“Adapted Physical Activity and Sports - Youths for Youths”

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APAS SWIMMING METHODOLOGY FOR PEOPLE WITH DISABILITIES

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FOREWORD

Swimming and exercising in water has numerous positive effects on psychophysical condition and health status. The beneficial effects are especially pronounced in people with disabilities, because in a certain number of them, swimming is the only independent physical activity. The swimming methodology for people with disabilities contains chapters that enable an overview of the basics of swimming and water exercises and methodological procedures that ensure the successful implementation of these activities with people with disabilities.

It is necessary to know the characteristics of disability and impairment in order to avoid contraindications and further disrupt the existing condition of the organism. In this regard, the first chapter explains the basic characteristics of certain (most common) forms of disability, as well as a chapter that provides practical advice and methodological recommendations in swimming training for people with disabilities.

The para swimming chapter allows coaches and swimming instructors, as well as those who want to become one, to acquire basic knowledge about para swimming and the process of classifying swimmers.

Methods of swimming and water exercise is a chapter that describes the methods used for swimming learning, especially people with severe disabilities, such as the Halliwick method, as well as water exercise programs Bad Ragaz Ring method and Watsu method. They enable the improvement of motor skills and health status of people with various forms of disability.

Modification of swimming techniques for people with disabilities is a chapter in which, through a description of typical mistakes and possible solutions, precise and concrete instructions are given for modifying body position, strokes and kicking in people with various forms of disability.

PATHOLOGY OF CERTAIN FORMS OF DISABILITY

In order to be able to successfully conduct swimming training or some other form of physical exercise for people with disabilities, it is necessary to know the basics of the disability itself. In that sense, the pathology will be explained, i.e. brief explanations shall be provided of cerebral palsy, spinal cord injuries (paraplegia and quadriplegia), amputations, muscular dystrophy, paralysis of the brachial plexus and visual impairment.

Cerebral palsy is a disorder of movement, position and motor function that occurs as a consequence of brain damage during its development. In relation to the dominant neurological signs, there are three forms of cerebral palsy: spastic, dyskinetic and ataxic. In relation to the number of extremities affected by cerebral palsy, there is a division into: paraplegia (mostly affected legs), quadriplegia (both arms and legs affected) and hemiplegia (mostly affected extremities on the same side of the body). The Gross motor function classification system (GMFCS) is also very important. It describes the functionality of children and young people with cerebral palsy, i.e. their gross motor function based on their ability to sit independently, walk and their mobility with the use of wheelchairs. The basic meanings of the GMFCS levels are as follows:

- Level I - Walks without limitations
- Level II - Walks with limitations
- Level III - Walks using a hand-held mobility device (canes, crutches)
- Level IV - Self-mobility with limitations; self-powered mobility
- Level V - Transported in a manual wheelchair

Amputations represent the loss of the whole limb (a leg or an arm) or some part of it. In relation to the time of origin, they can be: congenital and acquired. Congenital amputations occur due to anomalies that occur during fetal development (in the first three months of pregnancy). They lack a whole or a certain part of the extremity, or an anomaly in the extremity (morphological or structural alteration) may occur, which requires surgical amputation. Acquired amputations occur due to numerous factors, among which most often are diabetes, tumors, trauma, etc. Amputations are most often classified in relation to the level or height of the limb deficiency, the side of the body, as well as in relation to the function. According to International Sports Organisation for the disabled (ISOD) there are nine classes: A1 - Bilateral above the knee lower limb amputations, A2 - Unilateral above the knee lower limb amputations, A3 - Bilateral below the knee lower limb amputations, A4 - Unilateral below the knee lower limb amputations, A5 - Bilateral above the elbow upper limb amputations, A6 - Unilateral above the elbow upper limb amputations, A7 - Bilateral below the elbow upper limb amputations, A8 - Unilateral below the elbow upper limb amputations, A9 - Combination of amputations of the upper and lower limbs.

Spinal cord injuries (paraplegia and quadriplegia) occur due to spinal cord injury, which leads to loss of motor control and feelings below the level of impairment. The size of the paralysis caused by a spinal cord injury depends on the height of the injury and the size of the

nerve impairment. Paraplegia is a complete or partial amputation of the lower extremities. It most often occurs as a consequence of trauma, i.e. fracture or dislocation of the thoracic, lumbar or sacral vertebrae, as well as various congenital and acquired diseases. Quadriplegia represents complete or partial deprivation of all four extremities. It most often occurs as a consequence of trauma (fracture dislocation of one or more cervical vertebrae) and diseases or injuries of the CNS. Injuries are most often localized on the cervical vertebrae C6 or C7.

Muscular dystrophies are inherited progressive diseases that primarily affect skeletal muscles and lead to degeneration of muscle cells and the development of muscle weakness. There are a large number of muscular dystrophies that vary in relation to the clinical picture, the age at which the symptoms appear and in relation to the speed of pathological changes in the muscles. The two most common forms of muscular dystrophies are: Dischen's and Becker's. Dischen's muscular dystrophy occurs due to changes in skeletal muscles due to the lack of dystrophin protein, and is characterized by progressive weakness of skeletal muscles. The basis of the clinical picture is weakness in the proximal muscles of the lower extremities and pelvic girdle, then there is lumbar lordosis, limping gait and hypertrophy of the leg calf muscles as well as some other groups. Becker's muscular dystrophy has a more moderate clinical picture characterized by muscle weakness in the pelvic girdle, which spreads to the proximal muscles of the legs and arms, the muscles of the shoulder girdle and the dorsal muscles of the trunk.

Paralysis of the brachial plexus is a flaccid deprivation of the hands caused by traumatic stretching of the brachial plexus during childbirth. There is an upper, posterior type of lesion, as well as a complete lesion. The upper type of lesion occurs in 60% of cases and is the most common type. In an injured arm, muscle tone is lowered, the gripping reflex is present while the biceps and brachioradialis muscle reflexes are extinguished. The arm is located next to the body, stretched out at the elbow joint with the pronated forearm.

Visual impairment implies a permanent decrease in visual abilities below 0.3 measured in a better eye with the maximum possible correction. It occurs as a consequence of congenital conditions or as a consequence of eye diseases, brain injuries, direct eye injuries, etc. The visual abilities of these people are very different. Based on the criteria of the World Health Organization, persons with visual impairment can be divided into five categories: 1. persons with visual acuity from 0.3 to 0.1; 2. persons with visual acuity from 0.1 to 0.05; 3. persons with visual acuity from 0.05 to 0.01, or visual field narrowed to 5° -10° around the point of fixation; 4. persons with visual acuity below 0.01, persons with a sense of light or persons with a field of vision narrower than 5°; 5. persons without visual functions.

For the needs of sports, there is a division of athletes with visual impairment into three classes: B1, B2 and B3. Class B1 are athletes with the highest visual impairment.

PARA SWIMMING

As a Paralympic sport, para swimming is part of the program of the Games held in Rome in 1960. It is one of the most widely held and most popular Paralympic sports. Para swimming is competitive swimming intended for persons with physical, visual and intellectual disabilities,

where a person must meet the minimum disability criteria. The competition takes place in swimming disciplines in which the swimming techniques are crawl, backstroke, breaststroke and butterfly, then in medley and relay events. The same rules apply as the ones used by FINA with certain modifications adapted to swimmers with disabilities.

In order for a swimmer to compete in para swimming, he must go through a classification process that determines which athletes are eligible to compete in world para swimming and how athletes are grouped into competition classes. In relation to physical disability, swimmers are categorized for technique types crawl, backstroke and butterfly in classes 1 to 10 with the classification mark S (e.g. S5,). For the purpose of classifying breaststroke swimmers, the designation SB is used, while classes are categorized from 1 to 9 (e.g. SB2), while for medley the designation SM is used in the range of classes from 1 to 10 (e.g. SM7). A smaller class number means a higher degree of impairment. For instance, when it comes to amputations, class S7 includes swimmers with complete amputation of both legs, while class S9 includes swimmers with amputation of one leg. In case of visual disability, and based on the appropriate criteria for all four swimming techniques, swimmers are categorized into classes 11 to 13 with the mark S for the technique types crawl, backstroke and butterfly and SB for breaststroke technique. Swimmers with intellectual disabilities are categorized in class 14 with marks S or SB depending on the swimming technique as with the physical and visual disabilities.

MODIFICATION OF SWIMMING TECHNIQUES FOR PERSONS WITH DISABILITIES

Generally speaking, in relation to the biomechanical model of correctly performed competitive swimming techniques in the Olympic population of swimmers, modification of swimming techniques in relation to persons with disabilities refers to: corrections of arm work in terms of amplitude, frequency, length and rowing efficiency; then kicks; corrections of the ideal position of the body in the water in relation to the angle of attack, the degree of rotation along the sagittal, frontal and horizontal planes; corrections in terms of synchronization of arm strokes, kicks and synchronization of breathing, i.e. breathing while swimming.

This section will explain the modification of crawl, breaststroke and backstroke swimming techniques for people with amputations, hemiparesis, paraplegia and quadriplegia. These modifications can also be applied in persons with cerebral palsy and brachial plexus palsy. The given modifications represent the way in which swimmers should swim and perform swimming exercises in accordance with the type and form of disability.

Modification of swimming techniques in persons with upper limb amputation

In the backstroke, breaststroke and crawl swimming techniques, there is a typical error that occurs, such as an asynchronous stroke, which leads to deviations on the side of the amputation. Possible solutions to the problem, i.e. the modification are:

1. flexing the head laterally from the amputated arm;
2. reduce the strength of the stroke of the non-amputated arm;
3. place the swimming arm stroke on the part of the amputated arm if possible;
4. in the breaststroke technique, in addition to the given modifications as for the backstroke technique, it is also possible to perform the stroke with a non-amputated arm closer to the central line of the body and increase the strength of the stroke;
5. in the crawl technique, in addition to the given modifications for the backstroke technique, the stroke with the amputated arm can be performed slightly laterally in relation to the central line, and the stroke with the non-amputated arm directly towards the central line;
6. in the crawl technique, there is another problem with taking air towards the non-amputated arm, which can be solved by increasing the rotation of the body to the side of the non-amputated arm and returning it over the head.

Modification of swimming techniques in persons with lower limb amputation

In backstroke and crawl swimming techniques, typical errors such as asynchronous kicks lead to rotation in the hips while swimming. Possible modifications are:

1. reduce the intensity of kicks and work to increase the stabilization of the torso;
2. the non-amputated leg should perform kicks closer to the midline of the body.

Also, there can occur asynchronous kicks which lead to deviation towards the side of the amputation. Possible modifications are:

1. increase the force of the arm stroke on the side of the amputated leg;
3. flex the head laterally towards the amputated leg;
4. the non-amputated leg should perform strokes closer to the midline of the body.

In the breaststroke swimming technique, asynchronous kicks also occur, which lead to deviation towards the side of the amputation. Possible modifications are:

1. increase the force of the arm stroke on the side of the amputated leg;
2. flex the head laterally from the amputated leg.

Modification of swimming techniques in people with hemiparesis

In the backstroke swimming technique, there is a problem of rotation of the hypertonic side of the body downwards. Possible modifications are:

1. turn head away from the hypertonic side of the body;
2. lower the "healthy" shoulder and pelvis in order to rotate the torso to the opposite side;
3. use a swimming belt.

In these people, pain in the shoulder joint may occur when returning the arm close to the head in the recovery phase of the stroke. In such a situation, backstroke swimming should be avoided.

With the breaststroke swimming technique, there is a number of difficulties when swimming, such as problems with breathing control due to poor motor control or spasticity, diving due to reduced efficiency of kicks, as well as asynchronous strokes due to poor motor control and spasticity.

In relation to the first problem, possible modifications are:

1. use of a swimming mask with a snorkel;
2. use a swimming belt or "worm" for swimming under the armpits, so that the head is above the water all the time during swimming.

In relation to the second problem, possible modifications are the following:

1. instead of a completely correct kick for breaststroke, use a kick with less rotation in the joints;
2. use movement assistance or a swimming belt.

In relation to the third mentioned problem, the stroke is modified so that the stroke with a healthy arm is performed closer to the central line of the body.

With the crawl swimming technique, there is a problem with breathing control due to poor motor control or spasticity, which can be solved by the swimmer rotating the body around the longitudinal axis when moving from the prone to supine position.

In addition to this problem, there is an asynchronous stroke with the hemiparetic arm, which leads to a deviation towards the side of the body with hemiparesis. Possible modifications are:

1. flex the head laterally from the hemiplegic side of the body;
2. reduce the stroke strength of a healthy arm to match the stroke strength of the hemiparetic arm;
3. direct the force of the kicks to the hemiplegic side.

Also, there is a sinking due to the reduced efficiency of the kicks. Possible modifications are:

1. instead of quick kicks, emphasize the performance of small controlled movements;
2. increase flexion in the knee joint during kicks to reduce spasticity if possible;
3. use assistance or swimming belt.

Modification of swimming techniques in people with paraplegia

In the backstroke swimming technique, there are problems in controlling the rotation when returning the arm above the head in the recovery phase. Possible modifications are:

1. increase the power of the arm stroke underwater in order to neutralize the impact on the rotation of the arm above the water;
2. Practice swimming with rotation from the supine to prone position until the swimmer acquires a sense of control of movement.

With the breaststroke swimming technique, there is a problem of raising the body or head above the water surface when breathing due to flaccid (limp) deprivation of the legs, which leads to floating of the legs, which makes it difficult to lift the head out of the water. Possible modifications are as follows:

1. increase the power of the useful part of the stroke so that the body and head are raised high enough above the water to breath with minimal extension in the neck;
2. place light weights around the ankles so that the feet are immersed deeper in the water until the swimmer gains enough arm strength to be able to control breathing;

With the crawl technique there is also the problem of breathing due to limp legs. The following modifications can be used:

1. take air on every 5th stroke;
2. increase the power of the stroke at the time of taking the air;
3. perform the pronounced rotation of the body around the longitudinal axis when breathing, moving from the prone to supine position;
4. As with the breaststroke technique, smaller weights placed around the ankles can be used in the beginning.

Modification of swimming techniques in people with quadriplegia

In the backstroke technique, there is a problem with the recovery phase when returning the arm above the head due to the lack of flexion in the shoulder joint and extension in the elbow joint. This can be solved by allowing the swimmer to have a bent arm at the elbow joint and for the elbow to enter the water above the head first. It is also possible to modify the entry of the hand into the water by external rotation and abduction in the shoulder joint. In addition to the mentioned problem, there is also sinking of the body due to spasticity in the legs. This can be solved in the following way:

1. by lifting the chest and stretching the neck against the sinking legs;
2. use assistance or swimming belt until the swimmer increases the power of the stroke and body control.

With the breaststroke technique, there is a difficulty in controlling breathing due to the weak extension in the neck and the weak force of the stroke. Possible modifications in solving this problem are:

1. take air on every 5th stroke;
2. increase the power of the stroke at the time of taking the air so that the body lifts sufficiently above the surface of the water with minimal extension in the neck;
3. Use "worms" for swimming that are placed in the armpits.

With the crawl technique, there is a problem of the impossibility of stretching the arm above the surface of the water in the recovery phase, which makes it difficult to take air, and the power of the stroke is also reduced. Possible modifications are:

1. take air on every 5th stroke;
2. perform the pronounced rotation of the body around the longitudinal axis when breathing, moving from the prone to supine position;

Another problem that occurs is the sinking of the legs due to spasticity, which can be solved with assistance or a swimming belt, until the swimmer increases the power and efficiency of the stroke.

METHODS OF SWIMMING AND EXERCISING IN WATER

In order for people with disabilities to benefit from the positive effects of swimming, first they must learn to swim. Halliwick method is used for this purpose, especially in people with severe disabilities. The positive effects of movement and exercise in water are achieved by applying primarily effective and proven methods such as the Bad Ragaz Ring method and the Watsu method.

Halliwick method of swimming and exercising in water

Halliwick method of learning to swim was first as an idea and then as a method created by James McMillan in 1949 in London. The main goal of this method is to enable children and adults with disabilities to swim, i.e. to move independently and safely in the water. The essence of this method is based on the process of psycho-sensory-motor learning that is effective in people who need active motor learning in another medium (e.g. water), i.e. re-learning in a medium in which natural movements are mechanically difficult. Basically, Halliwick method is a program composed of ten points, whose main focus is on the dominant learning of postural control of the body in the water when learning to swim, and everything is based on the principles of mechanics and hydrodynamics of floating and moving the body in the water. The points of the Halliwick program are:

1. Mental adjustment;
2. Sagittal rotation control;
3. Transversal rotation control;
4. Longitudinal rotation control;
5. Combined rotation control;
6. Upthrust;
7. Balance in stillness;
8. Turbulent gliding;
9. Simple progression;
10. Basic (Halliwick) movement.

By successfully mastering and fully realizing the mentioned program, the swimmer should be able to move independently in and on the surface of the water using the technique that involves swimming in a floating position on their back, with simultaneous strokes of both arms. The goal of the Halliwick motor learning program is for a person with a disability to primarily learn the position of floating on the back with complete control of maintaining a stable balance in the water, and then the goal is to master the phase of controlled and targeted movement on the water surface, i.e. motor skill of swimming.

Bad Ragaz Ring method of swimming and exercising in water

Bad Ragaz Ring method (BRRM) was originally created about 80 years ago by therapists who worked at the Bad Ragaz thermal spa in Switzerland. From the passive use of thermal waters in swimming pools, they started applying active hydro therapy procedures. During their application, hydrotherapists realized that with the help of floating aids (rings, balls, boards, etc.) in different positions with the task of stabilizing parts or the whole body (floating on the back, sitting in water, etc.) and with the implementation of different types of loads that can be realized in water (isometric, isokinetic and isotonic) can significantly positively influence the health of exercisers. In other words, the application of swimming aids, and in different positions of the body in the water and the controlled types of loads, causes a positive neuromuscular effect according to the principle of proprioceptive neuromuscular facilitation.

In this way, the so-called model of re-motor learning of the realization of movements under the conscious control of the CNS and active muscles and muscle groups. Positive effects are achieved by applying specific water resistance during movement and elongation of the spine under the influence of the earth's weight or additional load under which the caudal part of the body is in water, which results in increased energy consumption which has a positive effect on general and local muscle endurance. Then there is the overall effect of relaxation in terms of reducing muscle tone as a consequence of specific water pressure on the entire surface of the body and skin. Additionally, there is an increased degree of mobility due to the effect of temperature, i.e. water heat and relaxation of ligament and tendon-connective tissue, as well as the overall effect of reducing muscle tone due to the reduction of activation required to maintain a stable balance on the ground.

BRRM means that the therapy is performed in warm water of 33^{o}C in a pool of smaller dimensions with a depth of about 120 cm, for the possibility of active assistance of the instructor, for whom the ideal position is to be able to hold the patient in the position between the eighth chest and of the eleventh thoracic spinal vertebra. To achieve the ideal floating position in a completely relaxing position, assisting means in the form of floating reels, floating boards, or floating belts are used. They are placed around the neck, torso and ankles, while floating boards or load belts are also used for sitting or vertical floating positions.

During active therapy, isometric loading is provoked by maintaining static body positions in the floating phases, which especially relates to the torso muscles during the torso stabilization phases. Isotonic contractile provocation is achieved by movements that aim to maintain the same tone, i.e. movements during which the most even water resistance is realized. Isokinetic contractions are provoked during the performance of movements in water at the same speed where agonist, antagonist and synergist muscles are provoked for a given stress.

In general, BRRM is extremely useful in people who feel pain during movement, in people with reduced mobility of the joint system, with spasticity, loss of coordination, decreased muscle tone, etc.

Watsu method of swimming and exercising in water

This method is a synthesis of the BRRM method and Shiatsu massage. The Watsu method is a relatively "young" method, having first been introduced in 1980 in Northern California. The essence of this method is to combine floating, as well as movement on the water surface in different static positions characteristic of BRRM with gentle and soft rhythmic movements of the extremities that have a positive effect on the entire body of the exerciser.

With this method, the program is also realized in a small pool, in warm water (33^{o}C - 34^{o}C), with intensive active cooperation of the instructor who helps in accordance with the principles of the BRRM method (during floating on the back, as needed, the instructor holds the patient in a position between the eighth and eleventh thoracic spinal vertebrae). It must be emphasized that, unlike BRRM, the Watsu method does not use floating aids, but only the instructor who holds the exerciser and manipulates their movement through the water in a controlled manner, i.e. performs the therapeutic tasks.

The recorded positive therapeutic outcomes in relation to the application of the Watsu method can be systematized as follows: reduction of muscle pain, increase in range of motion, increased level of physical abilities and better level of kinesthetic perception.

PRACTICAL ADVICE AND METHODOLOGICAL RECOMMENDATIONS IN SWIMMING TRAINING FOR PERSONS WITH DISABILITIES

Application of physical exercise for persons with disabilities requires pedagogical and professional-practical specifics in relation to the methodology applied for persons without disabilities. When we talk about the methodology of swimming instruction and training swimming, it is essential that it is adapted to the specific capabilities of the individual in relation to: disability, level of physical abilities, ability to adapt, level of motivation, different types of anxiety, as well as comprehensive capacities for educational and training work of a given individual. In people with various forms of disabilities and disorders, there are certain common characteristics such as contractures and restrictions in movement, high muscle tone, paresis, dystrophy, etc. These common characteristics enable the application of the same practical advice or methodological recommendations in swimming instruction, as well as in training swimming. In the following, some of the methodological procedures in relation to the common characteristics of disability will be listed.

Contractures and limitations in movements

These types of motor limitations are most common in people who have: amputations with a stump near the joint, multiple sclerosis, spinal cord injuries; traumatic head injuries, paralysis or paresis, etc. Methodical recommendations for swimming learning with people who have the above impairments are as follows:

- in the initial phase of warming up, exercise should be carried out very slowly with light intensity;
- provide a variety of different exercises for walking, jumping, climbing and descending the pool stairs in people with plantar flexion contractures;
- encourage and insist that swimmers make movements through the maximum range of movement;
- force never movements in the joint with contracture;
- adapt stroke performance based on range of movement limitations.

Paralysis, paresis and atrophy

They most often occur in people who have: traumatic brain injury, stroke, spinal cord injury, multiple sclerosis, spina bifida, muscular dystrophy, etc. Methodological recommendations for swimming learning in people with these disabilities are as follows:

- change the position of the head and use appropriate floating props and weights to establish an appropriate floating and streamline position due to the negative impact of paralysis on them;
- modify swimming techniques, the way of entering and exiting the water on an individual basis after determining the stability of the torso, the power of the limbs and control of the head of each individual swimmer;
- encourage individuality and independence during swimming lessons;
- provide mats around the pool for people who need to rest by the pool to avoid scratches and skin injuries due to the movements;
- take care of fatigue and increase the length and frequency of rest accordingly, as well as the duration of classes, especially taking into account the possible occurrence of muscle spasm;
- swimmers should wear socks to prevent scratches from scraping legs;
- work on the development of upper body muscle strength, with special emphasis on strengthening the deltoid muscles and stretching the pectoralis muscles.

Difficulties in controlling neck movements

These difficulties most often occur in people who have: a history of stroke or traumatic brain injury, cerebral palsy, muscular dystrophy, multiple sclerosis and other forms of neuromuscular damage and disease. Methodological recommendations for swimming learning with these people are:

- insist on training and learning swimming techniques in the position of floating on the back in order to facilitate breathing;
- when swimming in prone position, use a diving mask and snorkel for easier breathing;
- do not encourage people with cerebral palsy who have poor head control to breath by lifting their head up, because hyperextension in the neck can cause primitive reflexes that negatively affect the control of arm and leg movements;
- use additional props such as swimming belts, as well as the constant close presence of a trainer to avoid excessive situations in terms of sudden immersion of the head in water;
- determine the sign by which the swimmer notifies the trainer when he or she has a breathing problem.

High muscle tone

It occurs most often in people who have: cerebral palsy, traumatic brain injury, multiple sclerosis or other neurological damage. Methodological recommendations for swimming learning in these people are the following:

- mandatory implementation of swimming instruction in warm water with a temperature of 30^{o}C to 33^{o}C in order to cause the effect of muscle relaxation and reduce spasticity;
- during swimming instruction, pay special attention to the fact that spacity can cause the so-called "scissors", i.e. the movement of crossing the outstretched legs, which often causes pain and wounds in the knee area, so the preventive use of the so-called swimming floats or floating belts set at knee joint height;
- assistance near the swimmer's head is recommended, due to involuntary and sudden spastic movements that can lead to a sudden sinking of the swimmer and splashing of other swimmers around him or her;
- it is recommended to insist on light and slow movements in the water, and to avoid sudden, intense and fast movements, which provoke an increase in muscle tone;
- active help of the trainer is needed in terms of directing movements through the water in the desired direction;
- take care of the entry and exit of swimmers from the pool, due to possible sudden spastic movements.

Retention of primitive reflexes

This most often occurs in people with cerebral palsy, traumatic brain injury, severe forms of intellectual disability, etc. The methodological recommendations for swimming learning with these people are the following:

- work on adopting a position that reduces the possibility of reflexes, which is a position with a slightly tucked chin towards the chest and slightly bent legs at the hip and knee joint;
- use symmetrical swimming techniques such as breaststroke, backstroke with simultaneous strokes of both arms and leg movements as for breaststroke;
- take care when swimming on your back, because neck extension can stimulate a symmetrical tonic neck reflex, which leads to stretching the arms and bending the legs.

Visual impairment

Visual impairment refers to people who are blind and visually impaired. Methodical recommendations for swimming learning with these people are the following:

- use props in light colors;
- enable these persons to learn swimming between two instructors, using props such as large hoops or swimming strips;
- use certain short words as a reminder of what the swimmer should do;
- the trainer should use black or dark bathing suits due to the contrast in the water;
- use physical guidance which means that the instructor moves the swimmer's arms and legs imitating swimming movements;
- use a tactile exploration which means that the swimmer touches the arms and legs of the trainer with his or her hands and creates a feeling of the position of the extremities when swimming;

- in swimmers who have progressed and swim independently use a stick with a sponge or ball at the end of the stick to be warned when they are close to the edge of the pool to avoid injury.

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