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**CHARACTERISTICS OF PSYCHO-EMOTIONAL STATE OF PARENTS OF CHILDREN WITH PARALYTIC SYNDROMES AND ITS CHANGES DURING REHABILITATION MEASURES***N. Orlova*

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<https://doi.org/10.35339/ic.9.1.36-44>**ABSTRACT**

The current strategy for the treatment of chronic pain in children with paralytic syndromes and neurological lesions was defined by the WHO recommendations in 2012. These recommendations provide a multimodal approach of analgesia for the chronic pain treatment, including the widespread use of non-pharmacological methods and pharmacological therapy.

**Aim.** Assessing the subjective vision of parents of children with paralytic syndromes regarding the impact of physical rehabilitation on chronic pain and their psycho-emotional state.

**Materials and methods.** The study involved data from 64 children and their mothers (64 persons). The age of the children ranged from 1 to 6 years, the median age was 3 years and 3 months.

**Results.** The changed psycho-emotional state of parents of children with paralytic syndromes is determined. If the child has chronic pain, the parents' "Concern about the treatment of the child" is doubled (RR=2.1; p=0.0024), "Hyperopia of the child" – twice (RR=1.9; p=0.0094), "Intolerance to observe the suffering of the child" – one and a half times (RR=1.6; p=0.0017), and "Sadness and anger when a child cries" (RR=1.5; p=0.0122), "Internal tension" (RR=1.5; p=0.0029), "Insomnia" (RR=1.5; p=0.0215), "Inability of the child to lead a normal image life" (RR=1.5; p=0.0035), "Search for compassion or understanding" (RR=1.5; p=0.0446), "Inner anxiety, feeling of possible trouble" (RR=1.5; p=0.0074) increase one and a half times. After receiving rehabilitation measures, the psycho-emotional state of the parents of children with paralytic syndromes was determined to decrease: "It is intolerable to observe the child's condition" decreased by 31.3% (p=0.0012); "Feelings of inner anxiety" decreased by 24.5% (p=0.0125); "I fall asleep badly due to the child's condition" decreased by 20.6% (p=0.0109); "Internal tension" decreased by 19.6% (p=0.0269); "Sleepless nights due to the condition of the child" decreased by 18.6% (p=0.0401).

**Conclusion.** The authors consider that physical rehabilitation in children with paralytic syndromes reduces the incidence of moderate chronic pain and improves the emotional state of parents. So, we think that new approaches to rehabilitation should be applied with daily management of the children with paralytic syndromes' needs and their families with increased psychological and social support. Perhaps the searching for new approaches that optimize more intensive and effective rehabilitation strategies using the family reserve will provide the potential for adaptability of nerve plasticity and recovery in such a contingent of children and prospects for the future.

**Keywords:** *children with paralytic syndromes, chronic pain, psycho-emotional state, physical rehabilitation.*

**INTRODUCTION**

Chronic pain in children with paralytic syndromes affects various aspects of the child's life and family, such as sleep, emotional state, relationships, development and functional status. It is

usually caused by muscle spasticity, contractures, vertebral deformities, bedsores or maceration of the skin, hypersalivation and/or hyperproduction of bronchial secretions, tube feeding, tracheostomy, gastrostomy, colostomy, convulsions, central and peripheral nervous system damage [1].

The current strategy for the treatment of chronic pain in children with paralytic syndromes uses a multimodal model of analgesia, namely, the widespread use of non-pharmacological methods along with pharmacological therapy [2]. This

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model includes: psychotherapy, game therapy, physical and occupational therapy, music therapy, aromatherapy. It is believed that each component of multimodal analgesia relieves pain [2, 3].

The role of physical therapy in relieving chronic pain in children with paralytic syndromes is to overcome spasticity and reduce muscle tone [4]. Individual physical treatments for children with paralytic syndromes are selected depending on age, leading pathological syndrome in the motor area, the degree of motor impairment (Gross Motor Function Classification, GMFCS), the presence of complications of the underlying pathological condition (e.g., seizures or secondary skeletal deformities), the presence of comorbidities [4, 5] Concomitant diseases and their treatment should also be taken into account when choosing rehabilitation tactics [6].

### **Purpose, subjects and methods:**

**1. The purpose of the study:** assessing the subjective vision of parents of children with paralytic syndromes regarding the impact of physical rehabilitation on chronic pain and their psycho-emotional state.

### **2. Subjects & Methods**

*Study design and setting.* This study is a non-interventional, descriptive, cross-sectional, single-center. We provided the individual rehab plan to each child, depending on age, motor dysfunction and comorbidities. Pain assessment and questionnaires of children's parents with paralytic syndromes were performed at the beginning of rehabilitation and after 6 months (end-point).

*Ethical approval.* This study was approved by the Local Ethics Committee (Protocol No.9 on 16 October 2018), which was conducted with the involvement of underage patients and did not include measures that could harm their health and safety. Both parents of the patients were informed about the methods and scope of the study and agreed to their children participation in this research.

*Sampling.* Data from 64 children and their mothers (64 persons) were included in the study. The age of the children ranged from 1 to 6 years, the median age was 3 years and 3 months. Group Ia included 38 surveyed children with paralytic syndromes and chronic pain: 24 (63.2%) boys and 14 (36.8%) girls,  $p=0.1212$ . To group Ib – 26 children with paralytic syndromes without chronic pain, 15 (57.7%) boys and 11 (42.3%) girls,  $p=0.4200$ . Inclusion criteria: children 1–6 years old with paralytic syndromes according to ICD-10 (cerebral palsy G80, hemiplegia G81, paraplegia

and tetraplegia G82, other paralytic syndromes G83) on the background of CNS damage caused by hypoxia, bleeding, thrombosis, trauma; congenital brain defects. Exclusion criteria: malignant neoplasms; HIV/AIDS; degenerative diseases of the nervous system, demyelinating diseases; chromosomal diseases; orphan diseases; and those who did not consent to participate in the study.

*Data collection.* The research included a detailed evaluation of medical records, including an "Individual Rehabilitation Plan". The Gross Motor Function Classification System (GMFCS) was used to provide a standardized assessment of limitations in gross motor function in patients with paralytic syndromes. The parents' interview was conducted using the "Original Questionnaire for Mothers/Legal Representatives (Guardians)" (Copyright No.88107, May 2019). It includes five domains: Domain 1 – "Condition of child" (mobility, walking; pain or discomfort; child's ability to calm down; scream baby while feeling pain or discomfort); Domain 2 – "Score of Rehabilitation" (evaluation of the child condition before and after rehabilitation on a scale from 0 to 10, and number of rehabilitation courses, and follow rehabilitation recommendations at home); Domain 3 – "Parental emotional state" (anxiety, agitation, sleep and support – 13 items). Each item provided at least three choices: "Most of the time", "Sometimes" or "Almost never". This publication contains the results of the analysis of Domain 3 depending on Domain 1 (item Pain or discomfort).

*Analysis.* Statistical analysis was performed with the programs Statistica 7.0 StatSoft Inc. 1984–2004, (Serial No. 1225555555, USA) and MedCalc version 14.8 (©1993–2014) MedCalc Software bvba (Acacialaan 22 B-8400 Ostend, Belgium). Descriptive analysis, comparison of two proportions were used. In-group changes were estimated with the help of frequency tables and crosstabulations function to have an opportunity to connect the frequency of display of observations at different levels. Logistic regression analysis using relative risk index (RR) and its 95% confidence interval (CI). The difference in parameters was considered statistically significant at  $p<0.05$ . To identify the relationship between adverse signs of psycho-emotional state of parents and the presence of chronic pain in their children before and after rehabilitation, the function of cross-tabulation of values of different frequencies of psycho-emotional state of parents from these questionnaires with only 100% answers. The con-

struction of the conjugation table allowed to combine the frequencies of observation at different levels of factors and to determine the relationship between the cross-tabulated values.

**Results**

The results of the survey of parents of children with paralytic syndromes of the general cohort (n=64) were developed in the logistic regression model to determine the relative risk of adverse events. And although we understand that this is a subjective opinion of parents, it nevertheless gives us a more detailed assessment of their psycho-emotional state, anxiety, satisfaction with rehabilitation measures. It is parental feedback that can improve approaches to treating their children and supporting families. The relative risk of motor activity and chronic pain was determined by subjective assessment of parents of children with paralytic syndromes (Table 1).

Although no chronic pain was detected on the r-FLACC and NCPCC-R scales in the assessment of children in group Ib, parents nevertheless believe that their children are in pain. According to our study, 34 (89.0%) children with group Ia had severe problems with motor activity, and it is important that parents subjectively admit severe disorders 22.5 times (RR=22.5; p=0.0015).

The subjective assessment of parents of the psycho-emotional state of their children with paralytic syndromes was analyzed (Table 2).

According to the subjective assessment of the psycho-emotional state of their own child, there were no differences between the parents of both groups, except for one symptom: the ability to calm down, which was characteristic of children of group IB (RR=3.9; 95% CI 1.7–13.0 p=0.0259).

The general condition of own children with paralytic syndromes "eyes of parents" before rehabilitation and after rehabilitation is analyzed (Table 3).

The general cohort did not identify significant changes in the general condition of children before rehabilitation and after rehabilitation "through the eyes of parents".

According to the subjective assessment of the condition of parents of their own children before rehabilitation and after rehabilitation showed that 3 (7.8%) children from group Ia improved their condition: from the worst condition to the average condition of 2 (5.2%) children and 1 (2.6%) the child is in the best condition. And among the children of Ib group also improved their condition 3 (11.5%) children: from the average to the best condition 3 (11.5%) children.

*Table 1. Relative risk (RR) of movement disorders and chronic pain according to the subjective assessment of parents of children with paralytic syndromes*

Indication	Data-out				RR	95% CI OR	p
	a	b	c	d			
The child has significant problems with walking	33	5	1	25	22.5	3.3–154.9	0.0015
The child is experiencing chronic pain	35	3	18	5	1.2	0.9–1.4	0.1737

Notes: a – children of group Ia with the presence of a sign; b – children of group Ia without a sign; c – children of Ib group with the presence of a sign; d – children of Ib group without a sign.

*Table 2. Relative risk (RR) of signs of psycho-emotional state of children with paralytic syndromes according to subjective assessment by parents*

Indication	Data-out				RR	95% CI OR	p
	a	b	c	d			
Ability to calm down	3	31	9	17	0.3	0.1–0.8	0.0259
Ability to calm down with periodic contact	21	17	14	12	1.1	0.6–1.6	0.9112
The difficulty of calming down	11	27	2	24	3.7	0.9–15.5	0.0677
Moaning or whining	30	8	16	10	1.3	0.9–1.8	0.1575
Constant shouting	5	33	3	23	1.1	0.3–4.4	0.8478

Notes: a – children of group Ia with the presence of a sign; b – children of group Ia without a sign; c – children of Ib group with the presence of a sign; d – children of Ib group without a sign.

Table 3. Relative risk (RR) of subjective parental assessment of children with paralytic syndromes before and after rehabilitation

Indication	Data-out				RR	95% CI OR	p
	a	b	c	d			
Before rehabilitation							
The worst condition	29	9	13	13	1,5	0.9–2.3	0.0502
The best condition	2	36	1	25	1,3	0.2–14.3	0.7935
After rehabilitation							
The worst condition	26	12	13	13	1,3	0.8–2.1	0.1632
The best condition	3	35	4	22	0,5	0.1–2.1	0.3542

Notes: a – children of group Ia with the presence of a sign; b – children of group Ia without a sign; c – children of Ib group with the presence of a sign; d – children of Ib group without a sign.

In general, according to the parents, 6 (9.4%) children with paralytic syndromes improved their general condition after rehabilitation.

Thus, we see that an important component of medical care for children with paralytic syndromes is the involvement of parents in the rehabilitation of their children, taking into account their views, which can improve the psycho-emotional state of parents and improve the psycho-emotional state of children.

When comparing the frequency of care and rehabilitation at home among a cohort of children with paralytic syndromes, we obtained the following data: 21/38 parents of children in group Ia do not worry about the condition of their children (RR=2.3; 95% CI 1.1–5.1; p=0.0239), this can be explained by the fact that parents already have emotional burnout or that parents perceive their

own child's condition and feel humble. That is why we see that 20/38 parents of children in group Ia do not perform rehabilitation measures at home compared to 6/26 Ib group (RR=2.2; 95% CI 1.0–4.8; p=0.0344).

When comparing the frequency of conditions that affect parents among a cohort of children with paralytic syndromes showed that parents of children in group Ia are concerned about 5/17 delay in physical development (RR=0.5; 95% CI 0.2–1.1; p=0.0813) and 3/14 convulsions (RR=1.1; 95% CI 0.3–5.0; p=0.8277), and parents of children in group Ib 10/10 delayed physical development (RR=2.2; 95% CI 0.9–5.3; p=0.0813) and 4/16 general condition of the child (RR=0.3; 95% CI 0.1–2.3; p=0.2520). We analyzed the answers to 12 questions of the domain of psycho-emotional state of parents (Table 4).

Table 4. Relative risk (RR) of psychoemotional disorders of parents of children with paralytic syndromes according to subjective vision

Indication	Data-out				RR	95% CI OR	p
	a	b	c	d			
Helplessness or fear	36	3	20	6	1.2	0.9–1.5	0.1190
Sadness and anger when a child cries	36	3	16	10	1.5	1.1–2.1	0.0122
Internal tension	38	0	17	9	1.5	1.2–2.1	0.0029
Insomnia	36	3	17	9	1.4	1.1–1.8	0.0215
It is unbearable to watch a child's suffering	38	0	16	10	1.6	1.2–2.2	0.0017
Concerned about the child's treatment	32	6	10	16	2.1	1.3–3.6	0.0024
Hyperopia of the child	29	9	10	16	1.9	1.2–3.3	0.0094
The inability of the child to lead a normal life	37	1	16	10	1.5	1.2–2.2	0.0035
Search for compassion or understanding	28	10	12	14	1.5	1.0–2.5	0.0446
Inner anxiety, a sense of possible trouble	35	3	15	11	1.5	1.1–2.2	0.0074

Notes: a – children of group Ia with the presence of a sign; b – children of group Ia without a sign; c – children of Ib group with the presence of a sign; d – children of Ib group without a sign.

According to the frequency of psycho-emotional disorders of parents of children with paralytic syndromes, according to subjective vision, "Helplessness or fear" is common in both groups. If children with paralytic syndromes have chronic pain, it affects not only the condition of children but also the psycho-emotional state of the parents themselves, namely: "Concern about the treatment of the child" is reduced by half (RR=2.1; p=0.0024), "Hyperopia of the child" – twice (RR=1.9; p=0.0094), "Intolerance to observe the suffering of the child" – one and a half times (RR=1.6; p=0.0017), "Sadness and anger when a child cries" – one and a half times (RR=1.5; p=0.0122), "Internal tension" (RR=1.5; p=0.0029), "Insomnia" (RR=1.5; p=0.0215), "Child's inability to lead a normal life" (RR=1.5; p=0.0035), "Search for compassion or understanding" (RR=1.5; p=0.0446), "Inner anxiety, a sense of possible trouble" (RR=1.5; p=0.0074). Of the 12 questions asked, 9 showed profound violations of the psycho-emo-

tional state of parents of children with paralytic syndromes.

We tabulated the values of different frequencies of psycho-emotional state of parents of children with paralytic syndromes before rehabilitation and after rehabilitation. Only questionnaires with 100% answers were involved in the cross-tabulation function. The aim was to find out the relationship between the unfavorable signs of psycho-emotional state of parents and the presence of chronic pain and their children before and after rehabilitation. The construction of the conjugation table allowed to combine the frequencies of observation at different levels of factors and to determine the relationship between the cross-tabulated values.

We did not compare the objective assessment of chronic pain in children with the help of scales and the subjective vision of the parents of children with paralytic syndromes, but only the subjective vision of parents before rehabilitation and after rehabilitation (Table 5).

Table 5. Conjugation of observation frequencies at different levels of factors between crustabilized values

Question	Answer	Cross-tabulated values						p
		Before rehabilitation	Total n=51	%	After rehabilitation	Total n=34	%	
Feelings of inner anxiety	Sometimes	35	44	86.2	15	21	61.7	0.0125
	Most of the time	9			6			
Conversation with a psychologist	Sometimes	25	33	64.7	11	15	44.1	0.0591
	Most of the time	8			4			
Search for compassion or understanding	Sometimes	33	34	66.6	16	17	50.0	0.1205
	Most of the time	1			1			
Concern to lead a normal life	Sometimes	24	45	88.2	14	29	85.2	0.6900
	Most of the time	21			15			
Concerns about over-care	Sometimes	23	35	68.6	12	23	67.6	0.8467
	Most of the time	12			11			
Concerns about pain management	Sometimes	25	36	70.5	12	21	61.7	0.3883
	Most of the time	11			9			
It is unbearable to monitor the child's condition	Sometimes	23	46	90.1	11	20	58.8	0.0012
	Most of the time	23			13			
I do not sleep well because of the child's condition	Sometimes	33	48	94.1	16	25	73.5	0.0109
	Most of the time	15			9			
Sleepless nights due to the condition of child	Sometimes	31	44	86.2	16	23	67.6	0.0401
	Most of the time	13			7			
Internal tension	Sometimes	32	46	90.1	17	24	70.5	0.0269
	Most of the time	14			9			
I feel upset or angry	Sometimes	30	44	86.2	17	25	73.5	0.1691
	Most of the time	14			8			
Helpless or scared	Sometimes	13	31	60.7	11	16	47.0	0.2069
	Most of the time	18			5			

According to the conjugation table, we obtained the following values of the psycho-emotional state of parents of children before rehabilitation by rank: "I do not sleep well because of the child's condition" 44 (94.1%); "It is intolerable to observe the condition of the child" 46 (90.1%); "Internal tension" 46 (90.1%); "Concern to lead a normal life" 45 (88.2%); "Feelings of inner anxiety" 44 (86.2%); "Sleepless nights due to the condition of the child" 44 (86.2%); "I feel upset or angry" 44 (86.2%); "Concerns about the treatment of pain" 36 (70.5%); "Concerns about excessive care" 35 (68.6%); "Search for compassion or understanding" 34 (66.6%); "Conversation with a psychologist" 33 (64.7%); "Helplessness or fear" 31 (60.7%).

It is worth noting that the two psycho-emotional states "Unbearable to watch the child's condition" and "Helplessness or fear" parents experienced most of the time.

After rehabilitation measures, psycho-emotional disorders of parents remained, but we recorded a statistically significant decrease in their frequency among 5 signs: "Intolerable observation of the child's condition" decreased by 31.3% ( $p=0.0012$ ); "Feelings of inner anxiety" decreased by 24.5% ( $p=0.0125$ ); "I fall asleep badly due to the child's condition" decreased by 20.6% ( $p=0.0109$ ); "Internal tension" decreased by 19.6% ( $p=0.0269$ ); "Sleepless nights due to the condition of the child" decreased by 18.6% ( $p=0.0401$ ).

Not statistically significant, but the following signs tended to decrease: "Conversation with a psychologist" decreased by 20.6%; "Search for compassion or understanding" decreased by 16.6%; "Helplessness or intimidation" decreased by 13.7%; "Anxiety to lead a normal life" decreased by 3%; "Feeling upset or angry" decreased by 12.7%; "Concerns about pain treatment" decreased by 9.0%; "Concerns about excessive care" decreased by 1.0%.

### Discussion

According to one study, the psychological and physical health of caregivers, most of whom were mothers, was highly dependent on the child's behavior and care requirements. Problems with children's behavior were an important factor in the psychological well-being of caregivers, both directly and indirectly, because of their impact on self-perception and family functions. Care requirements directly affect both the psychological and physical health of caregivers. The practical daily needs of the child created problems for parents [7, 8].

These data confirm the influence of the emotional state of parents directly on the emotional state of children [9, 10]. Strategies for optimizing the physical and psychological health of the caregiver include support for behavioral management and daily functional activity, as well as stress management techniques [11, 12].

Most rehabilitation programs for children with paralytic syndromes for several decades have been aimed at normalizing motor functions, ensuring normal posture and independent functional activity of the child, regulating muscle tone, improving visual and auditory responses, supporting motor development and motor control, preventing joint contractures, and more. According to experts, setting individual realistic goals, setting priorities, informing the family and strengthening its participation increase the effects of physical therapy [13, 14].

But the effectiveness of physical therapy in children with paralytic syndromes, according to many researchers, is not based on sufficient scientific evidence. To assess the effectiveness of physical therapy, the use of indicators such as type of exercise, their frequency, intensity and duration has been demonstrated [14].

For example, a recent review of evidence-based approaches to physical therapy for children with cerebral palsy, published in 2019, demonstrates that the effectiveness of most interventions is limited. Despite the recognition of the effectiveness of individual targeted approaches to rehabilitation, future research is needed to determine the best ways to improve functional outcomes in children [15, 16].

Our own study did not include a thorough analysis of a particular approach, type of exercise and their intensity in the provision of rehabilitation services to children with paralytic syndromes. We used a multidisciplinary approach based on the individual needs of a young patient, used a time interval of 6 months, GMFCS, and, the main task was to determine the impact of physical therapy on chronic pain in children with paralytic syndromes, objective and subjective assessment by parents, and their emotional state.

A review of publications from 1990 to 2011, which included research to determine the experience of parents with the treatment of their child, where a quarter of the child population was under five, children received physical and/or occupational therapy in the rehabilitation program, provided a conceptual basis for that the experience of parents is closely related to the quality of interven-

tion for the child [16–18]. This review evaluated 13 studies (eight qualitative and five quantitative). Parents expressed different aspects of their own experiences, had different needs, and needed time to establish a relationship with their child's physical therapist [19].

Our questionnaire created the conditions for closer interaction between the physical therapist and parents, as we took into account the experience of parents (their assessment of rehabilitation), their emotional state, awareness that the child has chronic pain and the ultimate importance of the wider family context.

Equally important is the fact that physical therapists have received feedback on the subjective assessment of children's pain "through the eyes of parents" and their emotional state. A Finnish survey of 201 members of a multidisciplinary team and 311 physiotherapy providers found that they tended to be positive about their family-oriented service. However, research has shown that a family-oriented approach increases with increasing experience of the specialist [17, 20].

Therefore, our research and the proposed questionnaire can be used to identify areas for improvement not only by our team of professionals, but also for use by other rehabilitation practices.

Children with paralytic syndromes have a number of factors that cause pain [21]. To date, there is little empirical evidence that pain is better assessed clinically, and the search for pain assessment in recent decades has led to the development and use of standardized pain assessment tools, and research and broad international cooperation continue and cognitive impairment [22].

Although researchers recognize that pain in children with intellectual disabilities is a common and complex phenomenon, there are no standard educational components for caregivers or guardians of such children [23, 24]. Our study focuses on information for parents and professionals that nonverbal children (1 to 6 years old) with paralytic syndromes may have chronic pain, and they should be monitored for pain that parents can use with a physical therapy professional. pain assessment tool and gain experience in measuring it.

Of the existing tools for assessing pain in nonverbal children, we selected two scales, r-FLACC and NCCPC-R. The selection of the r-FLACC scale was based on the findings of clinicians from three medical centers who reviewed 15 videos of observations of children with neurological disorders using three pain assessment tools and preferred this scale. In addition, clinicians' scores

correlated with parental scores ( $p < 0.001$ ) and the reliability of testing and retesting was confirmed by strong correlations ( $r = 0.8–0.883$ ;  $p < 0.001$ ) [25–27].

In our opinion, the study from 2011 to 2014 on the determination of pain in a cohort of children with developmental disorders ( $n = 544$ ) who visited an outpatient clinic is interesting. In contrast to our study, the mean age of children was 14 years, with one-third of all children having cerebral palsy. Along with emotional disorders (anxiety and depression), children were diagnosed with chronic pain and even one that required treatment at tertiary care. The authors of the study believe that pain assessment should be a routine practice of all multidisciplinary teams [28, 29].

According to one study, the psychological and physical health of caregivers of children with paralytic syndromes was highly dependent on the child's behavior and childcare requirements. Problems with children's behavior have been an important factor in the psychological well-being of caregivers, both directly and indirectly, because of their impact on self-perception and family functions [30, 31]. These data confirm the influence of the emotional state of mothers directly in the first place on the emotional state of children and vice versa [8].

Strategies to optimize the physical and psychological health of the caregiver include support for behavioral management and daily functional activity, as well as stress management techniques. Therefore, it is very important for specialists of multidisciplinary teams to know the emotional state of parents to correct their quality of life, the effectiveness of clinical interventions and care [32].

### Conclusions

The authors consider that physical rehabilitation in children with paralytic syndromes reduces the incidence of moderate chronic pain and improves the emotional state of parents. So, we think that new approaches to rehabilitation should be applied with daily management of the children with paralytic syndromes' needs and their families with increased psychological and social support. Perhaps the searching for new approaches that optimize more intensive and effective rehabilitation strategies using the family reserve will provide the potential for adaptability of nerve plasticity and recovery in such a contingent of children and prospects for the future.

**DECLARATIONS:**

**Statement of Ethics**

The authors have no ethical conflicts to disclose.

**Consent for publication**

All authors give their consent to publication.

**Disclosure Statement**

The authors have no potential conflicts of interest

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The data can be requested from the authors.

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