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THE ROLE OF KINETOTHERAPY IN IMPROVING CEREBRAL MOTOR DISEASES

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Abstract

Cerebral motor infirmity is not a disease, but a syndrome, a set of lesions, changes and symptoms, respectively. This field permanently attracts specialists who dedicate their effort to elaborating strategies intended to recover these categories of patients. Kinetotherapy tries to educate or re-educate, through movement, the disturbed balance in the neurodevelopment of those affected, of young people lacking the possibility of movement.[10]

The motivation for choosing this theme comes from the need to have a broader picture of the therapeutic possibilities applicable in kinetic recovery.[1,2]

Introduction

Research Hypothesis - This paper aims to verify whether the kinetic means deployed in the sequential phase, when brain lesions are stabilized, can contribute to minimal physical and communication recovery. Specifically, it has been examined whether the spasticity can be reduced, in parallel with the increase in the amplitude of movement at the articular level. The recovery was aimed at developing the possibilities of moving and communicating with the work and supervision team, leading to the conclusion that the statement according to which "there are no recoverable cases" is correct.

The purpose of the research - the treatment established in the sequel phase should take into account that there is a stabilized brain injury that cannot undergo a

complete recovery process. In each case the therapy can lead to an improvement, to a stagnation of the aggravation of the disease - in the worst case.

Objectives - Obtaining a motility related to daily gestures, achieving independence on the move; developing communication and language achieved with the other members of the working team.

The general clinical picture is characterized by: impaired muscularity-muscular spasticity, muscle retractions and redness, decreased voluntary muscular contraction force, increased osteo-tendon reflexivity, modification of the morpho-functional characteristics of the effectors (bone, joints, capsulo-ligamentous apparatus, tendons, muscles) leading to changes in posture, gait, spine changes; sensory impairment, temporal-spatial disorientation, oculo-motor coordination deficiency; respiratory dysfunction, heart rhythm disorders, impaired thermoregulation, difficulty swallowing, urination, defecation; psycho-emotional lability - fits of anger, mental weakness going to idiocy, epilepsy in 40-50% of cases; aphasia, apraxia, nervous tics.[3]

Material-method

The kinetotherapeutic methods can be: relaxation techniques, exercises for stimulating balance, re-education of walking, methods of neuromotor re-education, techniques of neuromuscular facilitation [4,5]

The test method follows the punctual evaluation of the deficiencies (joint mobility, muscle strength, posture, coordination, balance).

Here are some of the classic tests that we have used to assess the dysfunctional conditions of patients:

Motion amplitude assessment (AM)

The maximum amplitude in a joint that can be reached in a momentary effort, with the help of an assistant, is called flexibility. The opposite of flexibility is rigidity, the most severe form that does not allow movement. Flexibility can be:

- dynamic (maximum AM is obtained by active movement);
- active (maximum MA achieved by active movement maintained voluntarily);
- passive flexibility (maximum MA maintained in an extreme position by his own body weight with the help of an assistant).

The following index scale was created (according to table no. 1):

Table 1. AM Assessment Index Scale

Ankylosis		0
Hipomobilitaty	With high limitation	1
	Normal	3
Hypermobility	Easy	4
	Important	5

Instability		6

The overall assessment aims to assess the patient's inability to act as a normal individual. Global tests use the system of scales in which a series of activities are listed that will receive coefficients according to the performance capacity. Finally, we reach a final score that focuses on the severity of the disability status. Currently the most used scale is the FID (Functional Independence Measure) scale, which comprises 7 degrees of appreciation. There is also the Barthel test, which can score 0–100 points, comprising 10 activities with scores between 0 (total dependency) and 10 (total independence). The ability to perform ADLs (daily human activities) divides individuals into "dependent" and "independent". [6,7,9]

Among the activities carried out at the Kinetotherapy Center within FEFS-Galati, we used the following kinetic treatment methods:

1. Relaxation techniques - extensions of the extremities through passive movements and maintaining these positions as much as possible

2. exercises to stimulate the balance - lateral and antero-posterior pressures, learning the defense against falling and returning to the correct position

3. Neuromotor re-education methods - the Vojta method was applied, which consisted in stimulating the rolling and dragging movements.

4. Neuromuscular facilitation techniques - Kabat method was used (facilitation schemes were used passively) [8]

5. palliative massage

The study was conducted at the Center for Physical Therapy within the FEFS, Galaţi. The center has a therapy room with standard equipment: kinetotherapy table, gym bench, trellis, balls and weights of different sizes and sizes or colored for sensory stimulation, mattresses, fixed bike, ergonomic bike, template for coordinating lower limbs, balance plates and others. The experimentation lasted for six months, from December 2024 to June 2025, with a two-stage evaluation: initial and final verification. The slow progression due to the severity of the conditions did not allow for intermediate evaluations. The experimental group included four patients who had the following common characteristics: young people, girls and boys under the age of 20; they did not have an early recovery treatment; motor disorders of cerebral origin are present; patients have severe psychiatric delay CI = 20-30; they do not benefit from the family environment, being abandoned and taken over by the state institutions; have a premarketing regime; psycho-emotional lability; aphasia (does not communicate verbally); apraxia (lack of coordination of movements); commutative phenomena.[14]

The recovery program was strictly individualized taking place under the guidance of the kinetotherapist responsible for conducting the activity within the center. For each patient we prepared an observation sheet containing data regarding age, sex, general diagnosis, initial evaluation, identified needs, general objective

pursued, long and short-term goals, activities undertaken and results obtained.Kinetotherapy was correlated with the particular situation of each patient, differentiated in terms of complexity and dosage. Kinetotherapy included the Bobath method, (neuromotor rehabilitation methods) elements of the Vojta method and the Kabat diagonals (neuromuscular facilitation techniques) plus relaxation techniques, balance-building exercises and walking re-education exercises. The characteristics required for the exercises were:

1. Exercises should be easy to perform, by imitation and progressive
2. The exercises were adapted according to each individual case (clinical form, severity of the disease, associated diseases).
3. They demanded a progressive effort, the pace and intensity of the activities increased, and the rest periods were shortened.
4. The exercises were permanently performed under supervision.
5. Each proposed exercise was performed in a series of 5 to 10 executions, depending on each individual case.[11.12]

The kinetotherapy program included: relaxation exercises at the beginning of the session; exercises for the development of important movements; exercises for the limbs and trunk; balance exercises.

This paper aims to verify whether kinetic means can contribute to the improvement of brain motor disorders.

PATIENT 1 - S.C. - 21 year old boy, severe mental retardation, notes of autism in behavior, IQ 30, operated intestinal occlusion.

EVALUATION - Serious bodily disorders, temporal-spatial disorientation, psychomotor behavior: lack of spoken language, major deficiency of effective nonverbal communication, stereotypes specific to the autistic sphere, muscular-normal system represented, phenomena of catatonic rigidity, contracts and tendon-muscle retractions, which led to the production of organic diseases (intestinal occlusion, respiratory diseases); bone system: predominance of deficiencies in the spine and anterior thorax, in the lower limbs; inability to descend and climb stairs; major ocular-motor coordination deficiency.

IDENTIFIED NEEDS - A very large number of life essential needs are altered

MAIN OBJECTIVE - Improvement of the general state of motion

Individual recovery program / PATIENT 1

physiotherapy and massage - monitoring and evaluation

Table 2. Individual recovery program /patient 1

Term	Objective	Activities	Final Evaluation
short;	- creating an effective collaboration	- walks inside the center;	- collaboration with the young man was very difficult due to the underlying

	relationship with KT; - stimulation of interest for physical activity; - formation of skills and abilities necessary for the partial regaining of independence in the physical plane; - formation of a correct position of the body during walking and orthostatism; - improving mobility and increasing the amplitude of movement in the coxo-femoral joint; - toning and increasing the flexibility of the extensor muscles at the lower limb.	- exercises of descending and climbing stairs; - physical exercise programs passively executed by a kinetotherapist with various materials.	pathology, but the kinetic program applied led to progress; - the descent and the climb of the stairs can be carried out with minimal help from the kinetotherapist and 50% awareness, sometimes walking and over two steps; - due to the flexed knees there is still tip walking (50%); - the patient descends and climbs the stairs supporting himself unilaterally, the stepping of the stairs is done step by step with support on the entire sole, but presenting some balance of the head, caused by the long and accentuated kyphosis and the shape of the barrel chest; - Another cause is the knee retraction

PATIENT 2 - T.V.M- girl, 25 years old, severe mental retardation on encephalopathic background, IQ 20, history of intestinal occlusion, operated.

EVALUATION

Severe bodily disorders (incorrect perception of one's own body position)

Temporal-spatial disorientation (specific for age 1 year-1,5 years)

The presence of nervous tics, of mimetic ability, exaggerated response to tactile and olfactory stimuli, serious ocular-motor coordination disorders, catatonic rigidity

Poor muscular system represented in all the structures of the body, muscular hypotonia, lack of muscular strength

Osteoarticular system with very reduced joint mobility

Stability and balance deficit in orthostatism and gait (embryo gait)

It cannot perform any action on verbal command, imitation or demonstration

It cannot descend or climb the stairs unless it is axially supported by two persons

IDENTIFIED NEEDS - Due to the history of encephalopathy, many needs are altered, the dissatisfaction of which leads to serious organic disorders (intestinal occlusion)

MAIN OBJECTIVE - Improving the general state of motion and maintaining it,

formation of physical self-perception.
Individual recovery program / PATIENT 2
physiotherapy and massage - monitoring and evaluation

Table 2. Individual recovery program /patient 2

Term	Objectives	Activities	Final Evaluare
- short;	- creating a collaborative relationship with the companion - reducing social isolation - awareness of the motor actions performed - improving the attention needed to perform and reflexively learn the main actions needed to regain independence in meeting certain needs (eg. attention to stepping and avoiding obstacles, turning, climbing and descending stairs with oculo-motor control).	- training in short therapy programs. - performing a small number of exercises, gradually increasing the degree of difficulty. - ergometric bike exercises - walking exercises (through the center) with passing and bypassing the obstacles - exercises to climb and descend the stairs - passive-active exercises performed with the help and using the materials provided in the recovery room - walks outside the center.	- descends the stairs, realizing the passage on each step - the climb is defficult. - not able to appreciate the distance and height of the steps, which is why he wants to walk more than three steps at a time, permanent supervision required.
- long;	- formation of physical self-reception - improving the overall movement capacity - improving the oculo-motor coordination, a condition necessary to satisfy the need to move and to have a good posture - the place of the meetings: the kinetotherapy room, other places inside the center (stairs), in the yard.	- walk outside the center - therapeutic sessions composed of passive and passive-active physical exercises with the help of the kinetotherapist and active exercises performed under the guidance and coordination of KT - sessions of medical gymnastics made up of sets of physical exercises adapted according to the disposition of the patient - the program can vary between 30 - 60 minutes	- descends and climbs the stairs step by step, with unilateral support (it is held by the railing with both hands) - the patient has moments when he is aware of the danger (depending on the disposition) - the obstructions during the walk have been reduced, being more confident in their own forces - shows high interest for movement, especially for outdoor walks in the center courtyard and outside it - bypasses the big obstacles, but cannot identify the small ones

			- conclusion: little progress has been made in the physical and mental processes of the young woman

PATIENT 3 -V.L. E - 23 year-old girl, severe mental retardation IQ 30

EVALUATION - young woman immobilized on the bed and wheelchair respectively due to a left hemiparous hemiparesis

- lack of flexibility and muscular strength
- muscle-tendon contracts that prevented the joint movement, only 2-3 steps with great difficulty, transferring the entire task to the companion.

IDENTIFIED NEEDS: to move; to have a good posture; to keep their entire skin; to have the possibility of minimal communication

MAIN OBJECTIVE: to improve general physical mobility; resuming walking with support

Individual recovery program / PATIENT no.3 kinetotherapy and massage - monitoring and evaluation

Table 3. Individual recovery program / patient 3

Term	Objectives	Activities	Evaluation
- short;	- attempt to remove the discomfort caused by total paralysis of the upper left limb by motor re-education of paralyzed muscles - Resumption of walking with support for the lower left limb - removal of hypertonia from the lower limbs - Increased degree of mobility in the knee joint	- exercises that promote stability in orthostatism - exercises performed passively to restore mobility at the level of the shoulder, elbow and fist joint - passive-active exercises for increasing the muscular strength of the entire left upper limb and maintaining the functionality of the upper right limb - passive-active gymnastics exercises using the floor, the bench, the kinetic table, medicinal balls of different weights and colors, etc.	- the young woman is able to maintain the orthostatic position of the body without difficulty resorting only to unilateral support - can travel 60m with unilateral support and small breaks at 30m - performs the transfer from the wheelchair to the bed and vice versa - can transfer her body from the chair to the floor and vice versa - executes simple commands communicates nonverbal (mimic and pantomimic)
- long;	- regaining the functional and physical independence of at least	- passive-active exercises in the form of a game - general and respiratory	

	50% of the lower left limb and its correlation with the recovery of the functionality of the upper left limb - strengthening the orthostatic position and maintaining it without support	exercises - walking exercises - exercises aimed at the same muscle groups and joints necessary for the attainment of functional independence	

PATIENT 4 - G.R.-girl, severe mental retardation, IQ 30, 23 years old, autistic behavioral notes, left lower limb gonarthrosis, right torticollis (history - frequent respiratory infections).

EVALUATION - Serious disorders of the body scheme (incorrect perception of one's own body position); temporo-spatial disorientation (cognitive development specific to the age of 10-15 months); serious ocular-motor coordination disorders, much diminished motor initiative, catatonic rigidity; poor muscular system represented at the level of the body structures, muscular hypotonia, lack of muscular strength, presence of muscle-tendon contracts generated by the positions imposed by the mental and habitual disorders of torticollis; osteoarticularity presents much reduced joint mobility and muscle tendon contractures.

It has a deficiency of stability and balance in orthostatism and walking deficiency with small steps and with a wide base of support. It cannot perform any action on the verbal command, imitation or demonstration. It can only descend and climb the stairs axillary supported by two persons. The young woman is deprived of a lot of the essential needs of life

MAIN OBJECTIVE - Improvement of the general state of motion and its preservation, formation of physical self-perception, prevention of the installation of serious physical functional deficits.

Individual recovery program / PATIENT 4

physiotherapy and massage - monitoring and evaluation

Table 4. Individual recovery program / patient 4

Term	Objectives	Activities	Final Evaluation
- short;	Creating a relationship of acceptance of kinetic therapy Increased flexibility and joint mobility Improving circulation in the lower limb by promoting circulatory flow in the calf and preventing edema at	Passive-active exercises performed with the help of the kinetotherapist and using the materials provided in the therapy room (balls, gym bench, kinetotherapy table, plush figurines) Postures for edema prophylaxis and improved brain circulation.	Medium interest for the organized movement included in the therapy programs. She often refuses to collaborate on therapy without being presented with an incentive (an object that makes noise, a plastic foil, etc.).

	this level Training in various kinetic activities stimulating the increased interest for various things specific to the therapy Increased muscular elasticity and joint mobility coefficient.		Has no manual skills Descends the stairs with bilateral support (one hand resting on the rail and one person accompanying her). Climbing and descending the stairs is a demanding action due to the presence of gonarthrosis, lack of ocular-motor coordination and muscular strength. It avoids big obstacles, but he cannot identify the small ones. Improved level of psychomotor nonverbal mimic and pantomimic communication (from amimia to hypomimia) The difficulties of integrating the messages from the external environment at the cerebral level are maintained. Satisfactory progress has been made, if we think that the young woman "forgot" to rip her hair and pull her ears.
- long;	Developing physical self-perception Improvement and maintenance of general movement capacity Permanent and sustained training in order to experience the pleasure of "moving".	Walks within the center premises and the center courtyard. Walking exercises on rough terrain. Exercises to descend and climb stairs inside and outside the center. Development of physical self-perception. Improvement and maintenance of general movement capacity.	

The proposed objectives divided into short and long term objectives are: reduction of spasticity (relaxation); increase of the amplitude of movement at the articular level; improvement of posture, coordination of movements and general balance; formation of the ability to adopt inhibitory (relaxation) reflex positions, correct; accentuation of basic skills (walking, even running,

steps, bicycle, use of upper limbs), these facilitating a more accelerated recovery.

The research methods we used were:
1. Theoretical documentation from the specialized literature;
2. The observation method for collecting the necessary concrete data (direct and experimental observation);
3. Method of evaluation by processing and interpreting the collected data;
The subjects were initially and finally tested. The massage was used as a palliative means by applying on the muscle groups antagonistic to the spastic muscles. patients. We performed the patients evaluation both at the beginning of the period and after six months time, by framing different scales, following the evolution of patients.

Results

A. FID Scale (Functional independence Measure)

Table 5. FID Scale (Functional independence Measure)

Pacient	Analysis Elements	Inițial Score	Final Score
S.C. I	Transfer(I)-Bed	4	4
	Gait(L)	2	4
	Stairs(M)	1	3
	Total FID Score	**7**	**11**
T.V.M. II	Transfer-Bed	4	4
	Gait	3	3
	Scări	1	4
	Total FId Score	**8**	**11**
V.L.E. III	Transfer scaun rotile	1	3
	Mers	1	4
	Scări	1	4
	Total FID Score	**3**	**11**
G.R. IV	Transfer-Bed	4	4
	Gait	3	4
	Stairs	1	3
	Total FID Score	**8**	**11**

I specify that the elements of analysis for self-help (AH) and for cognitive score (NR) fall into "complete dependence through total assistance (100%)" and were not taken into account. The degrees of dysfunction are seven, but in in this case

only grades 1-4 are concerned:

1 = individual with complete dependency through total assistance (100%)

2 = individual with complete dependence through maximum assistance (75%)

3 = individual with dependency modified by moderate assistance (50%)

4 = individual with dependency modified by minimal assistance (25%)

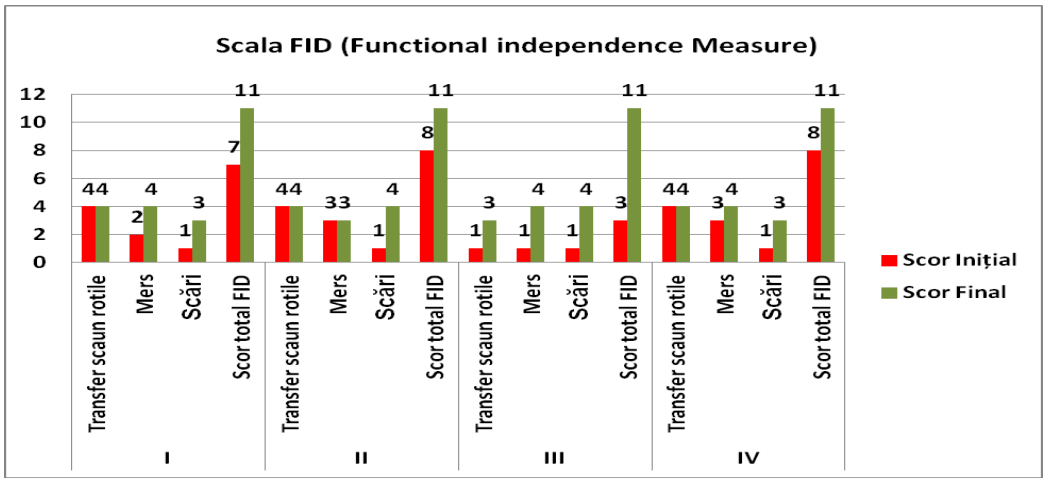

Fig. 1. Graph 2 – FID SCALE

B. The most complex scale called "Degree of functional independence" (GIF) applies especially to patients with central neurological lesions and analyzes 18 functions (activities) divided into 6 classes (I-VI).

Table 5. Scala GIF

Pacient	Transfer	Gait	Climb/Stairs Descent	Score
	Initial/Final	Initial/Final	Initial/Final	Initial/Final
S.C. I	3/4	2/5	1/5	6/14
T.V.M. II	3/4	2/4	1/3	6/11
V.L.E. III	2/5	2/3	1/1	5/9
G.R. IV	3/5	3/5	2/4	8/14

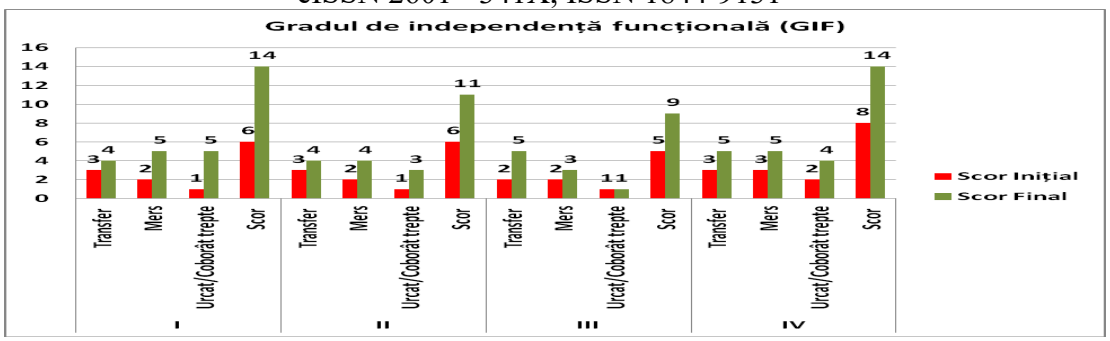

Fig. 2. Graph 3 - GIF SCALE

The execution capacity of each function is quantified on the basis of 7 degrees.

Grade 1 = executes less than 25% of the activity and is dependent on 2 persons

Grade 2 = executes 25% -45%, depending on a person

Grade 3 = performs 50% -74%, moderately dependent on a person

Grade 4 = performs over 75% minimal contact with a person

Grade 5 = requires only supervision

Grade 6 = needs some devices

Grade 7 = independent

Classes I, II, V, VI, were not taken into account as there are no capacities for these functions (self-care, communication, etc.).

C. Evaluation of patients according to the Barthel test

It is estimated by the following coefficients:

0 = incapable

5 = helped

10 = independent

I am analyzing only the categories of activities that I dealt with, the others being, in fact, appreciated with 0 (self-care, communication).

Table 6. Barthel Test

Pacient	Transfer	Climb/Stairs Descent	Gait	Barthel Index
	Initial/Final	Initial/Final	Initial/Final	Initial/Final
S.C. I	5/10	0/5	5/10	10/25
T.V.M. II	5/5	0/5	5/5	10/25
V.L.E. III	5/10	0/0	0/5	5/15
G.R. IV	5/10	0/5	5/10	10/25

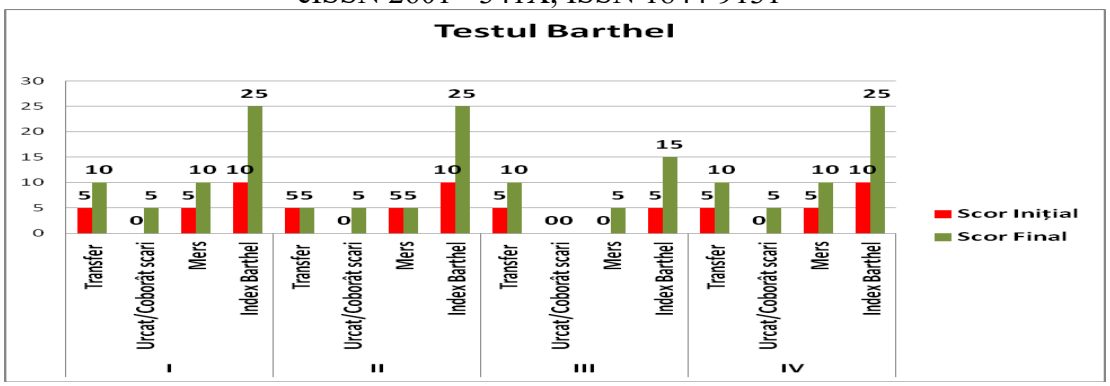

Fig.4. Graph 3 - BARTHEL TEST

Conclusions and recommendations

1. All patients were evaluated with disabilities, incapacities and disabilities to the extreme limit, requiring permanent hospitalization.

2. The approach of their recovery had to be done taking into account their mental illnesses. Calm behavior (extremely low voice, gentle movements, starting activity with positioning patients from the lateral and not the frontal) was extremely important. After a certain period (about a month) the cooperation became evident, the patients showing themselves interested in the kinetic program (they took my hand, the program could be extended up to 60 minutes, alternating the exercises with walking.)

3. The physical therapist must have very good physical strength because, due to the lack of coordination of the movements and the spatial disorientation of the patients, accidents might be possible.

4. All patients have made progress in recovery, regardless of the level from which they started.

5. Walking is the main function that must be followed because it influences many other functional capacities (cardio-respiratory, spatial orientation, reduction of spasticity, muscular, joint, balance, communication deficiencies). The walking evaluation leads to the establishment of the diagnosis, the recording of the joint, muscular and coordination deficiencies in the lower limbs and finally to the elaboration of the recovery plan.

6. The severity of the illnesses recorded in these young people could certainly have been diminished by starting the early recovery treatment, during the postnatal period (0-12 months).

7. It is important for the kinetotherapeutic program to be consistent and permanent for as long as possible. No matter how minimal the progress is made, they certainly lead to the patients refocusing from the point of view of the human condition.

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