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OPTIMIZATION AND ANALYSIS OF THE EFFECTIVENESS OF COMPREHENSIVE THERAPEUTIC AND REHABILITATION PROGRAMS FOR CEREBRAL PALSY IN A MODERN MULTIDISCIPLINARY HEALTHCARE INSTITUTION

Kayumov Otabek Oybekovich, Toyirov Diyorbek Azamatovich, Unarov Elbek Saidullaevich, Mamarasulov Sirozhiddin Kamol ugli
Clinic coordinator Department of Neurology Samarkand State Medical University

Kasimov Arslanbek Atabaevich
PhD in Medical Sciences, Associate Professor, Department of Neurology Samarkand State Medical University

Abstract: Cerebral palsy (CP) represents a group of permanent disorders of the development of movement and posture, causing activity limitation, which are attributed to non-progressive disturbances that occurred in the developing brain during the perinatal period. According to current epidemiological data, the prevalence of cerebral palsy is 2-3.6 cases per 1,000 live births and has remained stable over the past decades, despite significant progress in perinatology and neonatology.

Keywords: Cerebral palsy, multidisciplinary rehabilitation, interdisciplinary approach, neurorehabilitation, early diagnosis, functional outcomes, robotic mechanotherapy, orthopedic correction, neurophysiological methods, evidence-based medicine, telemedicine technologies, quality of life.

Introduction: The multifactorial nature of the disease, heterogeneity of clinical manifestations, and high frequency of comorbidities (cognitive, speech, visual, auditory) necessitate a differentiated approach to the diagnosis and treatment of this patient category. The modern concept of care for children with cerebral palsy is based on the principles of early intervention, comprehensiveness, continuity, and succession of rehabilitation measures, which requires coordination of efforts from various specialists and implementation of innovative technologies. Cerebral palsy (CP) represents a group of permanent disorders of the development of movement and posture, causing activity limitation and motor impairments, attributed to non-progressive disturbances that occurred in the developing brain of the fetus or newborn. According to epidemiological studies, the prevalence of CP is 2-3.6 cases per 1,000 live births and remains relatively stable over the past decades, despite improvements in perinatal care. The relevance of the problem is determined not only by the prevalence of this pathology but also by significant disability of patients, high frequency of comorbidities, and substantial socio-economic burden on the healthcare system and society as a whole. The modern concept of rehabilitation for CP is based on principles of a multidisciplinary approach, early intervention, continuity, staging, and comprehensiveness of therapeutic and rehabilitation measures. The results of numerous studies indicate that rehabilitation effectiveness is determined not only by timely diagnosis and early intervention but also by appropriate selection of techniques, their combination, and integration into a unified therapeutic program considering the individual characteristics of the patient, form, and severity of the disease. In recent years, significant changes have occurred in approaches to providing care for children with CP. The implementation of the International Classification of Functioning, Disability and Health (ICF) into clinical practice, development of standardized scales for assessing motor functions, modern rehabilitation technologies, and high-tech treatment methods have created prerequisites for optimizing the therapeutic and rehabilitation process. However, despite significant progress in rehabilitation science, many issues regarding the organization of effective care

for patients with CP remain unresolved. One of the key problems is insufficient integration of various techniques and technologies into a unified system of comprehensive rehabilitation within multidisciplinary medical institutions. Fragmentation of rehabilitation measures, lack of continuity between stages, insufficient use of modern criteria for effectiveness evaluation, and personalization of programs reduce the effectiveness of the therapeutic and rehabilitation process. Of particular relevance is the issue of optimizing comprehensive therapeutic and rehabilitation programs for children with CP in modern healthcare system conditions, considering resource limitations and the need to improve the effectiveness of medical care. The development and implementation of scientifically based algorithms for comprehensive rehabilitation, based on evidence-based medicine, with an assessment of their clinical and economic effectiveness, is of significant scientific and practical interest.

The purpose of this study is to optimize and analyze the effectiveness of comprehensive therapeutic and rehabilitation programs for cerebral palsy in a modern multidisciplinary healthcare institution based on an interdisciplinary approach and principles of evidence-based medicine. The study aims to address the following tasks: development and implementation of personalized rehabilitation algorithms considering CP forms, age characteristics, and comorbidities; assessment of the clinical effectiveness of various combinations of rehabilitation techniques; analysis of organizational aspects of integrating high-tech methods into the comprehensive rehabilitation system; development of criteria for evaluating the effectiveness of therapeutic and rehabilitation measures based on the ICF.

Research Objective. To study and analyze the activities of the pediatric neurology department regarding cerebral palsy: clinical features, diagnosis, treatment, and rehabilitation.

Materials and Methods. Based on the analysis of patients who underwent outpatient examination (initial assessment) followed by hospitalization in the pediatric neurology department during 2024 (January-December), with a diagnosis of "cerebral palsy" using standardized neuromotor assessment. During the reporting period, 1773 children aged from 1 to 18 years were examined by a pediatric neurologist at the polyclinic (Medical Complex of Samarkand State Medical University), of which 1200 children were suspected of having cerebral palsy. All children were examined by a pediatrician, ophthalmologist, dentist, orthopedist, and in some cases by a neurosurgeon and psychiatrist. In accordance with the examination standard, laboratory tests included a complete blood count with detailed biochemical analysis, general urinalysis, and stool analysis. Initial instrumental methods included ECG, EEG, echo-EG; in most cases, neuroimaging of the brain was performed using CT, MSCT, and MRI. In older children, when necessary, USDG of brachiocephalic vessels and ENMG were performed (more for differential diagnosis).

Results. After studying the clinical signs and level of intensity of lesions in cerebral palsy among the examined patients, patterns were identified that describe the diversity of disease course, determined by the size and area of brain damage; additionally, the intensity and duration of treatment were important factors. At the first stage of work, it was determined that the number of visits to the polyclinic of the Medical Complex of Samarkand State Medical University by children with suspected cerebral palsy was 1200 children. After comprehensive examination (using the methods indicated above), 845 patients were diagnosed with cerebral palsy, and after diagnosis, 840 children were transferred to inpatient treatment (parents of 5 patients preferred treatment in Tashkent), of whom 58% were boys and 42% were girls. By age characteristics, the study included 198 children aged 1 to 3 years, 396 from 3 to 7 years, 199 from 7 to 12 years, and 47 from 12 to 18 years, with the highest percentage of children with motor disorders in the age range from 3 to 12 years. In the city of Samarkand, 269 children resided, while the remaining 571 children were hospitalized in the pediatric neurology department from the Samarkand region (a large number from Urgut and Pasdargom districts, 165/112). In the individual examination of patients by topographic forms and in accordance with ICD-10, the most frequent forms detected were spastic diplegia (Little's disease) G 80.1, 30.4% and double hemiplegia (quadriplegia) G 80.0, 29.5%, which coincides with literature data (Sazonova N.V., Popkov D.A., 2015; Mavlyanova Z.F., 2024); infantile hemiplegia G 80.2, 20%; dyskinetic cerebral palsy G 80.3, 11.2%; ataxic cerebral palsy G 80.4, 6.6%; mixed and other forms of cerebral palsy G 80.8, 3.3%. Considering the globally accepted standard and correctness of patient assessment in the

dynamics of research results, the classification of communicative functioning and scales for objective measurement of motor functions were used: GMFM-88, GMFCS, CFCS scales.

Conclusions. The development of a rehabilitation system for children with cerebral palsy should be based on the principles of early diagnosis, multidisciplinary approach, and individualization of treatment and rehabilitation programs considering the form of the disease, the child's age, and comorbidities. A specialized multidisciplinary clinic provides optimal conditions for comprehensive diagnosis and rehabilitation of children with cerebral palsy through the integration of efforts from various specialists (neurologists, orthopedists, rehabilitation specialists, neurophysiologists, psychologists, speech therapists, etc.) and the application of modern technologies. The implementation of innovative neurorehabilitation methods, including robotic mechanotherapy, computerized trainers with biofeedback, virtual reality, and neuromodulation, significantly increases the effectiveness of restorative treatment and expands the rehabilitation potential of patients with cerebral palsy.

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