

## Recommendations of the Polish Society of Physiotherapy, the Polish Society of Family Medicine and the College of Family Physicians in Poland in the field of physiotherapy of back pain syndromes in primary health care

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**Summary** The purpose of these guidelines is to attract attention to the need for systemic corrections in the existing health care model to become an effective tool for improving health. The intention of the authors is to present the assumptions of a new approach of physiotherapeutic treatment standards for patients with motor disorders in back pain syndromes: cervical, thoracic and lumbar-sacral, at the primary health care level. The current management provides care for this group of primary care patients mainly through pharmacotherapy and/or by referring them to an appropriate specialist outpatient clinic. In the latter situation, the waiting time from the appearance of pain to first contact with the physiotherapist in Poland is several months. In many patients, the symptoms of back pain are uncomplicated and require a few simple low-cost physiotherapeutic procedures (massage, simple physical therapy and kinesis therapy). In such cases, physiotherapeutic treatment should be based on the simple assessment of the patient's condition and planning therapy on this basis. This can be achieved by performing a functional examination and palpation assessment to determine which muscles and ligaments are responsible for pain. This evaluation provides a basis for establishing a physiotherapeutic strategy based on massage, physical therapy and kinesis therapy. In addition, simple instruction on self-massage, self-physiotherapy and self-kinesis therapy should be provided, as well as the need for orthotic supplies and other technical assistance ought to be considered. The potential effects of such a form of primary care activation include: increase of the possibility to have influence, using directed simple physical factors, on a particular motion system disorder by the patient himself/herself, support of the rehabilitation process performed by a physiotherapist in the primary care and specialist outpatient clinic setting and shaping conscious pro-health attitudes in primary care patients.

**Key words:** primary care physician, physiotherapy, back pain syndromes.

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## Background

Back pain is a very serious medical, social and economic problem that is particularly visible in primary care. Chronic pain is an especially serious social problem. Its varied level disturbs daily functioning, causes absenteeism at work, eliminates one from everyday activities, models behaviors, worsens physical fitness and leads to a loss of self-esteem [1]. Implementation of a model of treatment aimed at expanding the competencies of primary care physicians will improve the effects of treatment, increase patient satisfaction, improve functioning of specialist

clinics, decrease the need for onerous and extensive over-diagnosis and thereby reduce the cost of treatment. The authors of these guidelines underline the need for a “return to health care and clinical care” [2]. They perceive their task in this regard as active involvement in the process of care provided in the cooperation of primary care physicians and physiotherapists. Due to rapid diagnosis and access to treatment at the primary care level, this will significantly reduce the time spent waiting for a visit to a specialist rehabilitation clinic, minimize the number of sick leaves, decrease absenteeism at work and reduce direct and indirect medical costs. Rapid therapeutic intervention will



limit discomfort, restore function and improve the mobility of patients as early as at the primary care level. The authors of the guidelines recognize and support the principles of evidence-based medicine and, just like the authors of the cited publications, believe that no effective monotherapy is currently available due to the heterogeneous nature of back pain syndrome [3]. The authors are advocates of simple therapeutic strategies (kinesiotherapy, massage, physiotherapy, orthopedic supplies, technical aids, self-therapy, education) which, in addition to the activities performed by a physician and physiotherapist, will actively involve the patient in the process of treatment.

## Method

The experts of the Polish Society of Physiotherapy, Polish Society of Family Medicine and College of Family Physicians in Poland performed a detailed review of published evidence regarding the physiotherapy of back pain syndromes in primary health care including the diagnosis, treatment and prevention of back pain syndromes.

## Definitions

In order to develop a clear model of standards for treatment, back pain was divided into three syndromes. This division is commonly used in scientific literature.

### Cervical back pain syndrome

According to the International Association for the Study of Pain, this is neck pain in the area below the nuchal line and above the line marked by the transverse line running through the first spinous process of the thoracic spine and laterally through the sagittal plane adjacent to the lateral surface of the neck [4].

### Thoracic back pain syndrome

Pain experienced in the upper and middle back of the torso between the Th<sub>1</sub>–Th<sub>12</sub> vertebrae [5, 6].

### Lumbar-sacral back pain syndrome

Or low back pain (LBP), is pain syndrome located below the 12<sup>th</sup> rib and above the lower gluteal folds, associated with possible radiation to the lower limbs [7, 8].

## Epidemiology

In the general population, neck pain is a common symptom of the musculoskeletal system. It affects people of all ages, regardless of gender. In a given year, 12.1% to 71.5% of the entire population reports of this complaint. On the other hand, the occupational problem ranges from 27.1% to 47.8% [9, 10]. The incidence of thoracic pain is not precisely estimated. In the United States, 15% of the general population has asymptomatic disc herniation, while 100 per 100,000 examined people manifest clinical signs. Every year, there are about 260 thousand compression fractures in the course of osteoporosis. Scoliosis is diagnosed in 150 per 100,000 people. In the Swedish adult population aged 35–45 years, the annual incidence of musculoskeletal pain in the thoracic part is 15% of all cases [6]. The percentage of people aged 16–65 years is 34.8% of working adults. On the other hand, up to 84% of people experience lower back pain throughout life. This problem is more common in women; it increases with age, with the highest intensity in the seventh decade of life. Only 1–5% of the population also suffers from sciatic nerve pain. The highest possibility of an incident falls within the fifth decade of life, and it more often affects women [6, 11, 12].

## Clinical course

The first incident of pain most often occurs in the third and fourth decade of life, and lasts from a few days to four weeks.

Due to its character, it is defined as blunt or sharp, and because of its location, it is recognized as local or diffused [13]. Depending on the location and size of pathology within the structure, it may develop into chronic [14]. There is an acute and chronic phase. Many authors define chronic pain as lasting beyond the expected healing period or at least 3 months [15]. Based on the duration of the ailment, neck pain is divided into: acute (lasting less than 4 weeks), subacute (lasting from 1 to 3 months) and chronic (lasting more than 3 months) [16]. Chronic pain can affect the physical condition of patients and their ability to perform everyday activities. This, in turn, has a negative impact on the well-being of patients, leading to anxiety and depression. The lack of a clear definition of the disease often generates the adoption of negative strategies for coping with stress during an illness. A vicious cycle may appear very quickly, in which a decrease in physical activity results in a significant deterioration in the quality of life, with reduced physical activity [12].

## Etiopatogenesis

Scientific research studying the risk factors of back pain syndromes indicate their direct relationship with work-related musculoskeletal disorders (WMSD) [17]. The causes of musculoskeletal disorders include biomechanical, psycho-social and personal components. Biomechanical determinants typically involve the effects of hard, physical, repetitive work, improper posture, weight lifting, prolonged standing or sitting, which generates severe pain. The most common complaints concern the lumbar, lumbar-sacral and sacral-iliac areas and usually result from degenerative changes in the spine, including pathology within the intervertebral discs. At the cellular level, there is an imbalance between degradation and synthesis of the extracellular matrix. This, in turn, leads to progressive mechanical damage of the intervertebral discs. A general decrease in the number of cells and cellular response to deficiencies in delivery of nutritional substances leads to changes in proteoglycans, both in the cartilage and disc matrix elements. The loss of key water binding proteoglycans leads to dehydration of the nucleus pulposus, which can affect appropriate distribution and regeneration in response to mechanical loads. Degeneration leads to neovascularization, with the possible passage of the fibrous ring and then the nucleus pulposus into the degenerative phase. The pathological formation of nerve fibers and vessels is associated with mechanical back pain experienced by patients, with the disease affecting the intervertebral discs. At the same time, when the supply of nutrients around the disc increases, its volume decreases, accompanied by calcification and changes in disc circulation. This creates an unfavorable cellular environment, which poses a major challenge for the body to maintain cell viability and preserve regeneration [18]. This is followed by a weakening of the ligaments and greater susceptibility to injuries especially in the lumbosacral spine. Rare causes of the condition include infections, non-infectious inflammation, malignancies and metabolic diseases. The second type of pain is root pain, which is caused by compression, inflammation or ischemia within the nerve roots. It can also be caused by degenerative lesions, rheumatic diseases, metabolic diseases, malignancy and injuries [14]. The analysis covers psycho-social factors, such as the relationship between high demands in the working environment, lack of satisfaction, stress and the symptoms of the disease. On the other hand, personal factors are related to gender, smoking, high BMI, low physical activity and co-morbidity [17, 19].

Thus, the care of patients with motor system diseases of the spine will be holistic. The causes of the ailments are not homogeneous; they are multifactorial, from structural (articular), muscular-fascial, to psychogenic [19, 20]. For this reason, not all patients will benefit from the same form of therapy; therefore, it is reasonable to appropriately identify the cause of the disorder in order to establish an individual therapeutic pathway [12].

## Detailed information

### Cervical spine

Non-specific cervical pain may result from the irritation of numerous neck structures and originate from the tissues surrounding this region, such as muscles, joints, ligaments, intervertebral discs and nerve structures [21]. Compression of the nerve roots produces symptoms of radiculopathy, which is manifested by muscle weakness, paraesthesia, tendon reflex disorders and the loss of sensation and functional function of the limb. It has been shown that muscular imbalance (in the sternocleidomastoid, trapezius, levator scapulae, serratus anterior and pectoralis muscles) and abnormal movements may cause improper congruence of the articular surfaces. This can provoke pain, a secondary consequence of a primary imbalance in muscle tone [4]. Incorrect axial loading of the articular joints results in overloading of the intervertebral discs, followed by destruction of the intervertebral joints (the formation of osteophytes, increase of muscle tension, worsening of mobility, transfer of local ailments to peripheral areas – upper limbs, chest) [22]. Cervical anomalies may be of a mechanical origin and result from alignment of the neck; they can be caused by an abnormal anatomical structure (especially mastoid process and/or uncovertebral joints), incorrect articular and process-process mobility, as well as originate in the soft tissue condition. Causes of the ailments often include: non-ergonomic posture at work, stress, negative emotions, heavy lifting and significantly demanding physical work. It is emphasized that the incidence of cervical pain is probably related to the widespread use of electronic equipment (mobile phones, tablets, computers), especially in the younger population [21]. It is indicated that cervical pain is a problem with poorly diagnosed pathophysiology; therefore, it sometimes has an idiopathic background [9, 23].

### Thoracic spine

Being obese and living a sedentary lifestyle increases the risk of pain associated with other musculoskeletal disorders, including postural defects. Pain is also frequently seen in patients with compression fractures in the course of osteoporosis [5].

### Lumbar-sacral spine

As in the majority of cases where the cause of pain cannot be found, it is defined as non-specific and may involve radicular, pseudo-radicular, neurogenic or mixed pain [24]. Many specialists consider non-specific lower back pain as a separate disease [13]. On the other hand, the diagnosis of specific lower back pain is related to its immediate cause (e.g. post-traumatic, inflammatory, neoplastic, congenital defects, canal stenosis, spondylolisthesis, rheumatic or metabolic diseases) [14, 25].

## Diagnostics

Back pain can originate in many anatomical structures (nerve roots, muscles, fascias, joints, intervertebral discs and the abdominal cavity and thoracic organs). It is necessary to carry out a detailed subjective examination, taking into account the current condition and medical history of the patient. In addition, the clinical assessment should take into consideration the risk factors mentioned above. Pain can be a source of pathology outside the motor system; therefore, before treatment is initiated, detailed diagnostics should be performed to exclude, in particular, malignancies (all systems), urogenital diseases, abdominal aortic aneurysm, inflammatory conditions in the

abdominal cavity, pneumonia, pleuritis, gynecological diseases, such as endometriosis and painful menstruation, urological diseases, including prostatitis, osteoporosis, mental disorders, aggravation, malingering and dyssimulation. After taking the medical history, the clinician performs a neurological examination by checking mobility, muscle strength, limb circumferences, sensation and reflexes. The visual-analogical pain scale (VAS) is used to determine the degree of pain. The so-called 'red flags' include weight loss and fever without a known cause, immunosuppression, prior diagnosis of malignancy, intravenous use of drugs, chronic corticosteroid administration and osteoporosis in people over 70 years of age [14, 15].

## Further information

For the **cervical spine**, diagnostic procedures should be expanded by the evaluation of cervical mobility, shoulder joint testing, neuronal integrity assessment (long nerve tension tests), strength and length examinations, as well as compression and decompression tests of the cervical spine [16].

In the **thoracic spine**, the nature of the ailment is most often muscular rather than being caused by intervertebral disc herniation. Often, the direct cause is identified as a weakening of strength in the peri-spinal muscles or excessive deepening or flattening of thoracic kyphosis. Therefore, the assessment should primarily focus on mobility and the curvature of the thoracic spine [5, 6].

For the **lumbar-sacral spine**, we can additionally use an instrument applied in the primary care setting: STarT Back Screening Tool. The questionnaire consists of nine questions and allows for classification of patients into one of three groups based on the risk of lower back pain. As the results of imaging studies are considered by some authors to be poorly related to pain, clinicians should primarily take into consideration the symptoms, information collected in the medical history and assessment of the patient's functional status [12].

## Treatment

In acute pain, it is recommended to calm the patient down, educate him/her, encourage exercise without limitation and to apply pharmacotherapy. It is not advised to stay in bed (in selected cases, 1–2 days), and one should perform supervised therapeutic exercises. In chronic pain, more intensive physical therapy (e.g. high energy laser, shock wave or electrostimulation) is not indicated. It is recommended supervised motor therapy, behavioral therapy, massage aimed at normalizing the resting tension of the muscles and improvement of their trophics [26–34].

## Palpation assessment for physiotherapeutic needs

As the primary goal of physiotherapy in the primary care setting is to limit back pain caused by the increased tone of muscles, it is essential to identify which structures exhibit higher tension. This can be achieved through a simple palpation evaluation of compression sensitivity of the muscles and ligaments [35–37]. The sites of palpation evaluation in the cervical spine are shown in Table 1, in the lower thoracic part in Table 2 and in the lumbar-sacral segment in Table 3.

**Table 1. Palpation evaluation of the compression sensitivity of muscles and ligaments – cervical back pain syndrome [35–37]**

Muscles/ligaments/nerves	Place of evaluation	Comment
Serratus anterior Levator scapulae Romboid minor Supraspinatus muscles	upper right angle of the shoulder blade	here, the assessed muscles are attached
Longissimus cervicis levatores costarum I–V	transverse processes of the Th <sub>1-4</sub> thoracic vertebrae	in order to exclude irritation of the five upper intercostal nerves; an additional palpation assessment of the cartilaginous ribs I–V in the vicinity of the sternum (compression sensitivity at this site will indicate irritation of the intervertebral nerves and thus sensitivity of the five upper ribs and the attached muscles: serratus anterior, pectoralis minor and major, intercostal muscles)
Scalene muscles	transverse processes of the C <sub>3-6</sub> cervical vertebrae	possibility of irritation of the brachial plexus (passing between the scalene muscles), which could be manifested by sensation problems within the whole palm
Multifidus Suboccipital muscles Levator scapulae	transverse processes of the two first cervical vertebrae	a feeling of cracking in the atlantooccipital joints, the possibility of dizziness when bending forward due to irritation of the vertebral arteries

**Table 2. Palpation evaluation of the compression sensitivity of muscles and ligaments – thoracic back pain syndrome [35–37]**

Muscles/ligaments/nerves	Place of evaluation	Comment
Latissimus dorsi	lateral sides of the Th <sub>5-7</sub> spinous processes	in the case of compression sensitivity: check for coexistence of tenderness in the medial epicondyle of the humerus and dysfunction of the ulnar nerve (it pierces through the medical intermuscular septum of the arm pulled by the tendon of the latissimus dorsi)
Trapezius	ascending part – the triangular beginning of the shoulder blade, transverse part – the upper edge of the shoulder blade crest, descending part – the upper edge of the shoulder part of the clavicle	
Rhomboid major Interior part of the serratus anterior Infraspinatus muscles	medial edge of the shoulder blade	on the medial edge of the shoulder blade, these three muscles grow together
Iliocostalis Longissimus thoracis Levatores costarum VI–XII	transverse processes of the Th <sub>5-12</sub> vertebrae	in order to exclude irritation of the Th <sub>6-12</sub> intervertebral nerves; perform an additional palpation evaluation on the Th <sub>6-12</sub> cartilaginous ribs in the vicinity of the sternum

**Table 3. Palpation evaluation of the compression sensitivity of muscles and ligaments – lumbar-sacral back pain syndrome [35–37]**

Muscles/ligaments/nerves	Place of evaluation	Comment
Sacroterous ligament Erector spinae	lateral edge of the sacrum	in the case of compression sensitivity, muscle tension will be increased in the structures remaining in contact with the sacrotuberous ligament: erector spinae, gluteus maximus, biceps femoris, semitendinosus and semimembranosus, adductor magnus
Iliocostalis band of the loin (lateral part of the erector spinae)	upper posterior iliac spine	in the case of compression sensitivity, the final attachments to the angles of the lower ribs (six to nine) will also have increased sensitivity – difficult breathing – pain during deep exhalation
Piriformis Gluteus medius	posterior upper surface of the greater trochanter of the femur	possibility of upper and lower gluteal artery disorders, including sciatica
Adductor femoris	medial surface of the thigh (10 cm above the fissure of the knee joint)	increased tension in the adductor femoris, the probability of irritation of the obturator nerve by the external obturator muscle, through which the posterior branch of obturator nerve passes, or by iliopsoas, through which the lumbar plexus crosses, including the obturator nerve
Lumbar plexus	medial surface of the tibia	hypersensitivity at this site will be a symptom of irritation of the saphenous nerve, which is a part of the lumbar plexus
Quadratus lumborum	inner lip of the iliac bone in the paraspinal part	hypersensitivity at this site will indicate an increased tension of the quadratus lumborum and iliopsoas, as these two muscles fuse together on the inner lip of the iliac ala crest

## Physiotherapeutic strategy

Based on an evaluation of the patient's condition, including the palpation assessment (see Tables 1–3), we can determine the muscles and ligaments responsible for back pain. This evaluation is the basis for creating a physiotherapeutic strategy [38–40].

### Cervical back pain syndrome

1. Normalization of the resting tension in the following groups of muscles, which, in the palpation assessment, showed compression sensitivity:
  - a) longissimus cervicis, levatores costarum I–V,
  - b) serratus anterior, levator scapulae, rhomboid minor, supraspinatus muscles,
  - c) scalene muscles,
  - d) multifidus, suboccipital muscles.
2. Restoration of normal trophics within the descending part of the trapezius, the upper part of the serratus anterior, levator scapulae, rhomboid minor, supraspinatus, para-spinal (longissimus cervicis, levatores costarum I–V) and scalene muscles.
3. Suppression of atrophy, especially in the para-spinal muscles (longissimus cervicis, levatores costarum I–V and scalene muscles) – restoration of their structure and efficiency by stimulating the processes of angiogenesis and fibrogenesis.
4. Reeducation of correct movement patterns within the spine, especially at the border of the cervical and thoracic segments (rotational movements), through targeted exercises of different degrees of complexity, and in the shoulder girdle [41–47].

### Thoracic back pain syndrome

1. Normalization of the resting tension in the following structures:
  - a) muscles and fascias that remain structurally dependent on the latissimus dorsi,
  - b) muscles and fascias that remain structurally dependent on the trapezius,
  - c) muscles and fascias that remain structurally dependent on the rhomboid major and serratus anterior,
  - d) muscles and fascias that remain structurally dependent on the iliocostalis, longissimus thoracis and levatores costarum (VI–XII rib).
2. Restoration of normal trophics within the latissimus dorsi and trapezius – the ascending and transverse part, the rhomboid major and serratus anterior, and para-spinal muscles (longissimus thoracis and levatores costarum).
3. Suppressing atrophy, especially in the para-spinal muscles (longissimus thoracis and levatores costarum VI–XII) – restoring their structure and efficiency by stimulating the processes of angiogenesis and fibrogenesis.
4. Reeducation of normal movement patterns within the spine, especially at the boundary of the lumbar and thoracic spine (rotational movements) through targeted exercises of varying degrees of complexity [26, 27].

### Lumbar-sacral back pain syndrome

1. Normalization of the resting tension in the following structures:
  - a) muscles and fascias that remain structural in relation to the iliopsoas,
  - b) muscles that remain structurally dependent on the sacrotuberous ligament.
2. Restoration of normal trophics in the area of the buttocks, sacrotuberous ligament and sciatic nerve supplied by the following arteries: superior and inferior gluteal artery emerging from the piriformis (arterial blood supply and smooth outflow of venous and lymphatic blood), which will create conditions for normal regeneration in the sa-

crotauberous ligament, iliopsoas, hip joint acetabulum and sciatic nerve.

3. Suppressing atrophy in the sacrotuberous ligament, gluteus maximus and medius. as well as erector spinae; restoration of their structure and efficiency by stimulating the processes of angiogenesis and fibrogenesis.
4. Reeducation of correct motor patterns in the hip joints and spine through targeted exercises of varying degrees of complexity [48–50].

## Back pain syndromes – summary

During the first visit after qualifying patients for physiotherapy, the muscles responsible for pain should be evaluated by palpation. Having determined the severity of pain and the complexity of the motion system disorder, at this stage, massage, physiotherapy and kinesitherapy ought to be considered to alleviate pain. The duration of such visit should be 30–40 minutes. We then ought to provide simple instructions on self-massage, self-physiotherapy and self-kinesitherapy (maximally 2 activities), set up a diary to keep self-therapy records and arrange a follow-up appointment. The frequency of visits due to pain (depending on the severity of pain) does not need to exceed 1–2 times a week. The next visit should begin with the patient demonstrating the self-therapy activities he or she performs at home in order to improve their effectiveness [49, 51–54].

The introduction of self-therapy (to be performed by the patient himself/herself) not only aims to achieve normalization of the disturbed muscular tension caused by pain, it is also intended to improve and support the performance of muscles and connective tissue elements (fascia, ligaments, tendons, etc.). These effects are realized by stimulating angiogenesis, regeneration, reparation and adaptation. For this purpose, the patient should, daily or even twice a day, manipulate the shape of the indicated muscles, ligaments and tendons with simple massage techniques (kneading, rubbing). This leads to increased levels of growth factors, such as VEGF and FGF, which are responsible for stimulating angiogenesis and fibroblast activity. The implementation by the patient of these simple measures provides a lasting improvement in the blood supply of the massaged structures. It also improves the structure through collagen fiber replacement [55–58]. In addition, it is advisable to perform, after each such self-massage, a simple heat treatment (biotron lamp or hot water thermofoam), followed by 2–3 simple movement exercises that activate the structure (muscle, ligament, tendon) previously subjected to self-massage, thus avoiding a recurrence of pain in the future. The cost of this form of physiotherapy as self-therapy is limited to the single production of a film, instructional information and brochures concerning a particular motion system disorder and devoting, by a physician or physiotherapist, 5 minutes to instruct primary care patients. The introduction of a self-therapy diary aims to increase patient engagement. The potential effects of this form of activation of primary care include: increase of the possibility to have an influence on a particular motion system disorder by the patient himself/herself using directed simple physical factors, support of the rehabilitation process performed by a physiotherapist in the primary care or specialist outpatient clinic setting, as well as shaping conscious pro-health attitudes towards the motor system among primary care patients [59].

## Physical therapy

The role of physical stimulation procedures is related to the effect of analgesia, anti-inflammatory properties, muscle tone reduction and blood flow improvement. This increases the quality of life of patients, their independence and improves functioning. Some physiotherapeutic procedures can be performed at home, while others have to be outpatient. The emphasis should be placed on the education of patients on the need for regular-

Table 4. Physiotherapy in cervical back pain syndrome [4, 21, 22]

Muscles/ligaments/fascia	Self-massage	Massage	Self-physiotherapy	Physical therapy	Self-kinesitherapy	Kinesitherapy	Orthotic supplies
Longissimus cervicis, Levatores costarum I-V	rubbing in the area of the intermediate linea of the sacral bone at the site of the attachment of the lateral part of the longissimus cervicis and the inferior nuchal line of the occipital bone - the place of attachment of the longissimus cervicis	semitendinosus and semimembranosus, gluteus maximus, longissimus cervicis, levatores costarum I-V until compression tenderness on the cartilaginous ribs I-V resolves	poikilothermic compresses (warm or cold, depending on the state of the patient - acute, subacute or chronic, and on individual tolerance of thermal stimuli); the use of ointments or painkillers or NSAIDs after pre-warming of the application site; Biopton or ledotherapy lamps or IR; TENS currents with small battery devices - bath salts with mud extracts or special water-pearling inserts or even ozone will be an excellent addition as a preventative or self-therapeutic element; the use of a sauna or a bath can also be used as a preventative or therapeutic element; many patients have access to magnetic mattresses where they can sleep or perform treatments twice a day	using physiotherapeutic procedures for a given purpose (analgesia, improvement of trophics or decrease of muscle tone, increase of strength) - physiotherapist's choice after eliminating contraindications, taking into account the equipment available in the office (the same goal can be achieved with different treatments); the application can be directed at the cause or the site where pain radiates, or mixed technique; different groups of treatments (electrotherapy, light therapy, magnetic field, UD, electromagnetic field) can be combined to complement the action of the stimuli; the patient's position will be essential	home exercises (self-therapy); self-therapy (muscle tone normalization by simple techniques: TNM and TEM); postural reeducation	special exercises: deep stabilization of the cervical spine, foot and gait mechanics (optional insertions); exercises to improve alignment of the joints: pelvic alignment; postural reeducation (restoring proper head position, correcting posture habits); exercises strengthening and improving the strength of the upper stabilizers of the shoulder blade	stabilizing cervical orthosis, elastic (soft collar); cervical immobilizing fixed orthosis (stiff collar)
Serratus anterior, Levator scapulae, Romboid minor, Supraspinatus muscles	moving and rubbing of the thoracic-lumbar fascia, the central part of the deltoid	moving and rubbing of the thoracic-lumbar fascia, the central part of the deltoid, supraspinatus muscle, rhomboid and levator scapulae					
Scalene muscles, Multifidus, Suboccipital muscles	stroking and moving of the cervical fascia, rubbing within the lateral part of the inferior nuchal line of the occipital bone	gluteus maximus, biceps femoris, semitendinosus and semimembranosus, erector spinae, cervical fascia, scalene muscles					

TNM - neuromuscular techniques; TEM - muscle energy techniques; TENS - transcutaneous electrical nerve stimulation; IR - infrared radiation; UD - ultrasound.

Table 5. Physiotherapy in thoracic back pain syndrome [21, 88]						
Muscles/ligaments/ fascia	Self-massage	Massage	Self-physiotherapy	Physical therapy	Self-kinesitherapy	Kinesitherapy
Muscles and fascia that remain structurally dependent on the latissimus dorsi	thener, hypothenar, anterior group of the forearm, medial intermuscular septum of the arm, the lateral edge of the latissimus dorsi	gluteus maximus, thenar, hypothenar, anterior group of the forearm, medial intermuscular septum of the arm, latissimus dorsi	poikilothermic compresses (warm or cold, depending on the state of the patient – acute, subacute or chronic, and on individual tolerance of the thermal stimuli); the use of ointments or painkillers or NSAIDs after pre-warming of the application site; Biopton or ledotherapy lamps or IR; TENS currents with small battery devices – bath salts with mud extracts or special water-pearling inserts or even ozone will be an excellent addition as a preventive or self-therapeutic element; – the use of a sauna or a bath can also be used as a preventive or therapeutic element; – many patients have access to magnetic mattresses where they can sleep or perform treatments twice a day	using physiotherapeutic procedures for a given purpose (analgesia, improvement of trophics or decrease of muscle tone, increase of strength) – physiotherapist's choice after eliminating contraindications, taking into account the equipment available in the office (the same goal can be achieved with different treatments); the application can be directed at the cause or the site where pain radiates; or mixed technique, different groups of treatments (electrotherapy, light therapy, magnetic field, UD, electro-magnetic field) can be combined to complement the action of the stimuli; the treatment position will be essential	home exercises (self-therapy); self-therapy (muscle tone normalization by simple techniques: TNM and TEM); postural reeducation	soft tissue therapy including techniques: TEM, TNM, postural reeducation, breathing exercises, strengthening exercises and improving the strength of lower and upper blade stabilizers
Muscles and fascia that remain structurally dependent on the trapezius	deltoid	deltoid, trapezius – the ascending transverse part				
Muscles and fascia that remain structurally dependent on the rhomboid major and serratus anterior	thoracic-lumbar fascia	thoracic-lumbar fascia, rhomboid major, infraspinatus muscle and serratus anterior				
Muscles and fascia that remain structurally dependent on the iliocostalis, longissimus thoracis and levatores costarum (VI–XII)	gluteus maximus; iliocostalis muscle at the level of the lumbar part, rubbing in the region of the upper posterior iliac spine and the dorsal surface of the sacrum	gluteus maximus, biceps femoris, semitendinosus and semimembranosus, adductor magnus, erector spinae at the level of the chest, levatores costarum until compression tenderness on the cartilaginous ribs VI–XII resolves				

TNM – neuromuscular techniques; TEM – muscle energy techniques; TENS – transcutaneous electrical nerve stimulation; IR – infrared radiation; UD – ultrasound.

Table 6. Physiotherapy in lumbar-sacral back pain syndrome [22, 28-34]

Muscles/ligaments/ fascia	Self-massage	Massage	Self-physiotherapy	Physical therapy	Self-kinesitherapy	Kinesitherapy	Orthotic supplies
Thoracic-lumbar fascia: Gluteus medius, Quadratus lumborum, Piriformis, Iliopsoas	thoracic-lumbar fascia: gluteus medius, region of the greater trochanter, iliopsoas on the lesser trochanter	thoracic-lumbar fascia: gluteus medius, quadratus lumborum, piriformis, iliopsoas on the lesser trochanter	poikilothermic com- presses (warm or cold, depending on the state of the patient – acute, subacute or chronic, and on individual tolerance of thermal stimuli); the use of ointments or painkillers or NSAIDs after pre-warming of the application site, Biopton or ledotherapy lamps or IR; TENS currents with small battery devices – bath salts with mud extracts or special water-pearling inserts or even ozone will be an excellent addition as a preventative or self-therapeutic ele- ment; – the use of a sauna or a bath can also be used as a preventative or therapeutic ele- ment; – many patients have access to magnetic mattresses where they can sleep or perform treatments twice a day	using physiotherapeutic procedures for a given purpose (analgesia, improvement of trophics or decrease of muscle tone, increase of strength) – physiotherapist's choice after eliminat- ing contraindications, taking into account the equipment avail- able in the office (the same goal can be achieved with differ- ent treatments); the application can be directed at the cause or the site where pain radiates, or mixed technique; different groups of treatments (electro- therapy, light therapy, magnetic field, UD, electromagnetic field) can be combined to complement the ac- tion of the stimuli; the patient's position will be essential	home exercises (self- therapy); self-therapy (muscle tone normalization by simple techniques: TNM and TEM); postural reeducation; simple forms of physical activity in order to im- prove overall mobility and fitness.	a) manual therapy elements used to examine and treat functional disorders in the area of dysfunc- tional soft tissues (the use of joint trac- tion elements, soft tissue mobilization and elasticity). The overriding task is to compensate for muscle tone differences by using muscle energy (TEM) techniques to raise or lower the muscle tone, restore proper flexibility and correct the range of motion in the joints (e.g. PIR – poizometric muscle relaxation, RI – reciprocal inhibition stretching); b) the use of traction of the spine; c) other forms specific exercises such as deep stabiliza- tion of the lumbar- iliac-pelvic complex (neuromuscular reeducation)	lumbar-sacral stabiliz- ing flexible orthosis with partial relief (low corset); walking stick elbow crutches
Sacroteruberous ligament: Gluteus maximus, Biceps femoris, semi- tendinosus and semi- membranosus, Adductor magnus, Erector spinae	gluteus maximus, biceps femoris, semi- tendinosus and semi- membranosus, adductor magnus	sacroteruberous ligament: gluteus maximus, biceps femoris, semi- tendinosus and semi- membranosus, adductor magnus, erector spinae					

TNM – neuromuscular techniques; TEM – muscle energy techniques; TENS – transcutaneous electrical nerve stimulation; IR – infrared radiation; UD – ultrasound.



ity of treatment (the therapeutic effects of individual days of treatment will add up) and safety of the operation of an apparatus. Physiotherapeutic treatment can be a preparation for even more effective kinesitherapy and massage or a separate form of therapy, especially in patients struggling with pain [60, 61].

Electrotherapeutic procedures performed in primary care units that help achieve the goal and yet are simple and safe include: TENS currents, galvanization, iontophoresis, diadynamic currents, AMF currents [62–66]; light therapy: Sollux lamp, Bioptron, ledotherapy, laser [67–73]; thermotherapy: poikilothermic compresses (warm or cold, depending on needs) [74–76]; and others: ultrasound, magnetotherapy and magnetostimulation (e.g. viofor) [77–79].

### Kinesitherapy

Kinesitherapy treatments should include: exercise in stress relief, exercise in stress relief with resistance, isometric training, proprioception training, equivalent exercises, exercises using open and closed kinematic chains, encouraging recreational activities [80].

This should include simple forms of activity and therapeutic exercises in order to normalize muscle tone, restore normalization in terms of muscle flexibility, improve the range of motion and overall activity. The goal is to improve overall performance, balance and tolerance in one's day-to-day workload. The therapy also includes the use of methods, tools and measures at the basic level, preparation of therapeutic exercises that are easy to repeat and self-implement, placing an emphasis on patient co-responsibility for the therapy (involvement in self-therapy) and general rehabilitation [81].

### Massage

This should be used within the primary care setting for short-term actions – normalization of resting muscle tone and restoring the normal trophics of the fascia, muscles, ligaments, tendons, articular capsule; and in long-term actions – carried out by the patient himself/herself as self-massage – the inhibition of atrophy in the muscles, tendons, ligaments, fascia by induction of angiogenesis and intensification of the exchange of collagen fibers in the connective tissue forming the organs of the locomotor system mentioned above [55–58, 82–85].

### Orthotic supplies

One of the effective ways of counteracting mechanical overloading of the spine, under so-called primary and secondary prevention, is the appropriate choice of orthotic supplies,

such as corsets and collars – this kind of provision not only limits spine ailments, but is also necessary to relieve, stabilize and immobilize overloaded tissue structures, creating favorable conditions for the healing process. Some patients with these ailments should also use appropriately selected orthopedic inserts and technical aids [86–88].

A summary of physiotherapy elements used in back pain syndromes is presented in Tables 4–6.

## Conclusions

The main goal of physiotherapy in the primary care setting is to reach patients for whom this is the most often form of treatment and the so-called low risk group, including people with chronic diseases, especially the elderly (with locomotive organ diseases, civilization diseases) and school children (advice on posture defects). The proactive approach is aimed at increasing a patient's responsibility for the treatment of existing ailments and preventing their recurrence. The particular emphasis is placed on physioprophylaxis, i.e. forms of widely understood education, the availability of ready-made solutions and an understandable choice of physiotherapeutic activities that can be performed by the patient on his/her own at home, as well as the preparation of ready-to-use descriptions of exercises, self-massage, drawings, recordings and recommendations. Teaching the principles of ergonomics in everyday life and acquiring knowledge about protection against overloading in the performance of normal daily activities should be another important element. This will eliminate the risk factors of recurrence and develop useful motor strategies [17].

These actions should be focused on the following tasks:

- 1) normalization of the resting tone of the muscles and fascia (massage and poizometric muscle relaxation);
- 2) restoration of the normal trophics of motor system tissues and organs (correct arterial blood supply and efficient outflow of venous and lymphatic blood), which will create conditions for proper regenerative or reparative processes (in the case of tissue damage – past injury or inflammation);
- 3) suppressing atrophy of the muscles and connective tissue (ligaments, tendons, fascia) – restoring their structure and efficiency (massage, physical therapy, kinesitherapy);
- 4) reeducation of the correct motor patterns through targeted exercises of varying degrees of complexity (kinesitherapy) [89–93];
- 5) the use of appropriate orthotic supplies and technical assistance, depending on the needs.

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