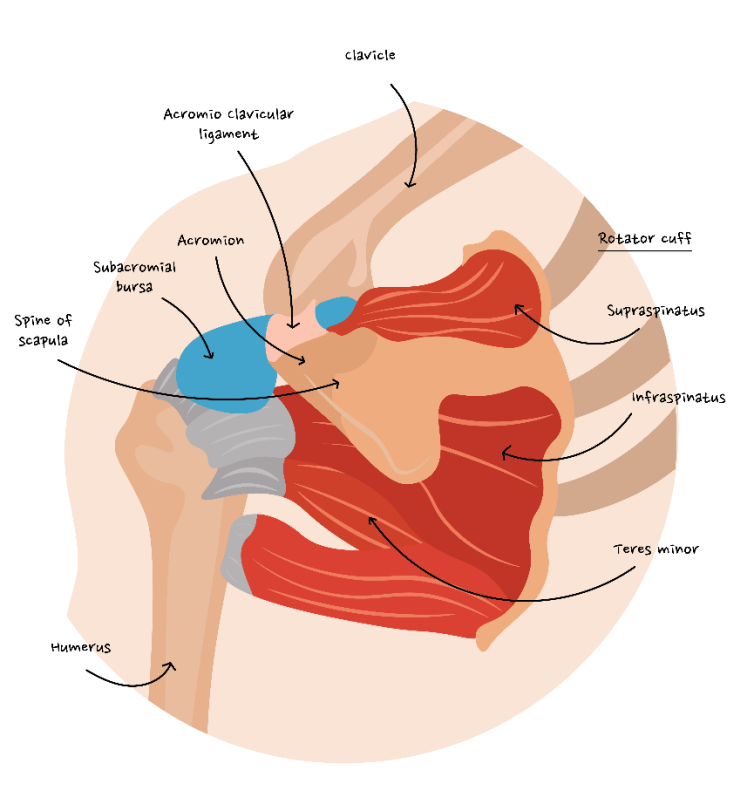


Figure 5 Shoulder joint and major structures 1: Kadi, 2017. 2: Woodward, 2000. 3: Hopman, 2013.

The shoulder joint and shoulder belt form a functional unit, thus affecting each other's function in their stability and mobility tasks, i.e. they depend on each other. A scapulo-humeral rhythm of adequate rate and scope provides the full range of motion of the shoulder joint. Do this to ensure that the "executive organ" (the hand) of the upper limb is involved in almost everything we do (Moscato, 2010) is in the most optimal position in the space.

The upper extremity connects to the axial frame through the acromioclavicular and sternoclavicular joints and through the scapulothoracal functional link. Muscle groups of the shoulder belt, such as trapezius, levator scapulae, rhomboides, and serratus anterior, contribute indirectly to the function of the glenohumeral joint by adjusting, manipulating, and stabilizing the scapula. The synergistic relationship between the scapula and glenohumeral joint allows the arm under normal conditions to perform high-volume, yet precise motions without becoming unstable. The variable position of the shoulder belt, such as the protraction shoulder support, contributes to reduced range of motion in the shoulder joint or compensation movement patterns.

The normal position of the scapula can be determined relative to the chest and spine (height, distance, rotation) and other factors (e.g. symmetry, axis, plane). The position of the scapula is highly dependent on the position of the vertebrae (neck, back) and the condition of the stabilizing muscles. (Rees, 2021)

The scapula movements are arthokimatically complex, as it must not only conform to its shape in the scapulo-thoracic connection, but also create the consistency of rotational-like

movements through its joint with the clavicle at the same time. The changes in his movements also involve a change in the scapulo-humeral rhythm (diskinesis), which is not a musculoskeletal diagnosis on its own, but may be a cause of the development of certain shoulder complaints. Proper coordination between anatomical structures and muscle groups can be an important key to preventing and treating shoulder injuries. However, it cannot be clearly stated that the discrepant pattern of scapula movement is always a pathoanatomic factor in the background of shoulder joint complaints. (Lange, 2021) During the elevation movement of the shoulder girdle, the movement is accompanied by extension and lateral flexion of the spine, so keeping the spine flexed or not fully extending can limit free shoulder movements. (Land, 2017)

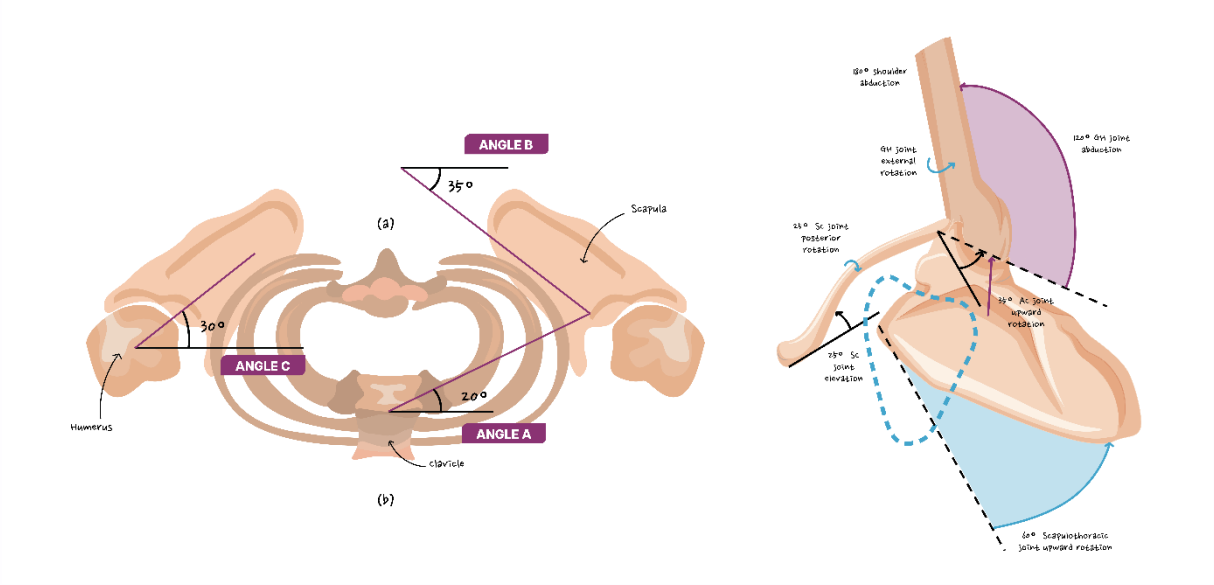


Figure 6 Shoulder-shoulder joint relationship (Crookes, 2023)

4.3 Proprioception and shoulder support of visually impaired persons

The relative position and movement of the body segments is ensured by a serious, coordinated neuromuscular background. Appropriate movements are based on inter- and intra-synchronisation of muscles, for example, for which extra-, inter- and proprioceptive information can be obtained. Vision is an important source of information for coordinated movements and postural and equilibrium skills among human senses such as proprioception, somatosensation and exteroceptive stimuli. (Moon, 2021) Proprioception is “afferent information from the internal peripheral areas of the body that contributes to posture control, joint stability and a variety of mindfulness.” Somatosenization is a broader concept, which, in addition to proprioception, means all other information coming from the periphery, including information from the receptors of mechano-, thermo- and pain. Thus, proprioception can be considered an important part of somatosenization. The term used to summarize the factors necessary to

accomplish the task is called neuromuscular control, which provides dynamic stabilization of the joints. (Riemann, 2002)

Despite the high prevalence of vision loss and blindness, relatively few studies have looked at postural and musculoskeletal problems in visually impaired people.

Due to the complications caused by diabetes with an increasing incidence, it is expected that vision injuries will continue to increase. Visual information strongly supports proprioceptive information for postural adjustment. Persons with visual impairment may have different functions due to lack of visual control in their coordination, posture and balance control mechanisms. (Walicka-Cupry, 2022)

One of the most important senses is vision, which affects other senses and motor control. In this way, it affects essentially the performance of all functional tasks. Loss of vision can occur at any age, but most often occurs in the elderly due to macular degeneration. Individuals with poor vision have pronounced musculoskeletal complaints such as muscle pain, neck and scapula stiffness, fatigue, and other symptoms. In addition, other musculoskeletal problems may occur due to the impaired coordination of the eyes and hands. In the absence of vision, the information provided by proprioceptive receptors may result in misfeed-back. Thus, the absence of visual motor stimuli may necessitate the use of a compensation strategy, resulting in a different retention and movement pattern. (Zetterlund, 2009) Reduced vision, but especially blindness, causes abnormal sensorimotor interaction. Insufficient visual information due to reduced or lost vision leads to an increased incidence of musculoskeletal problems. (Alghadir, 2019)

Overuse of non-physiological muscle and joint movements and positions typically leads to recurrent or long-lasting symptoms of stiffness and pain, typically in the shoulder girdle and neck area. (Zetterlund, 2016)

4.4 Shoulder pain

Therefore, the complex anatomical system of the shoulder region may be due to a variety of abnormalities from many structures, therefore its differential diagnosis may be difficult. It makes analysis even more difficult, because in many cases, shoulder problems do not involve an imaging-proven abnormality. Chronic shoulder pains result in muscle imbalance, loss of range of motion and functional deterioration. Rehabilitation is slowed by the appearance of a violent reaction (sensitization) to pain in patients, fear of movement due to fear of pain, and/or compensatory shoulder and trunk movements.

The effect of pain on motor function is unclear but may interfere with the pattern of movement. Individuals who experience pain may exhibit poor motor performance and may have a reduced ability to learn certain motor patterns. At the same time, pain adaptability seems to be striving to accomplish functional tasks through the nervous system’s operating strategy. The path is to find the movement pattern with the least pain. Over time, repeating these movements will reduce pain. (Arieh, 2022) These mechanisms may be important to support the body’s self-

healing mechanisms, however, if altered patterns of movement persist, they may become a rehabilitation task.

Studies also link the severity of avoiding fear of painful movements with measures of pain-functional deficiency. (Gonez, 2023) The development of pain is multifactorial and varied in its characteristics (intensity, localization, nature, etc.), which, in addition to the unique characteristics of the client, affect the effectiveness of the therapy. The severe pain sensation results in less rehabilitation success, i.e. in this case, a more moderate and difficult rehabilitation result can be predicted. However, there is no clear, strong evidence that the longer duration of pain and complaints, or the initial greater degree of limitation, would clearly project a weaker result in advance. In addition, the effect of psychosocial factors cannot be negligible in the rehabilitation process. (Kuijpers, 2004) In the case of atraumatic shoulder pain, psychological factors such as the level of pain, the patient's goals, and the perceived disability, influence the level of perceived discomfort. The same cannot very often be said for the clinical picture (physical examination findings, structural abnormalities). Higher levels of self-efficacy lead to greater improvement in shoulder pain during rehabilitation. (Grandizio, 2022)

In case of persistent pain, it is important to judge the severity of the patient. This includes an individual's adaptation, attitude, and employee coping strategies for pain. Myths about pain determine what the patient does with this feeling (prevents, reduces, or amplifies it). This different pain sensation and processing should also be considered during physiotherapy in case of chronic pain (Bahadir, 2023)

4.5 Classification of shoulder complaints

One way of classifying shoulder complaints is to classify those that are related to an accident or traumatic event and those that are not. However, it is certainly a very common and significant individual and social burden problem that is often associated with other diseases (e.g. stroke, diabetes, hypertension, thyroid dysfunction, psychological disorders).

Periarthritis (43.1%) and sub-acromial pain syndrome (26.9%) are high as causes of shoulder pain, but typically vary between younger and older ages. Periarthritis and subacromial pain syndrome are more typical in younger ages. People over 40 years of age are at increased risk of chronic rotator cuff involvement (inflammation, rupture), adhesive capsulitis or arthritic process of the glenohumeral joint (osteoarthritis). Although, in the case of the latter, it is possible to talk about processes that are still starting, so these cause slight complaints, which usually have intermittent appearance, and then increase with age, they thicken. People over 61 years of age have a lower cure rate due to a worse prognosis of periarthrotic involvement. Frozen shoulder syndrome and calcified tendinopathy peak in the middle-aged (40-70 years).

Appearance of shoulder symptoms is accompanied by repeated or chronic involvement of individuals in about half the time. Regardless of the cause of the disorder, pain in the shoulder is the most common cause for a person to seek medical attention. In addition to pain, loss of movement (extreme limitation when the shoulder is frozen) and weakness are the most common complaints. (Murphy, 2010)

The medical history and the common shoulder complaints during the physical examination can be grouped according to the following division: subacromial pain syndrome, adhesive capsulitis, glenohumeral instability, and other common diagnoses. (McClure, 2014)

Rotator cuff involvement involves one or more muscle tendons. The most common is the involvement of the supraspinate artery, which is often associated with the irritation of the long head of the biceps brachii and/or bursitis, but they may also have independent inflammatory processes. Its causes are varied: it can have functional, degenerative and mechanical backgrounds.

Impingement syndrome refers to the mechanism of the disease, in which case the tendon injury develops with a collision and pinching mechanism between bony structures, which results in inflammation, consequently picking and then partial or complete rupture of the tendon. (Murphy 2010) This process may also be associated with inflammation of the subacromial bursa. **(**Yang, 2021)

Newly, an effort is being made to unify the nomenclature of shoulder involvements, as there are several forms of division and naming (e.g. rotator cuff syndrome RCS, subacromial pain syndrome SAPS).

It **is customary to distinguish between two forms of** impingement syndrome, its external type, subacromial impingement syndrome (SIS, SAIS), which is caused by the narrowing of the subacromial space (primary form) or occurs due to the decrease in stability caused by the imbalanced muscle balance (secondary form). In this form, irritation of the supraspinous tendon of the m under the acromial arch occurs. In addition, the internal impingement type can be distinguished, which, in connection with overhead workflows, causes repeated impingement of the lower deep fibers of the rotator cuff to the glenoid fossa (anterior, posterior). Subcoracoideal syndrome is also differentiated in other divisions. (Garving, 2017)

Subacromial pain syndrome is the summarized name of all problems associated with complaints in the subacromial area. Thus, it includes, for example, impingement syndrome, tendinopathy affecting the rotator cuff, primarily supraspinous, tendinitis and bursitis. (Rees, 2021)

Adhesive capsulitis or frozen shoulder syndrome is a condition of characteristic symptoms and unknown etiology. In the event of its development, severe pain, increasing at night, severe passive and active range of motion (mainly abduction, flexion and rotation) and persistent functional impairment can be encountered. The characteristic of the disease is that several periarticular structures are affected, and despite the reduction of pain, connective tissue limitation may make further improvement impossible for conservative treatment. Imaging does not usually confirm any particular abnormality. It may be primary and secondary in shape. In the case of the primary form, there is other organ involvement, which means an increased risk factor for the development of shoulder joint complaints (e.g. thyroid disease, Parkinson's disease). The secondary form is created in case of immobilization due to shoulder injury or

other pathology associated with shoulder pain (e.g. impingement, biceps tenosynovitis, sclerotic tendonitis).

The disease itself can be divided into three stages. The first is a period of “freezing”, which typically lasts for 2-9 months, and is mainly determined by pain (diffuse, severe) which often causes the patient to complain of lack of sleep and sensitivity.

The second is a period of “frozenness”, which lasts 4 to 12 months from the first symptoms. In this case, in addition to gradual pain reduction, significant progressive loss of movement (flexion, abduction, rotation and rotation) can be found in the tight, rigid shoulder joint. In the third phase, during the period of “melting” (5-26 months), in addition to cessation of pain, the return of movements is typical. Although the disease is self-reliable, complications resulting from inactivity may cause permanent or permanent damage, disability, and functional difficulties at the end of the entire healing period of 1-3 years. (Chan, 2017)

Glenohumeral instability is usually caused by congenital conditions (joint incongruence, ligament laxity, etc.) or traumatic injuries. The extent, nature, and lifestyle of the individual of stability deficiency basically determines the need to manage the involvement.

In **glenohumeral arthritis**, cartilage degeneration affects all joint components as the process progresses. It often appears in association with other diseases and creates functional limitations with increasing and sustained pain in the shoulder joint.

Scapular dyskinesis can be associated with any shoulder joint problem. In fact, it is a term used to describe the position and movement of the scapula and is not a musculoskeletal diagnosis. The significance of the glenohumeral joint angle may be therefore in the change of its movements, in the increased tension of the acromioclavicular joint, in the modification of the size of the subacromial space, and in the activation abnormality of the shoulder muscles. Its development can be influenced by a number of factors, such as thoracic kyphosis, shortened thoracic connection, AC joint involvements, glenohumeral joint lesions, cervical radiculopathy, etc. It is also influenced by tension and stiffness of the short head of the pectoralis minor and biceps. Periscapular muscle function typically changes in dyskinesis, so the anterior and trapezial muscles of the serratus rotating the blade outwards. Impingement syndrome, shoulder pain can also cause the movement of the scapula to change (posterior tilt, upward rotation), thereby forming dyskinesia. Similarly, prolonged scapula dyskinesia may reduce the strength of the rotator cuff, increase the impact symptoms, and increase the tension of the glenohumeral ligaments. (Kibler, 2013)

4.6 Risk factors

Each musculoskeletal region affects each other's function, so the pain in the neck and/or back previously developed increases the chances of shoulder pain. Shoulder pain is also influenced by psycho-social factors, as well as environmental factors such as work processes, leisure activities, sleep quality, etc. **(**Roe, 2013) There is no benefit to lying down on the shoulder by compression, but prolonged lying can also cause joint and nerve pressure: weakness, sensory disturbances and pain. (Zenian, 2010)

Repetitive work, especially in obsession, increases the chances of periarticular complaints. (Hopman, 2013)

Shoulder complaints can often be linked to lifestyle and workplace harms. Persistent static, repetitive movements, extreme path of motion movements all support the development of the shoulder pathomechanism. Other risks include prior injury, lifting heavy objects, working with a vibration device, working in cold or humid environments. (Liger, 2015)

Shoulder pains often appear as complications on the ground of certain diseases, such as inflammatory or other diseases (rheumatoid arthritis, gout, systemic lupus erythematosus, polymyalgia rheumatica, diabetes mellitus). Or shoulder complaints may be increased in certain conditions (stroke) or conditions. An example of the latter is sustained immobility. (Murphy, 2010)

4.7 The Examination

The effectiveness of a patient examination is an important consideration in shoulder pain. Physiotherapists play an important role in ensuring that treatment can be started as soon as possible. The first step is to obtain a thorough medical history and physical examination to identify, if possible, the disorder underlying the shoulder syndrome and to determine whether the treatment or other professional examination can be started within the professional competency limit. In other words, one of the main functions of the diagnosis is to identify whether the source of pain originates from the cervical spine, the glenohumeral joint, the periarthicular units, or a connection to the shoulder girdle. It may be difficult to detect real backgrounds that a problem in one region may help cause one or more of the other segments to become asymptomatic (e.g., effects of the shoulder or cervical or thoracic spine on the shoulder joint, or in case of shoulder joint pain, excessive pain in the shoulder belt or elbow joint area due to compensation). When complaints are reduced, the original cause may appear. Cause and causality are also essential to determine treatment goals and methods as quickly and accurately as possible. Delayed initiation of therapy or inappropriate selection will clearly result in worse results during rehabilitation. (Lowry, 2023)

A method of assessment of shoulder pain symptom complexes and guidelines to support the decision on the patient's future life course are available, but the decision must always be individualised in the context of the individual and the environment.

The design and results of the study are also determined by the scientific knowledge, preparedness and experience of the specialist, as there are very diverse study opportunities available. It's also worth remembering that the current state of the clinchers, their performance level of that day's mood, pervasive environmental factors, etc. They affect which may distort the results when measuring back. However, it is important to be as objective as possible in the patient study, so in the past decade, several research teams have tried to develop a more consistent evaluation strategy for physiotherapists, taking into account the results of the functional studies. (Ristori, 2018) Examples include: modified Delphi consensus approach (Eubank, 2021), the shoulder symptom modification procedure (SSMP) (Lewis, 2009), the staged approach for rehabilitation classification: shoulder disorders (STAR-shoulder) (McClure, 2015), and the Klintberg proposal (Klintberg, 2015), Algorithm for Clinical Reasoning (Santy, 2022)

The patient examination starts with the recording of the medical history. When obtaining medical history, it is important to record the patient's gender, age, activity, occupation, pre-existing medical conditions, present complaints, and information related to previous injuries, treatments, and other factors that may affect the symptoms developed. The latter is primarily aimed at identifying risk factors.

Regarding "red flags" and "yellow flags" phenomena. During the interview with the patient's, ask about the characteristics of the indicated pathologies: Red Flags.

What are the present symptoms and complaints? Where and when does pain occur? (pain at night: inflammation, tumour, hot area, redness, swelling - infection)

Has the patient had any accidents or injuries in the last few days? (acute injury: bruise, sprain, accident, haemorrhage, deformity, pain - dislocation = TRAUMA), no instability

A possible injury that causes weakness and pain, as this is exclusionary for physiotherapy treatment. Similarly, signs of inflammation (warm, redness, swelling) and connective tissue proliferation (tumour) require discontinuation of the patient examination, suggesting further medical examination. Radiant symptoms may also be caused by the heart, gastrointestinal complaints (MI - myocardial infarction - cold sweats, chest pain, dizziness, nausea; tension, muscle fever-like pain - compartment syndrome, thrombosis; side injury, panic disorder, etc.), and should be considered. Complaints from the neck section should also be excluded. For example, cervical spine involvements, neck nerve involvements (cervicobrachialgia, thoracic outlet syndrome), in addition to the medical history, physical examinations, e.g. special tests, may be performed. (Rees, 2021)

In the case of painful diseases, the issue of pain is always in focus. The division of shoulder pains can be accomplished through an anatomical structure - either tissue or a pathanatomic mindset based on causality analysis. However, this type of approach does not clearly define physiotherapy diagnosis and rehabilitation strategies, because due to differences in extent of involvement, comorbidities, personal characteristics of the client (quality of life) individual level evaluation is always necessary. (McClure, 2015)

The characteristics of pain affect the identification of the origin of the problem. Typical questions about shoulder pain are about the location of symptoms, duration, day part characteristics, nature, enhancing and mitigating factors. In case of severe pain occurring during moderate movements or even at rest, the number of feasible examinations becomes severely limited, making it difficult or impossible to make an accurate diagnosis.

Assistance with medical history questions may be obtained from several literature sources. Such as A revised Delphi approach to address the following as part of the core set of questions: Can you characterize your pain?

- When in your shoulder do you feel the most pain?
- How long have you been symptomatic (i.e. date)?
- Is the shoulder problem the result of an injury?
- Do you have any pain in your shoulder?
- Can you determine the pain?
- Where do you feel the pain the most?
- How long have you been feeling?
- What is your pain severity?
- Is there pain during specific activity?
- Is there presence of night pain?
- Is there pain at rest?
- Does anything aggravate the pain? If yes, specify.
- Does anything help to relieve the pain? If yes, specify. (Eubank, 2021)

Pain intensity is usually determined using a visual analogue scale. Its nature is more circumscribed (e.g., rip, sharp, dull, pull). Of course, these answers, along with the information we get from other questions, will be really useful. It is worthwhile to carefully investigate complaints with several questions, as the causes of shoulder complaints often manifest in similar symptoms, and their functional picture is often not consistent with the clinical picture (a slight deviation may cause an explicit complaint and vice versa). It may be useful to use condition-specific scales or functional focus questionnaires for thorough investigation. (Roe, 2013)

Questionnaires and functional scales specifically for use in shoulder problems are specific questionnaires that specifically assess pain characteristics and functionality. They do not mostly require a physical examination; asking the patient will determine the level of difficulty, limitation, and pain based on their subjective judgment. However, there is also a combined form that, in addition to asking questions, attempts to further investigate the circumstances and impact of the complaint from a strength and range of motion perspective. This multi-item metric form also requires the recording of measurement parameters by a professional.

Examples of these questionnaires, scales, which may be used for shoulder complaints include:

- Shoulder Pain and Disability Index (SPADI)
- Disabilities of the Arm, Shoulder and Hand (DASH)
- American Shoulder and Elbow Surgeons Score
- Constant-Murley Shoulder Outcome Score (CMS)
- Shoulder Disability Questionnaire (SDQ)
- Simple Shoulder Test (SST)
- Oxford Shoulder Score (OSS),
- Western Ontario Shoulder Instability Index (WOSI)
- Constant-Murley Shoulder Score (Constant)
- American Shoulder and Elbow Surgeons standardized form for assessment of the shoulder (ASES)
- University of California at Los Angeles Shoulder Rating Scale (UCLA)
- (for advanced instability: Western Ontario Shoulder Instability Index (Wosi), Walch-Duplay Score, Rowe Scores)

As previously described, there are a number of algorithms that help with the planning and process of the patient study and, more recently, the treatment. For example, the test sequence diagram created by Rees et al. makes it easier to decide whether to treat shoulder pain. As you can see in Picture 3, following the medical history, a physical examination can be performed to rule out the reasons necessary to identify non-shoulder areas or other cases requiring special treatment (red flags, acromioclavicular joint, cervical segment involvements).

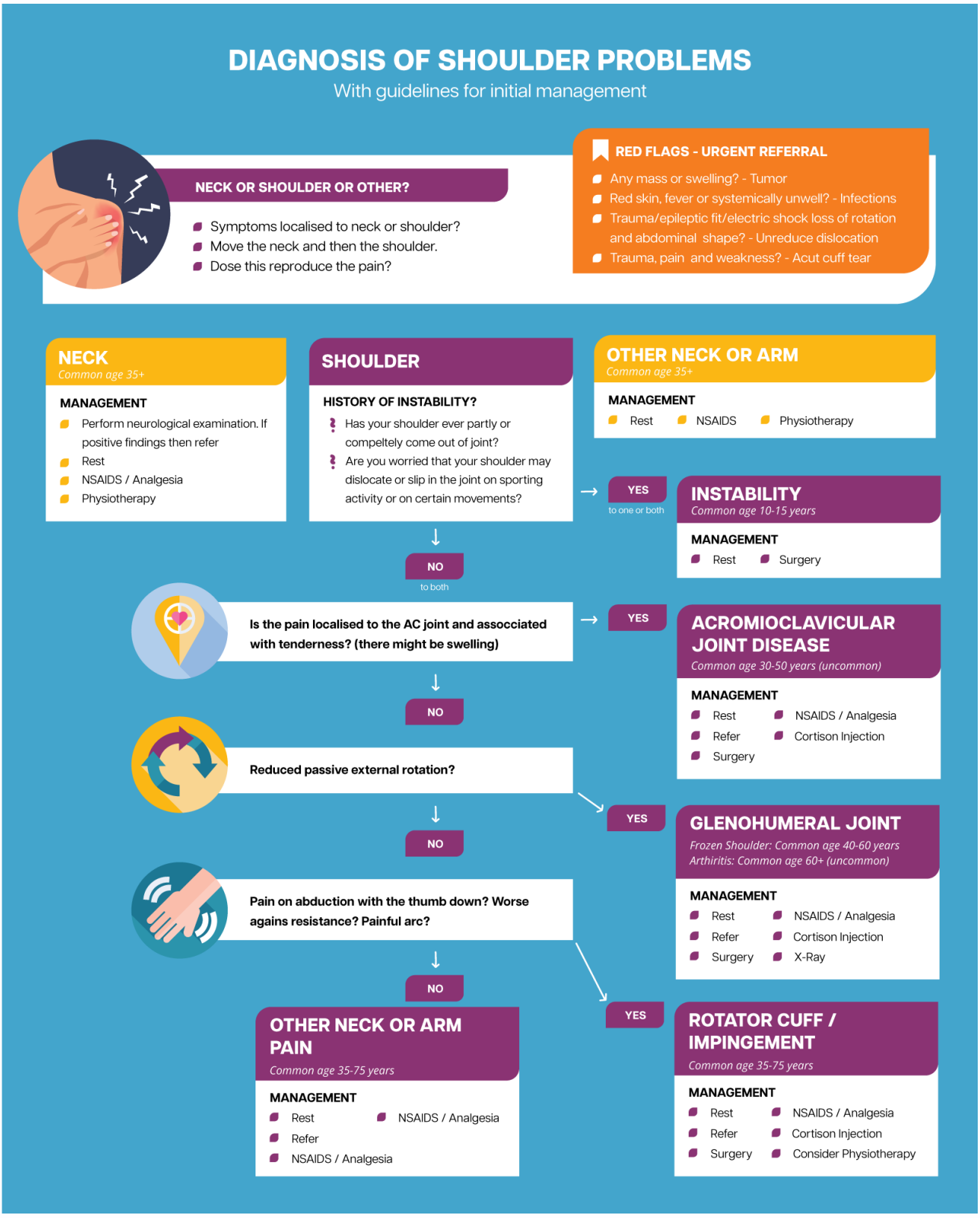


Figure 7 . Diagnosis of shoulder problems in primary care. Guidelines on treatment and referral. (Rees, 2021)

4.8 Physical examination

Using the conventional scan sequence, useful information about the symmetrical, normal, or different shapes of the client shoulder can be obtained from a single view. Deviations can be identified, such as asymmetrical shoulder support or upper limb support abnormalities, muscular atrophy, other disorders (redness, wound, scar, swelling, hemorrhage). For complete analysis, it is also important to view the posture and position of the shoulder belt from the front, back, and side. At the time of the patient's arrival, introduction, and medical history, the movement or absence of upper limb can be seen. In case of pain, the person tends to squeeze the upper arm (with the adductive support of the shoulder joint) due to the gentleness of the upper limb, so the expected synchronization does not occur during walking. Viewing is often done with touch. During viewing, examination of the shoulder belt and the cervical and thoracic spine is recommended, as they also affect the position of the shoulder joint, which affects the feasibility of movement. Keeping the head and neck in place by overloading the muscles between the shoulder belt and neck vertebrae can cause abnormal scapula position or disabling of the muscles that define this. The position of the scapula also affects the position of the shoulder joint as previously described. Because of these overloads, we often find painful muscle nodules (trigger points) resulting from postural defects, even in healthy individuals. Both bony and soft tissue structures can be palpated, which may be sensitive to pressure. (Eubank, 2021) When testing the sensitivity to pressure, it is also worth checking the supraspinatus and biceps brachii tendons, but also in other areas, such as the adhesion of the deltoid muscle or cervical muscles, the tenderness seen in many cases, but also in the area of the acromioclavicular joint can be provoked. (Yang, 2021)

In addition to the size of the postural characteristics and deviations, the measurements can be performed as well as the gonio- or inclinometer or centimeter tape tests of the range of motion. In this case, as seen during the viewing, it is worth specifying a comparison study of the two sides in cm as well.

During the inspection and palpation, the posture can be analysed in several planes, paying particular attention to the shoulder girdle area. This involves a comparative examination of the two sides, analysis of the line of gravity and the location of reference points. The Lennie test shows, in centimetres, whether the points defined on the thoracic spine coincide with the three reference points of the scapula. Physiologically, the superior angulus is palpated at the level of the second dorsal vertebra, the spina scapulae at the level of the fourth dorsal vertebra and the inferior angulus at the level of the eighth dorsal vertebra. Meanwhile, it is also checked that the distance of the marked points of the scapula from the spine is symmetrical with respect to the two sides. A deviation in the position of the scapula also implies a change in the position of the shoulder joint. (Sobush, 1996)

Because the cervical spine and shoulder belt affect the chin of the shoulder joint, determining their position may be an important consideration during the study. These can be determined or followed by measuring the distance of bony structures from the wall (for example, occiput or acromion) in the patient's usual standing position. You can also use apps that can be downloaded to your phone to check the position of your head, neck and shoulder. These tests

may be useful to objectively determine the position of the shoulder girdle and cervical spine, which will allow the effectiveness of the treatment to be monitored.

These phone applications are often free and allow more thorough measurements.

Simple and easy to use protractor. The app allows you to measure angles from images or from camera, in real time. With Angle Meter 360 an unlimited number of angles can be measured simultaneously. Adding new devices to an object or removing old items allows you to compare data from multiple angles at once. Scaling, moving the measured object, as well as the ability to change the colours of the tools, allows you to measure angles easily, quickly, very accurately.

Measurement of neck angles: two Pictures are taken of each participant according to defined criteria. To take the Pictures, the pendant pewter is fixed to the wall next to the chair and the mirror is placed opposite the participants at eye level. The subject is seated on the chair and then the points defining the planes are marked on them using marker dots: vertebra C7, the middle of the two eyebrows, the tragus and the tip of the acromion. The Picturegraphs are taken at a distance of 1.5 m from the participants, first in a neutral position (corrected position) and then also in a habitual position (relax, siting in usual position). The gravitational force acting on the pendant ensures the vertical orientation during the test. The perpendicular lines projected onto the vertical vector point to the right in the digital Picturegraphs and form the X-axis, the Y-axis being the vector provided by the pendant itself. The Pictures are evaluated using the Angle Meter program, first the auxiliary lines are drawn and then the CVA, HTA and SHA angles are measured as shown in the Picture.

- CVA: craniovertebral angle, the line drawn through the points of the tragus and C7 processus spinosus and the angle enclosed by the horizontal.
- HTA: head-tilt angle, the angle enclosed by the line joining the points of the tragus and labella and the vertical (y-axis) drawn on the tragus.
- SHA: angle characterising the position of the shoulder, the line joining the acromion and the spinosum of the C7 processus and the angle enclosed by the x-axis. (Ormos, 2010)

As well as clear shoulder joint and joint shoulder joint movements, the degree of scapula movement can also be examined. In the meantime, it is important to monitor and correct the quality of movement to avoid compensation. It is the responsibility of the examiner to position the examiner properly and perform the requested task as expected for accurate data and repeatability. At the end of the passive range of motion, the implementation of a pressure-controlled end-state sensation may be important for further examinations and treatments. For example, a hard bony or capsular state of end may call attention to the need for additional scans.

The information about pain that disappears, increases or decreases during movements also

helps to make the diagnostic evaluation as accurate as possible. This can often be read from the patient's gestures and physical reactions, but questions can also be asked to find out about the nature and strength of the pain.

The most accurate method of measuring muscle strength is instrumental, machine measurements, but if these are not available, conventional muscle strength measurement (Medical Research Council Muscle Grading System) is recommended. In addition, functional or special tests can be performed to determine whether the level of muscle function is appropriate (for example: wall push-up test - anterior serratus m). This can often be obtained in tests that do not have the main purpose of measuring muscle strength, but require proper muscle effort to perform the test (for example: Jobe test-m. supraspinatus)

When carrying out special tests, the patient's pain level should be taken into account, as these tests often increase it. It is not the purpose of the study or the treatments to induce intolerable, large pain.

4.9 Special tests

These tests will help further clarify the origin of the pain. Unfortunately, there is no test to clearly determine the source of the problem, but you can confirm what has been thought up to this point in previous studies.

For the following examinations, the patient needs to be aware that pain may be induced during the examination and that pain may sometimes be provoked to identify the underlying cause(s).

Special tests may be performed to rule out problems of cervical spine origin. (Jones, 2023)

Spurling test - for radiculopathy testing

The purpose of further examinations is to rule out the origin of the cervical spine.

Spurling test - to examine radiculopathy

Standing behind the seated patient, the treating physician moves the head into extension, lateral bending, and contralateral rotation, and then applies axial pressure to the cervical spine. The goal is to create cervical nerve root compression.

The test is positive when symptoms appear:

- occurrence of local pain, e.g. arthritis, degenerative processes
- radiating pain in the direction of the upper limb, e.g. nerve root involvement

Other provocative tests for the cervical spine:

Shoulder abduction (relief) test – the patient places the side arm of the radiating symptoms on their head. If this causes a reduction in nerve symptoms, the test is considered positive.

Cervical distraction test - when the patient is in the correct position in a sitting position, the examiner will hug the head under the chin and at the back of the neck. Then, distraction removal force is applied. The test is positive if the symptoms are reduced. (This can also be combined with a compression test. If compression increases, dstraction reduces symptoms, even more likely spinal nerve involvement.)

Additional tests may be performed, such as Arm squeeze Body Nerve Stretch Tests

L'hermitte sign: When the patient is seated, the examiner passively flexes the patient's cervical spine. A positive test result is a sensation of electric shock in the spine or extremities. In many diseases, positivity may occur, but is predominantly in neurological diseases, such as multiple Sclerosis. (Khare, 2015)

Hoffman sign: A test can be performed in case of spinal cord abuse (degenerative myelopathy), in which the examiner taps the distal wall of the middle finger on the patient's hand (passive downward movement). Positive test if flexion-aduction of thumb and index finger of the same side is achieved in response. (Johnes 2023)

Examples of tests that may be performed in case of suspected **thoracic outlet syndrome** include: Adson, Wright, Eden, Roos, etc.

Shoulder instability tests:

Load and shift test: A test performed while the patient is lying down or sitting, in which the examiner stabilizes the scapula with his/her close hand while with the other hand, he/she will hold the proximal part of the upper arm (finger on humeral head, front), the patient relaxes his/her muscles. The examiner then shifts anteromedial (anterior stability) and posterolateral (posterior instability). The normal anterior motion should not be greater than half of the humeral head.

Anterior drawer test:

The patient is lying on her back, the examiner encapsulates the patient's arm, stabilizing the scapula entirely proximally with her other hand (finger I on the coraoid process, others looking back). From here, the patient moves the relaxed arm to an abduction of 80-120°, 20° flexion, and 30° rotation, and then moves forward. Positive for high displacement of the other shoulder joint (about a quarter of the head).

Posterior drawer test:

The patient is lying on her back, the examiner circles the patient's arm all the way proximally and stabilizes the scapula with her other hand (finger I on the coraoid process, others looking

back). The examiner moves the shoulder joint into 90° flexion with the patient's elbow flexed and relaxing muscles. Axial pressure is then applied from the patient's elbow in the posterior direction. Positive for high displacement.

Inferior instability, Sulcus sign:

The patient is in a sitting position with an arm next to her body with an elbow flexion of approximately 90°. The examiner pulls the humerus in the inferior direction by covering the patient's upper arm distally. The test should be performed with a neutral, then outwardly rotated arm. Positive test if fissure appears in subacromial region.

(Valencia, 2017) (Eshoj, 2018)

Tests of shoulder structures

The cross-body adduction test (scarf test)

This is also the very simple test. With the patient in the sitting position, the examiner moves the arm in 90° of forward flexion and was adducted across the body. The test was considered to be positive if it caused pain in the shoulder, pain may occur in the AC joint (possibly the SC joint).

Painful arch body

In the standing position, the patient performs an abduction movement of the upper limb throughout the full range of motion. The patient's complaints can identify the involvement: pain between 150-180° indicates involvement of the acromioclavicular joint, while pain between 60-120° indicates involvement of the glenohumeral joint (e.g. impingement syndrome).

The test can also help to identify other characteristics: it shows muscle strength - 3 on Oxford scale (0-5)

Apley scratch test

The test is a quick range-of-motion test that can provide information on pain and ejection difficulties. The patient attempts to touch the opposite scapula in two steps to test shoulder range of motion.

1-During abduction and external rotation testing, the patient tries to touch the opposite scapula from above.

2-During adduction and internal rotation testing, the patient tries to touch the opposite scapula from below.

If not one or both attempts are unsuccessful, a more thorough examination of shoulder-shoulder girdle mobility may be necessary.

In case of pain, further detailed examination of the shoulder joint is recommended (e.g. impingement, rotator cuff involvement). (Batool, 2016)

Modified Apley test: the previous test can be done with both arms at the same time. In such cases, the vertical distance between the two arms can be measured by bringing the fingers closer to the other, which can be an objective measure of the improvement during the treatment. With normal shoulder mobility, the fingertips reach each other.

Hawkins Kennedy Test | Shoulder Impingement

The examiner sets the patient's arm in 90 degrees of shoulder joint flexion, the elbow is also in a 90 degree flexion position and from there (with or without supporting the upper arm), and internally rotates the shoulder joint. The test is positive if there is pain during the test.

Infraspinatus test

During the infraspinatus test, the elbow is also included at 90° and the upper arm is locked next to the trunk. The examiner then asks the client to hold the arm against resistance and applies inward rotational pressure to the forearm. The test is positive if there is pain or weakness during the test.

Jobe / Empty Can Test | Subacromial Pain Syndrome (SAPS)

The patient is tested at 90° elevation in the scapula plane and full internal rotation (empty can) or 45°external rotation (full can). Patient resists downward pressure exerted by examiner at patients elbow or wrist. The test is positive if there is pain or weakness during the test.

Scapular retraction test

The examiner's forearm rests on the border of the patient's scapula (at its medial edge), fixing it to the chest. Maintaining this case, the empty can test is performed. The test is positive if the strength of the rotator cuff is restored. (Kibler, 2006)

Shoulder dyskinesis / Scapular Assistance Test (SAT)

This test indicates weakness of the scapula stabilizers. To perform the test, the patient is in a standing position, the examiner is behind an increment and fixes the clavicle and scapula with one hand, while the other hand grasps the lower angle of the scapula. The patient’s phone raises the arm forward or to the side while the examiner supports the movement of the scapula.

The SAT test is positive if the patient feels less pain with the assisted empty can than with the unassisted empty can. (Rabin, 2006)

Lateral scapula slide test

During the examination, the degree of asymmetry between the two shoulder blades is measured during the patient's active shoulder movements, at the height of the inferior angle (performed up to the spinous processes of the dorsal vertebrae, on the same horizontal plane). Position 1 with the shoulder in a neutral position, then the humerus is medially rotated and abducted to 45 degrees by placing the patient's hands around the waist, and the humerus is placed in maximum medial rotation and abducted to 90 degrees.
The test is positive if there is a difference of 1.5 cm or more when comparing the measurements bilaterally. (Curtis, 2006)

Closed kinetic chain upper extremity stability test

Closed kinetic chain upper extremity stability test During this test, the athletes performed the modified PU position (with knee support), and both hands placed on two adhesive tape markers to the ground at a distance of 91.4 cm. The athlete remained in the modified PU position with one hand on each piece of tape. Then, for 15 s, the athletes alternatively touched the opposite hand. The hand touch count is the score for this test. The athletes completed as many repetitions as possible during 3 sets and rested 45 s between sets. examiner controlled the stopwatch, and the other the touch counts. Then the examined person indicates how much pain it feel in their shoulder joint on the Numerical Rating Scale (NRS). (Tucci, 2014)

Additional muscle tests may be performed, such as:

- Suscapular test: Lift off test, Passive lift off test, Belly-press test, Belly off sign, Bear hug test
- External rotators: External Rotation Lag Sign (Full Thickness Rotator Cuff Tears), Hornblower's sign
- Supraspinate tests, impingement: Neer's test, Full can test, Whipple body test
- Biceps: Speed's test, Yergason's test, Bicipital groove tenderness, Uppercut test

(Jain, 2017)(Ackmann, 2021)

Additional stability tests may be performed, such as:

- Anterior instability: Apprehension test, Shoulder release (surprise) body, Relocation test
- Posterior instability: Posterior apprehension test, Jerk test, Kim test, Fukada test, Push-pull test
- Inferior instability: Inferior apprehension test, Gagey test (hyperabduction test),

(Goldenberg, 2020)

Additional tests:

- Labrum involvement: O'Brien test, Anterior slide test, Crank test
- AC joint: AC resisted extension test, O'Brien test

(King, 2014)

If necessary, additional examinations may be performed to detect the suspected problem, for example: neurological tests (sensory examination, nerve stretch tests), circulatory examination.

4.10 Treatment

The treatment decision is mostly made based on the nature of the tissue damage detected, the characteristics of the pain and the degree of functional impairment resulting from them. The basic purpose of treatment is to achieve painless and powerful full-motion movements of the shoulder joint, if possible. (Chan, 2017) By completing the study steps, it was already mentioned that a number of author groups recommended different organizing mindsets regarding the treatment goal based on the results and the principles and methods used in the implementation.

Considering the rating scale of the pain VAS, McClure used the results of the medical history and physical examination to form three groups. Categories are created based on tissue irritability reflecting the physical stress-tolerance of the tissue. The ability to tolerate stress is affected by the individual's physical condition and current level of inflammatory activity. Based on the classification, the extent of the intensity of the treatment can also be determined. One group is those with severe, severe pain (high values between 7-10) who have persistent pain at night or at rest, which also affects the range of motion. When measuring the range of motion (ROM), they are more active than passive. In their case, this high degree of limitation requires the use of minimal physical stress, reducing the activity level. Preferably, physiotherapy in a painless range is recommended, i.e., careful treatment with gradual progression is required. For the second group, pain is moderate, and range of motion is less affected. Moderate pain (values 4-6) occurs intermittently and a minor difference between the active and passive ROM is observed. In their case, mild to moderate intensity treatment can be used. Graduality is of course a concern here, but here, movements in the end range and excessive loading should be avoided. The third group displays low pain with little limitation (values 3 or below). A strong physical program can be given to them, avoiding underloading, striving for high levels of functionality and motor control development.

Treatment planning should take into account a number of factors, such as the patient's clinical condition, functional status, mental and cooperative abilities, capabilities, and other factors that determine treatment goals.

The extent to which outcomes are achieved is based on the joint teamwork of the practitioner and the person being treated, so this type of relationship should be characterised by adequate information and shared responsibility from the outset. The highest level of cooperation (coherence) influences the effectiveness and sustainability of outcomes, so the aim is to establish a partnership from the patient assessment onwards.

Of course, this responsibility comes with risk. Diagnosis is not always clear, many underlying causes may only surface later and misdiagnosis leads to inefficiency. The patient should be aware that the physiotherapist, however well trained, and however "often seen" the problem, cannot be relied upon to make safe predictions.

The ambiguous causal background often arises from simple interrelationships, generalising, affecting multiple segments and formulas (spinal segments, upper limb), triggering neurological effects (e.g. proprioceptor problems, antalgic movement fixation, chronic pain syndrome, fear of pain).

In addition, in the case of shoulder problems, the combined results of the clinical and functional examination can be well evaluated, providing guidance for setting treatment goals and determining the techniques to be used.

In order to start the examination, it is advisable to make use of the available guidelines, which, in simple or more complex form, include the pathologies that should be excluded, if possible, before starting treatment.

When determining treatment options, it is worth using the information obtained during the previous examination, and then regular attention should be given to the feedback and effectiveness to help determine if a good therapeutic course has been achieved.

Treatment should not be used to increase pain, but if moderate pain is present, it should resolve within 12 hours. The physiotherapy should be used to actively contribute to the patient, and to exercise independently. In addition to active/guided active exercises, passive methods such as manual techniques for mobilization may be used to reduce symptoms or causes.

Proper patient positioning and adjustment of the body position are essential for the tasks (both in the trunk and in the upper vesicle). This is useful to use a mirror during the period of body awareness. Without proper practice, erroneous patterns of movement will be followed through home practice. Strive to consciously eliminate compensating movements should also be taught to the patient. The sooner you start to pay attention to the quality of your movements, the easier it will be to apply the exact finish that initially made you harder and slower.

Initially, while pain is greater, it is recommended to perform unloaded situations or non-resistance analytic exercises. In cases of severe functional impairment, at this stage, the primary goal is to carefully increase pain relief and range of motion. In this case, positioning of the limb may be useful at rest. During exercises, shuttle exercises, table, wall slides can be used. (Crookes, 2023) May help increase the range of motion even with tasks performed on the auger system, hand-catched exercises, ribbed movements, etc. In a suitable room, a

suspension grid, CMP or subequal exercise can be performed. If the pain is extremely great, during the day, releasing the arm with a cloth or brace can help relax the muscles in the short term. In other cases, muscle strengthening in the existing range of motion can be started immediately, often with static exercises that require isometric muscle activity, reducing the need for a painful range of motion. For endocrinopathy, external support of concentric activity work and eccentric exercises may be beneficial. The effectiveness of progressive resistance exercises has been demonstrated in terms of pain relief and function improvement as opposed to passive methods (ultrasound, short wave, etc.). At the same time, the types and parameters of these types of applications vary greatly, so careful weighing and gradual combination is recommended. (Augusto, 2024) In some cases, the use of cooling (cryotherapy) may also be recommended to reduce pain and inflammation, or irritation after exercises, for a minimum of 10 minutes and a maximum of 30 minutes. (Hanchard, 2004)

Muscle strengthening not only aims to increase muscle mass and strength, but also to improve joint stability through motor learning, both in the scapula and shoulder joint. An important area of rehabilitation is functional movements, closed kinematic-chained exercises, and the performance of dynamic tasks. Other useful methods and exercises such as scapular stabilization, soft tissue and nerve mobility techniques, shoulder and neck manipulations may be added. (Ibrahim, 2022) During rehabilitation, it may also be important to manage the position of the girdle, the balance of the muscles surrounding the scapula, the movement of the scapula, to implement long-term plans, and to minimize recurrence. Scaping exercises can be beneficial as a motor control program, either separately or in conjunction with thinking in the kinematic chain. (Kibler, 2013) Although there is no clear evidence of its effect, in many cases manual correction of the scapula is routinely used in a targeted program for the reduction of shoulder symptoms. (Christiansen, 2017)

Complex therapy can be complemented by the use of hand-intensive exercises, as it appears that this has a beneficial effect on improvement of shoulder function through the neurological relationship. These types of practices facilitate the activation of rotator cuff members through optimized operation and joint protection. This is done by reducing the activation of the central anterior deltoid artery, which may improve the effectiveness of targeted rotator cuff muscular training. (AlAnazi, 2022)

The majority of cases of shoulder complaints improve with conservative treatments within 6 weeks. And within 12 weeks, we expect a pronounced improvement. Patients should learn good quality shoulder movements from the start of treatment, depending on the options available. However, this can only be expected from the client with painless or mild pain. Muscle pain and fatigue are acceptable to some extent. Quality movements are free from the compensatory movements of the trunk and shoulder belt. To do this, it is necessary to determine the optimum load level for the patient. Pain can be a sign of increased tissue stress, which can prolong rehabilitation time (inhibition of motor re-learning, maintenance of tissue irritation) and may also reduce patient motivation. Clients should be advised not to exercise excessively at home or to other endeavors during the day (carrying, lifting, etc.) as pain decreases, as these will also cause a drop in the results achieved. (Clintberg, 2015)

In the case of visually impaired individuals, it is especially important to improve the patient's coordination and proioception. In everyday life, the blinders should experience as many exteroceptive stimuli as possible, different textures and unstable surfaces. (Walicka-Cupry--2022) This may also be important for the proper functioning of the shoulder belt-shoulder joint, as unstable balance and worse feeling of position will also affect the position and use of this segment. Rehabilitation of blind persons may require the cooperation of several professionals. (Alotaibi, 2016)

Lifestyle advice should always be adapted to the current state. For example, unblocking the patient from carrying or leaning is necessary for an improving patient.

After complete rehabilitation, it is important to try to prevent recurrence, which involves thorough warming, including increasing the circulation of the shoulder, increasing the elasticity of the soft tissue, and increasing the efficiency of synchronized movements. Then, by applying the techniques and sequences learned, a regular exercise program, followed by a conduction combined with stretching techniques, can be provided with the opportunity to reduce shoulder problems. (Ankar, 2024)

4.11 Summary

So the aim of the assessment is always to decide whether we have the means and capacity to deal with the clients who come to us. This can be done through guided questions in the anamnesis, through physical examinations as deemed necessary following examination and palpation. Functional and specific tests can be of great help in this. Symptoms around the shoulder joint are often related to abnormal functioning of the shoulder girdle or abnormalities of the cervical and/or dorsal spine. It is up to the physiotherapist to decide which of the many tests to use and, in the case of a positive test, to confirm the test with further tests from a similar range. It is worth ruling out or just identifying a problem area and starting from there. This is often not easy, however, because there are no big, clear pointers. It should be remembered that tests should never look at a single structure, a wide scope and complexity is needed to get the right result. To summarise, let us now look again at what to look for in the decision-making process of a person with shoulder symptoms.

1. Ask about the present complaints, ask about any additional problems that may require the involvement of other professionals in terms of physiotherapy.

2. Examine and palpate the shoulder-shoulder-bone-neck complex, looking for abnormalities. Try to identify any deviations or asymmetry of the body parts in relation to the reference points. You can also use the application presented here.

3. Measure range of motion or lack thereof using conventional methods (goniometer, inclinometer), or, in case of minor deficits, using functional tests or special tests or during the performance of these tests (e.g. painful face test).

4. Carry out muscle strength testing using conventional methods e.g. British Medical Research Council (MRC) muscle grading or tests that provide information on muscle strength. E.g.: Dynamic Rotator Stability Test

5. Then, based on the results (information you have heard, seen, experienced), carry out the tests you think are necessary. Remember, a single test does not confirm a certain pathological background (specificity), but, taking into account the correlations, they provide a very good basis for a functional diagnosis.

6. Finally, it should be remembered that the relationship and interaction of each movement segment must also be taken into account. To this end, the examination of the shoulder girdle, the cervical and thoracic segments can and should be part of the examination of the shoulder joint. In the longer term, the results of treatment can only be maintained if quality movements are performed, based on good posture and dynamic stability. The latter includes stability provided by the muscles in both open and closed kinematic chain movements.

4.12 COMMUNICATION

In this part of the lesson, you will learn how to communicate with an adult patient with a sensory impairment, especially a blind adult, and what cultural rules should be followed in such a case.

What is a disability? What does it mean to have a disability?

The term "disability" is a complex and multifaceted concept. Despite various efforts, no universally accepted definition of disability has been created to date. The English word "handicap" and its Hungarian equivalents, the words "disabled" or "crippled", are no longer accepted as they are not in line with the contemporary understanding of disability. There may be differences in word usage preferences according to different groups of people with disabilities and also according to geographical areas. The individual wishes of people with disabilities must be respected as much as possible. (Ustun et al., 2003; Krahn et al., 2021)

The International Classification of Functioning, Disability and Health of the World Health Organization (WHO) considers disability not only as a "pathological health condition" or a "biological" disorder, but also takes social aspects into account. (United Nations Enable, 2006) The UN Convention on the Rights of Persons with Disabilities (2006) states that "disability is a changing concept, and that disability is the result of the interaction between persons with disabilities and attitudinal and environmental barriers, which prevent them from fully and effectively participating in society on an equal basis with others". (Leonardi et al., 2006) Disability is therefore a long-term physical, mental, psychosocial or sensory impairment that, together with many other limitations, may limit an individual's ability to participate fully, effectively and equally in society. (Mello et al., 2020)

The 1980 definition of the World Health Organisation (WHO, 2011/a) goes beyond disability as a collective term and distinguishes three concepts that differ in degree and content: impairment can be interpreted at the level of the body, as any abnormality or deficiency in the

physiological functioning of a person; disability or dysfunction manifests itself at the level of abilities, in a psychological context; and handicap appears at the social level, limiting and in some cases preventing the individual from fulfilling his or her everyday role, depending on age, gender, social and cultural factors. In this way, disability is the socialisation of impairment and disability. However, this interpretation still focused only on the disabled person: he/she can't walk, talk, he/she can't fit in, the handicap - as a kind of predestination - comes from him/her. Since the reformulation of the WHO interpretation of disability in 1997, it is no longer about the correlation of cause and effect, consequences moving along a line, a kind of predestined outcome, but - reflecting a significant change in attitude - about the interactions between impairment and social participation, which indicates precisely that the disadvantages resulting from impairment, its extent and perception (but also the deterioration of the condition) depend to a significant extent on social acceptance, the scope and opportunities provided by society. (Scotch, 1988, Leonardi et al., 2006; United Nations Enable, 2006, WHO, 2011/a, Beaudry, 2019, Krahn et al., 2021).

This interpretation states that the person with a disability is not at fault; disability is both personal (individual) and environmental (societal). Disability is therefore not just a fact, but a relationship and a value - it is the perspective of the latter that determines whether or not the phenomenon is interpreted as disability by a given society. We call this approach the 'social model of disability'. (Krahn et al, 2021)

Hungary was the second country in the world to ratify the UN Convention on the Rights of Persons with Disabilities and the first to join its optional protocol. According to WHO estimates, approximately 15% of the world's population, or more than one billion individuals, have some form of disability. Of these, only approximately 5% are congenital abnormalities. A survey conducted by the United Nations Development Program revealed that 80% of individuals with disabilities reside in developing countries. The World Bank estimates that 20% of the world's impoverished population lives with some form of disability. People with disabilities are often referred to as the world's largest minority, but in contrast to other minorities, this group is "open": any individual can join at any time due to an accident, illness or even aging. (WHO, 2011/b)

Visual impairment

A person is considered visually impaired if their visual functions (visual acuity, adaptation, contrast, colour vision, field of vision) and/or processing and interpretation skills (visual impairment in the perception of visual stimuli acquired as a result of brain damage) are impaired or absent. Visual impairment can be hereditary or acquired, organic or functional.

An individual is considered to be visually impaired if the visual performance, as measured with maximum correction in the right eye, is 0-30% of the normal vision and/or the visual field narrowing is 20° or more (WHO, 2011/b).

Visually impaired people are usually divided into three groups according to their existing vision: blind, partially sighted and visually impaired. In accordance with the conventional categorisation, those who are blind are those who have no residual vision. Those who are

partially sighted perceive light, see spots and possibly large objects, but their vision does not reach 0.1. Those who are visually impaired are those whose vision is 0.1 and 0.

However, the assessment of the visual function based on the value of vision is no longer considered authoritative, and this division is also problematic in many respects professionally. Nevertheless, since visually impaired individuals themselves frequently utilise these terms, it is undoubtedly prudent to be fully cognizant of these categorisations. (Brunner et al., 2009)

In a functional approach, a person is considered to be visually impaired if they are impaired in any of the following areas due to an eye disease or a disease of the central nervous system affecting visual functions:

1. Transportation orientation

2. Everyday life (self-care, housework, administration, etc.)

3. Information and communication (computer, reading and writing, etc.)

4. Psycho-social functioning (crisis resulting from visual impairment, difficulties in establishing relationships, isolation, deficiencies in social competence, etc.)

5. Conducting studies Career choice, employment

6. Use of vision and/or use of vision improvement devices

(Brunner et al., 2009; Vidonyiné, 2010)

The functional limitations of individuals with sensory impairments or blindness can present significant challenges to effective communication between physiotherapists and their patients. This chapter presents practical suggestions for overcoming the communication difficulties that are commonly encountered in this context. The objective is to instruct therapists on how to communicate with blind individuals in a confident and sensitive manner that is acceptable and comfortable for the patient, taking into account personality differences, from the initial encounter.

The psychological aspects of blindness

It is important to note that disability is not a disease; rather, it is the result of a congenital or acquired impairment or disease that may prevent a disabled person from participating in society. It is imperative that individuals with disabilities are afforded the same opportunities as their non-disabled counterparts, with equal respect and equal rights. Independence is a fundamental aspect of life that ensures that all individuals with disabilities have the opportunity to participate in society and assume an active role as citizens. It is a principle that excludes any form of discrimination or restriction in political, economic, social, cultural, civic, or any other field.

The process of accepting one's status

The process of accepting one's status is an essential aspect of the disability rights movement.

The condition of blindness does not define an individual. It is essential to gain an understanding of the individual behind the disability, rather than making assumptions based on their impairment. It is therefore imperative that we exercise caution to prevent the formation of stereotypes. The process of ascribing certain characteristics or motives to a group of people is referred to as stereotyping. Stereotyping is the process of ascribing similar characteristics to any individual belonging to a group, regardless of the actual diversity of the group members (Aronson & Aronson, 2018). In accordance with Aronson's definition, national stereotypes may be evoked when contemplating intercultural communication. However, this assertion is equally applicable to the formation of stereotypes pertaining to any other group. Allport provides illustrative examples that are both intriguing and pertinent. A blind person is so strongly defined by his fellow humans based on his blindness that his other characteristics are not even noticed at first glance. Despite the individual's extensive knowledge, dedication, and professional competence, they encounter significant challenges in securing employment due to the pervasive and limiting stereotype of blindness. (Allport, 2000) A blind person can experience a range of emotions, including happiness, sadness, equilibrium, and confusion. One must also consider the difficulties that the individual in question is currently facing. Perhaps the most crucial of these is the acceptance of one's condition. The most effective means of determining this acceptance is through the onset of visual impairment.

A person who is blind from birth or at an early age will experience a markedly different life trajectory. Their worldview, creative output, and conceptualisation of reality will be shaped by their blindness. Their cognitive and physical development will be influenced by their visual impairment. Their movements are distinct from those of their sighted peers, characterised by a stereotypical, "blind" style of movement. It is possible that individuals with visual impairments may experience difficulties in self-realisation and in carrying out their daily routines. The numerous specific situations that they encounter can cause psychological strain, which may result in a withdrawn, lonely, insecure personality. Alternatively, individuals with visual impairments may overestimate their abilities, which could lead to them becoming selfish and arrogant towards their environment. A child who is blinded at an early age is only affected by the consequences of his lack of vision. The lack of vision itself usually does not manifest itself, because the child has never seen and does not know what he has lost.

In contrast, the personality of a ***child or young adult who later becomes blind*** has already been formed. Therefore, there is less chance of a developmental disorder. In contrast, trauma has a more profound impact on the personality, as the entire life must be reevaluated, habits and daily routines must be changed. During adolescence, the loss of vision and the recognition of a disability can easily lead to a "crisis of blindness". The trauma of this condition can prompt a young person to rethink their life and habits, which must now be adapted to blindness. Furthermore, the individual may also disengage from their previous social circles, seeking out new social groups and affiliations. The trauma of blindness can also give rise to self-identity issues if the blind person is uncertain about how to navigate their new reality.

The loss of vision in adulthood represents a profound and negative event that fundamentally alters the frameworks within which individuals have communicated with the world until that point. The changed circumstances set new frameworks for the individual, both in terms of his communication with the world and others, and his relationship with his own body and identity. The pivotal question is whether these frameworks will be constraints or a challenging space of opportunity, whose rules and boundaries are revealed and filled with new skills and attitudes, and the world immediately becomes livable and homely again. (Karlsson, 1996; Keenan et al., 2014; Jessup et al., 2018; Ingram et al., 2019; Földiné, 2020.)

Work with a blind person

The objective of this lesson is to familiarise the learner with the techniques required to work as a physiotherapist with an adult, disabled patient. In particular, the lesson will examine the communication techniques that should be employed when examining and treating a blind person.

The specific elements of the lesson that appear in the videos are as follows:

- An analysis of how personality affects the experience of disability and how this affects and determines the work of a physiotherapist. (Video 1.)
- How to greet and accompany a blind person. (Video 2.)
- How to avoid well-intentioned but ineffective or inappropriate elements of communication. (Video 3)
- How to help a blind person communicate their complaints properly.
- What effective and simple communication techniques can help you communicate with the blind. (Video 4.)
- What to do if the blind person has a companion (person or dog). (Video 2.)

General rules of communication

It is also important to note that the basic rules of verbal and non-verbal communication, as well as their consistency and congruence, are essential when communicating with a blind person. ***It is crucial to express our attention and openness to the patient not only verbally, but also non-verbally, even if he does not see us.***

- Face-to-face interaction, although not necessarily complete.
- Open posture, with limbs uncrossed if possible.
- Facial expression of interest and engagement.

- Direct eye contact (!!!)
- Relaxed, stress-free posture.

(Please, Pease, 2017; Rogers, 1951)

The images below illustrate the active and empathic communication and its elements, as exemplified by Carl Rogers, an American psychologist and the creator of the person-centred approach. (Picture 4)

Picture 4. Communication that is open, attentive and accepting.

Special rules for communication with a blind person

It is important to note that although blind individuals may exhibit considerable variation in their abilities and preferences, there are general and specific recommendations for communication that a practicing physiotherapist should consider. (Pilling, 2020.)

General recommendations:

- Communication with blind individuals is often challenging, and their examination or treatment may require more time than usual.

- It is crucial to avoid preconceived notions about how communication with blind individuals will unfold. Individuals with similar disabilities may utilize distinct forms of communication more effectively. It is imperative to adapt to the individual in question.

- It is a common misconception that a person who is blind is also hard of hearing. In reality, the volume of speech is not an issue.

- Furthermore, it is crucial to ascertain whether the individual in question requires assistance before offering it. Many individuals with disabilities are adept at utilising their abilities to overcome obstacles. If the patient accepts the offered assistance, it is advisable to enquire as to the most appropriate method of providing help. The patient is likely to be best placed to judge this, given their intimate knowledge of their own abilities.

- In the case of a disabled person being accompanied by a relative, it is important for the physiotherapist to be careful with whom they communicate. As a specialist, it is their responsibility to prioritise contact with the patient, so address questions and requests to them. The patient should only engage in conversation with their companion about matters that they specifically wish to discuss. (Due to the instinctive acceptance of eye contact, the sighted specialist usually talks to the sighted attendant and informs him of the things he should inform his blind patient about. It is advisable to avoid this, so the attendant should really only be present as a helper, while the visually impaired – especially if he is an adult – as an equal to be handled.)

- It is not necessary to be embarrassed when using certain words. It is not uncommon for individuals to be hesitant to utter the word "see" in the presence of blind individuals. This is an unnecessary concern. When saying goodbye, it is acceptable to say, "see you later."

- As previously mentioned, it is crucial to express attention and openness to the patient, both verbally and non-verbally, even if the patient is unable to see.

- It is important to remember to turn towards the blind person when talking, as the direction of the voice is precisely perceived by your blind companion, including the fact that you are speaking to him. (Pilling, 2020.) (Picture 5)

Picture 5. Turn towards the blind person when talking

The most basic, special recommendations:

- If you want to contact a blind person, call them by name, if you don't know them, touch their shoulder or forearm so that they know that you are asking them, calling them. Let's introduce yourselves and then tell him/her what you want to discuss.
- If he/she comes to us as a patient, we can also shake hands when introducing yourself (this is a basic custom in Hungary). We say our names in preparation for a handshake. If he/she responds by extending his/her hand for a handshake, we can hold it and shake hands with him/her. We can also offer our hands, but we must indicate this verbally ("I offer you my hand")! Do not grab the hand hanging next to the patient's body without saying a word!
- If we want to help him/her, for example, to get somewhere, first of all, we ask him if he wants help. Let's also accept rejection - there are people who want to act independently. When helping the movement, place the blind person's palm on one of our forearms or offer our elbow so that he/she can put his arm around us, or gently hold the patient's elbow. If he/she drives with a white stick, always stand on the other side! Let's be one step ahead of the visually impaired! While walking, we verbally indicate upcoming obstacles, such as stairs. When passing through a door or a similar narrow place, it is most appropriate for the driver to lead the blind person one step behind him/her. In this case, the driver receives appropriate feedback about possible obstacles that may arise in front of him/her. (Picture 6)

Picture 6. Helping them to move

- The white cane is a valuable aid for the visually impaired individual and a clear indication to those around them. The white cane provides both tactile and acoustic signals to blind people, the perception of these signals, the analysis of the acquired information and the quick and adequate response to them make up the assistance to the blind person using the white cane in a complex way.

- Prior to seating, it is essential to ascertain the precise characteristics of the seat in question. This includes whether it possesses a backrest, armrests, wheels, and whether it is situated in front of a table. In the event that the chair is equipped with a backrest, the hand of the blind patient is placed on the chair's backrest, from which he can ascertain the dimensions and shape of the chair or other seating and subsequently sit down. (Picture 7)

Picture 7. The hand of the blind patient is placed on the chair's backrest

- Verbal instructions can be employed to assist patients in navigating their environment. These instructions can be provided in the form of a verbal map, which describes the location of specific points of interest and the route to reach them. In this manner, we compare the new information to a previously known point of reference, such as "the bathroom is to the left of the door." Alternatively, we can illustrate the directions with the face of a clock, with the patient looking in the direction of 12:00. For instance, the bathroom is located at the 5 o'clock position, while the examination bed is situated at the 7 o'clock position. Indicative words (e.g., "there," "here," "there," etc.) are to be avoided.

- For a blind individual, it is of paramount importance that the physiotherapist verbally communicates their actions and intentions. For instance, upon the physiotherapist's arrival, it is advisable to inform the patient of their presence. Should you wish to leave the room, it is advisable to inform the patient of your intention in advance. It is similarly vital to be informed of the procedure to be followed prior to the commencement of any examination or intervention.

- It is important to note that the blind individual must always respond verbally. A smile or a nod are meaningless to the blind individual.

- In the event that a device is to be provided to a blind patient, it is first indicated verbally, for example, "I'm handing you the ball." In addition, the device can be gently touched to the patient's body, for instance, the ball can be placed on the chest or abdomen. It is of paramount importance to observe the movements of the other person and to move in unison with them. (Picture 8)

Picture 8. Device can be gently touched to the patient's body

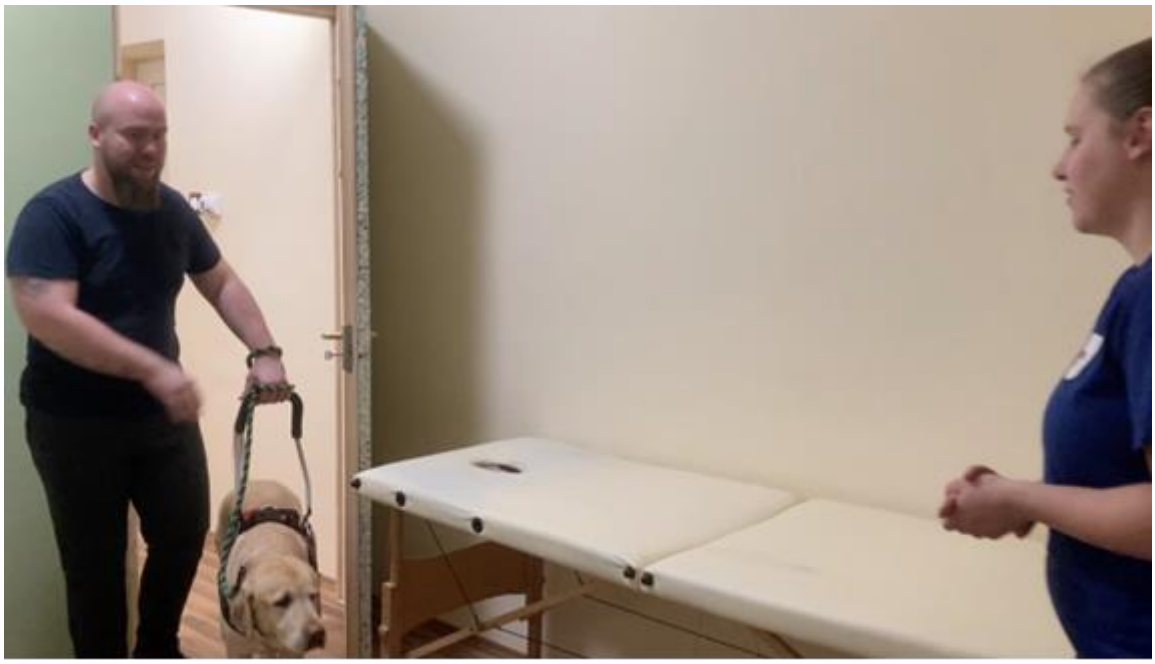
- If a blind patient regularly visits a healthcare facility for treatment over an extended period, it is possible to assist them by maintaining a consistent environmental arrangement. The order of events is of fundamental importance in the lives of visually impaired individuals. The following tenets must be observed: it is of the utmost importance that all belongings and objects are placed in their designated locations and remain there at all times. Furthermore, it is crucial that the doors are either fully open or fully closed. Where the blind person is moving, do not leave objects behind! Adherence to these regulations will enhance

the sense of security and reduce the vulnerability of the visually impaired individual, thereby facilitating independent living.

- In the event that a visually impaired individual is required to sign a document, it is advisable to ascertain the method employed. Some individuals utilize a signature frame, while others may request assistance in positioning the index finger of their non-writing hand in the appropriate location. Prior to the signing of any document, it is the responsibility of the health professional to inform the patient of the size of the document to be signed and the location of the signature.

- In the event that a visually impaired individual is accompanied by a guide dog, it is imperative that any interaction with the assistance dog be preceded by a request for permission. Petting, inviting, or feeding the assistance dog without first obtaining consent is not advised. Should one wish to accompany or lead a blind person on a walk with a dog, it is imperative that one does not run over the dog. Instead, it is advisable to stand on the opposite side. Should a blind person arrive at the examination room accompanied by a dog, we will accompany the blind person to a secluded location, such as a walled area, prior to the commencement of the examination. This will allow the dog to be placed in a quiet area for the duration of the examination.

(Pilling, 2020) (Picture 9)



Picture 9. Visually impaired individual is accompanied by a guide dog

A number of audio devices can assist the blind and partially sighted in their daily lives. One such device is a talking blood pressure monitor, which can help to improve the quality of life for those who are visually impaired. In the event that one requires tools for use with a blind individual, it is advisable to ascertain whether a specialised version exists.

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