MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY STATE UNIVERSITY
MEDICAL INSTITUTE

Eastern Ukrainian Medical Journal

2, Rymskogo-Korsakova st., Sumy 40007, Ukraine
e-mail: EUMJ@med.sumdu.edu.ua
eumj.med.sumdu.edu.ua
ISSN: 2663-5909 (print)

ABSTRACT

DOI: https://doi.org/10.21272/eumj.2022;10(4):360-367

Kateryna Holiuk[1]
https://orcid.org/0000-0002-5298-9389
Nataliya Kuksa[2]
Liudmyla Taramak[1]
Olha Klishch[1]

[1]*Department of Pediatrics, Sumy State University, Sumy, Ukraine;*
[2]*Department of Health, Physical Therapy, Rehabilitation and Occupational Therapy, Sumy State Pedagogical University named after A. S. Makarenko, Sumy, Ukraine*

THE ROLE OF A PHYSICAL THERAPIST IN THE CATAMNESIS SYSTEM

Numerous scientific and clinical studies demonstrate an increase in the number of children born prematurely and with perinatal pathology. After discharge from perinatal centers, they form risk groups for chronic, disabling diseases development. Such children are usually more socially isolated, characterized by attention deficit and greater hyperactivity compared to full-term children.

Physical therapists play an important role in monitoring motor development and detecting delays, as well as informing parents about possible difficulties that may be observed in such children.

Materials and methods. The study included 36 children who were being treated at the Ukrainian North-Eastern Institute of Applied and Clinical Medicine in Sumy. By gender, there were 22 (61.1%) male children and 14 (38.9%) female children. The birth weight ranged from 1090 to 2440 g. All children had a history of perinatal hypoxic-ischemic lesions of the central nervous system, periventricular ischemia of various degrees. A third of the children were diagnosed with subependymal hemorrhage and cerebrospinal fluid hypertension of various degrees.

Based on the results of studying the anamnesis, interviewing parents, and detailed information, the main and control groups were formed and the strategy for the habilitation program implementation was determined. Both groups included 18 children aged 13 to 23 months. The children of the control group underwent the habilitation course according to the standard program, while the children of the main group were treated according to the developed experimental physical therapy program.

Results. The results of the experimental study showed positive changes in children's weight; muscle tone of the lower and upper limbs; motor, sensory, adaptive, and social behavior of children.

Conclusions. A complex of medical, rehabilitation, pedagogical, logopedic therapy, and other measures should be started already in the first year of life. It is important to ensure the sequence of stages of recovery measures. Rehabilitation started at the wrong time may prove to be ineffective. All interventions should be selected individually for each child, carried out with the support and supervision of an occupational therapist, and in close cooperation with parents and physiotherapists/occupational therapists.

Key words: habilitation, premature children, perinatal pathology, catamnesis, occupational therapist, physical therapist.

Corresponding author: *Kateryna Holiuk, Department of Pediatrics, Sumy State University, Sumy, Ukraine*
e-mail: k.holiuk@med.sumdu.edu.ua

РЕЗЮМЕ

Катерина Голюк[1]
https://orcid.org/0000-0002-5298-9389
Наталія Кукса[2]
Людмила Тарамак[1]
Ольга Кліщ[1]

[1]*Кафедра педіатрії навчально-наукового медичного інституту СумДУ, м. Суми, Україна;*
[2]*Кафедра здоров'я, фізичної терапії, реабілітації та ерготерапії навчально-наукового інституту фізичної культури СумДПУ ім. А. С. Макаренка, м. Суми, Україна*

РОЛЬ ФІЗИЧНОГО ТЕРАПЕВТА В СИСТЕМІ КАТАМНЕСТИЧНОГО СПОСТЕРЕЖЕННЯ

Численні наукові та клінічні дослідження демонструють підвищення кількості дітей, які народились передчасно з перинатальною патологією. Після виписки з перинатальних центрів вони формують групи ризику з розвитку хронічних, інвалідизуючих захворювань. Такі діти зазвичай більш соціально ізольовані, характеризуються дефіцитом уваги і більшою гіперактивністю в порівнянні з доношеними дітьми.

Фізичні терапевти відіграють важливу роль у моніторингу моторного розвитку і виявленні затримок, а також в інформуванні батьків про можливі труднощі, які можуть спостерігатися у таких дітей.

Матеріали та методи. У дослідження включено 36 дітей, які знаходилися на лікуванні в Українському північно-східному інституті прикладної та клінічної медицини м. Суми. За гендерною характеристикою ми виділили 22 (61,1%) дітей чоловічої і 14 (38,9%) дітей — жіночої статей. Маса при народженні коливалася у межах 1090–2440 г. Всі діти в анамнезі мали перинатальне гіпоксично-ішемічне ураження центральної нервової системи, перивентрикулярну ішемію різного ступеню. У третини дітей діагностували субепендимальний крововилив та ліквoрну гіпертензію різного ступеню.

За результатами вивчення анамнезу, опитування батьків та детально зібраної інформації формувалися основна і контрольна групи та визначалася стратегія реалізації абілітаційної програми. До складу обох груп входило по 18 дітей віком від 13 до 23 місяців. Діти контрольної групи проходили курс абілітації за стандартною програмою, діти основної групи – за розробленою експериментальною програмою фізичної терапії.

Результати. Результати експериментального дослідження показали позитивну динаміку показників маси тіла дітей, оцінки м'язового тонусу нижніх і верхніх кінцівок, моторну, сенсорну, адаптивну і соціальну поведінку дитини.

Висновки. Комплекс лікувальних, реабілітаційних, педагогічних, логопедичних та інших заходів треба починати вже на першому році життя. Важливо забезпечити наступність етапів відновлювальних заходів. Реабілітація, що розпочата невчасно, може виявитися малоефективною. Всі втручання індивідуалізуються для кожної дитини, здійснюються за підтримки та під контролем ерготерапевта і проводяться у тісній співпраці батьків і фізичних терапевтів/ерготерапевтів.

Ключові слова: абілітація, передчасно народжені діти, перинатальна патологія, катамнестичне спостереження, ерготерапевт, фізичний терапевт.

Автор, відповідальний за листування: *Катерина Голюк, кафедра педіатрії НН МІ СумДУ, м.Суми, Україна*
e-mail: k.holiuk@med.sumdu.edu.ua

How to cite / Як цитувати статтю: Holiuk K, Kuksa N, Taramak L, Klishch O**.** The role of a physical therapist in the catamnesis system. *EUMJ*. 2022;10(4):360-367
DOI: https://doi.org/10.21272/eumj.2022;10(4):360-367

INTRODUCTION / ВСТУП

The population's health is an integral indicator of the country's overall development, a reflection of its socio-economic condition. It is one of the factors in the formation of the demographic and cultural potential of society.

Numerous scientific and clinical studies demonstrate an increase in the number of children born prematurely with perinatal pathology; after discharge from perinatal centers, they form risk groups for developing chronic, disabling diseases [1, 2]. They also have social adaptation disorders that require a wide range of continuous specialized assistance [3, 11].

Such children are usually more socially isolated, characterized by attention deficit and greater hyperactivity compared to full-term children. Cognitive impairment and delayed psychomotor development in this population may be the cause of these problems [4, 7].

Physical and occupational therapists play an important role in monitoring motor development, identifying delays, and informing parents of possible difficulties that may be observed. Neuroplasticity, adaptive capabilities of the brain are those mechanisms, the use of which in the process of physical therapy of such children allows for minimizing the possible consequences of perinatal pathology, primarily associated with the risk of neuromotor dysfunction, provided timely, adequate and qualified rehabilitation assistance [8].

In Ukraine, several new directions have been identified within the framework of reforming and improving the healthcare industry: "Medical assistance in complex neonatal cases" and "Rehabilitation of children." These aid packages included such proposals as the provision of services for catamnestic observation of prematurely born children and children with perinatal pathology from birth to 3-year age; formation of an individual rehabilitation plan drawn up by a multidisciplinary team in partnership with parents/guardians and the child; the mandatory presence of a physical and rehabilitation medicine doctor and/or a physio therapeutist in the team [5].

An occupational therapist focuses work on the issue of occupational activity, namely:

- Child's play, including with parents and peers
- Development of skills, including emotional and volitional control, for adequate socialization
- Self-care, primarily all aspects of feeding. Also, dressing and hygiene
- Arrangement of the environment (developing and adapted)
- Safety of the child, especially when independent
- Development of fine motor skills

The physical therapy program for young children who were born prematurely with perinatal pathology has a comprehensive approach to applying habilitation techniques [12].

They take into account general and individual features, the nature of the main and accompanying lesions of organs and systems in combination with a program of medical and social support.

Objective

The aim of this study was to develop a comprehensive program of physical therapy for young children who were born prematurely with perinatal pathology.

Material and methods

The study included 36 children who were being treated at the Ukrainian North-Eastern Institute of Applied and Clinical Medicine in Sumy. By gender, we identified 22 (61.1%) male children and 14 (38.9%) female children. The weight at birth ranged from 1090 to 2440 g. When analyzing the anthropometric data at birth, it was determined that the body length ranged from 35 to 44 cm, the average body length was 39.0±2.45 cm. The average head circumference was 27 .9±1.42 cm, the maximum value was 31 cm, and the minimum value was 25 cm. The indicator of the condition of newborns according to the Apgar scale in the first

minute ranged from 1 to 6 points, at the fifth minute – 5 to 7 points, with no statistical difference between gender groups of the children. All children had a history of perinatal hypoxic-ischemic lesions of the central nervous system, periventricular ischemia of various degrees. A third of the children were diagnosed with varying degrees of subependymal hemorrhage and cerebrospinal fluid hypertension.

The main and control groups were formed based on the results of studying the anamnesis, interviewing parents, and detailed information collected. The strategy for the implementation of the habilitation program was determined. Both groups included 18 children (7 girls and 11 boys) aged from 13 to 23 months. The children of the control group underwent the habilitation course according to the standard program, the children of the main group were treated according to the developed experimental physical therapy program.

Based on the data of medical records (medical records and discharge from the maternity hospital), the following parameters were determined: children's passport data, birth weight, body length, head circumference, gestational age, Apgar score at 1 and 5 minutes, duration of stay in ICU and respiratory support, maternal history, presence of hypoglycemia, IUGR, maternal age during pregnancy; symptoms and features of the pathological condition of a specific child; accompanying disorders; prescribed movement regimes and methods of treatment for children who participated in the experimental study.

An assessment of the child's physical and mental development was carried out. To assess the level of physical development, we used anthropometric studies, which included the measurement of body length (BL), body weight (BW), and head circumference (HC).

The degree of spasticity of the muscle tone was determined by the degree of resistance of the muscle during its stretching. The assessment was carried out according to the modified Ashworth scale (Modified Ashworth scale – Bohannon R.W., 1987) in points:

0 points – no increase in muscle tone;

1 point – a slight increase in muscle tone, muscle dystonia;

2 points – a moderate increase in muscle tone during the majority of movements; passive movements are easily performed;

3 points – a significant increase in muscle tone; passive movements are difficult;

4 points – muscle stiffness, complete lack of movement.

All measurements were carried out in accordance with international standards. The description of the central regularity and the degree of dispersion of the sample was carried out using the average arithmetic value (M), the variability of the feature was characterized by calculating the standard error of the average (s).

The research data bank was maintained using Microsoft Excel 2010 software (license number 01631-551-3027986-27852). All calculations were performed using Statsoft Statistica 8.0 (license number STA862D175437Q).

Results and discussion

Children with disabilities are usually delayed in their development compared to healthy children in one or more aspects of development, such as, for example, motor, sensory, or mental levels.

The physical therapy algorithm for young children who were born prematurely with perinatal pathology of the central nervous system consisted of the following stages:

1. Assessment of the risk of violations in children (Table 1);
2. Formulation of the goals of physical therapy;
3. Planning and carrying out rehabilitation interventions (adherence to recommended dietary therapy, hydrokinesitherapy and group play classes "Yoga for children").

We used the algorithm for assessing the risk of disorders in premature children with perinatal pathology to implement the first stage. For each clinical sign, its presence or absence was determined, and corresponding prognostic factors were added. When the threshold sum of coefficients is reached using the scale, the risk group was determined:

- if the sum of prognostic coefficients is equal to or lower than -19.8, the risk is minimal;

- if the sum of prognostic coefficients is greater than -19.8 and less than 19.8, the risk is uncertain;

- if the sum of predictive coefficients is equal to or higher than 19.8, the risk is high.

The formulation of physical therapy goals was based on a detailed examination of the child and the identification of critical problems. The goals were determined jointly with parents and other multidisciplinary team members (neurologist, occupational therapist, psychologist). An individual habilitation program was developed for each child.

Table 1 – Algorithm for assessing the risk of disorders in prematurely children with perinatal pathology

№	Sign, units of measurement	Gradation	Prognostic value
1	Body weight at birth, g	> 1800	-8,9
		1501–1800	+4,0
		1001–1500	+4,1
		< 1000	+9,5
2	Gestational age, week.	> 34	-3,3
		32–34	+2,5
		< 32	+4,8
3	Mother's age	≤ 30	-8,0
		> 30	+2,7
4	Obstetric and gynecological anamneses	abortions	+4,0
		frozen pregnancy	+7,5
		IVF	+10,0
5	Length of stay in the neonatal intensive care unit	≤ 1 week	-5,2
		> 1 week	+2,0
6	Terms of respiratory support, days	< 3	-5,4
		3–7	+1,3
		> 7	+2,2
7	Score on the Apgar scale for 10 minutes, points	< 3	-6,0
		5–6	-0,5
		> 6	+4,0
8	Intraventricular hemorrhages	I st.	-1,3
		II st., ICH	+3,2
		Neurosurgery	+7,3
9	IUGR II–III st.	No	-5,2
		Yes	+0,7
10	Hypoglycemia	Transitional	-1,3
		Constant	+2,0
		Stable lasting	+3,6

The International Classification of Functioning, Limitations of Vital Activities and Health (ICF) is a standardized tool for a unified approach to physical therapy and the direction of activities of the occupational therapist / physical therapist and other team members.

After taking into account the presence of neurological symptoms in children, diet therapy with the correct content of proteins, fats, carbohydrates, vitamins, and minerals was selected. First of all, mothers are recommended to continue breastfeeding up to 2 years of age.

A child's daily diet consists of the following:

- meat/fish (veal, beef, turkey, chicken, rabbit, sea fish) boiled, stewed, or chopped;
- necessarily a variety of cereals on water and milk (buckwheat, oat, rice, barley, wheat, corn, millet);
- use bread and bakery products with the addition of bran;
- it is recommended to use only those vegetables and fruits that are grown in our region; this is due to the chemical composition of the soil and water of different geographical zones;
- milk and fermented milk products (cheese, kefir, "Narine," yogurt, "Bifivit," etc.)
- homemade pastries and sweets;
- during the day, give a sufficient amount of clean drinking water at the child's request.

Parents were invited to visit the pool with their children.

The duration of the initial individual lesson was 45 minutes. Classes with an instructor were held 2–3 times a week, every other day. The duration of the course equaled 1 month. In group classes, there were 6 children together with mom/dad simultaneously.

Play is a natural way of learning, expressing joy and other feelings, starting from childhood [6]. With the help of the game "Yoga for little ones" (Figure 1), various areas of the child's development were developed (Table 2).

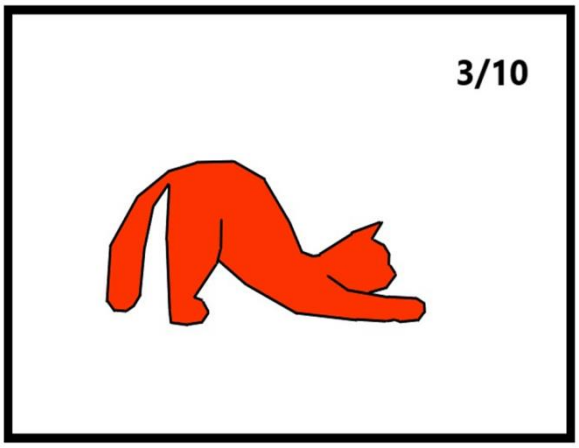

Figure 1 – Yoga card "Cat stretching"

The results of the experimental study showed positive dynamics of children's body weight indicators, assessment of muscle tone of the lower and upper limbs, motor, sensory, adaptive and social behavior of the child [9, 10].

The average percentage deviation of the main group child's body weight from the norm's lower limit increased by 182.2%, and in the control group, it increased by 14.5%. Before the study, this indicator of the main group was 3.5%, after the experiment – 9.8%. The indicator of the control group before the experiment was 2.1%, after the study was 2.3% (Figure 2).

We can note that in the main group, the dynamics of the decrease in the index of muscle tone of the limbs according to the modified Ashforth scale was observed 25.0% more often than in the control group.

The growth dynamics of the motor-sensory behavior index in the main group was observed 43.8% more often than in the control group.

Table 2 – Spheres of child development

Fine motor skills	Relaxation	Memory
Gross motor skills	Voltage reduction	Imagination
Speaking skills	Processing emotions	Creativity
Eye contact	Self-confidence, self-esteem	Attentiveness
Decision-making	Thinking	Perception
Cooperation	Trust in others	Observation

According to the analysis of adaptive behavior in the main group of children, there were 5 cases of increased indicators in the experimental children, which amounted to 31.3%, and 11 cases when the indicator did not change (68.7%).

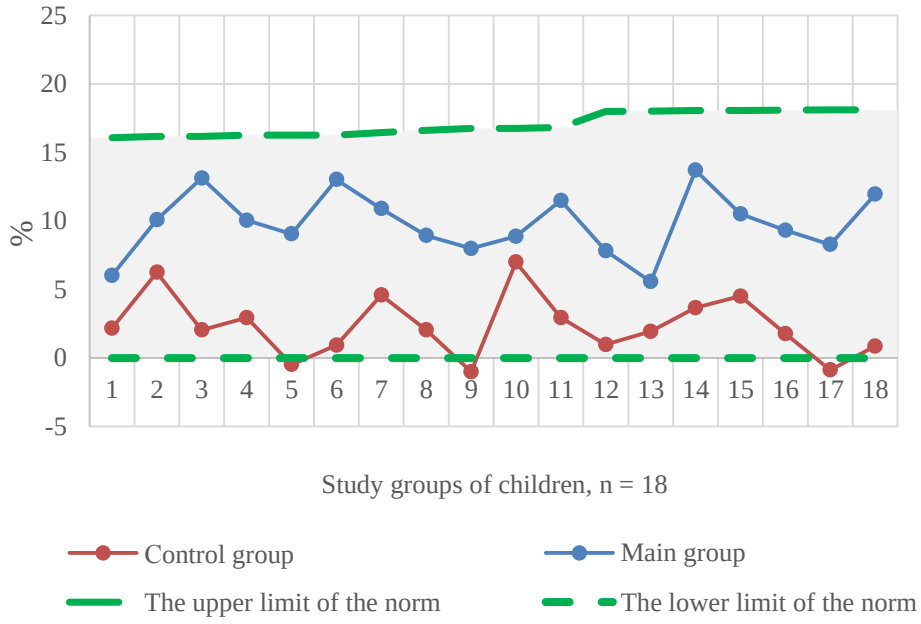

Figure 2 – Indicators of percentage deviation of the body weight of the control and main groups after the experiment

We can note that in the main group, the growth dynamics of the adaptive behavior indicator was observed 12.5% more often than in the control group children.

Analyzing the indicator of social and personal behavior in children, we have the following changes in the main group, namely, the dynamics of growth was observed 68.7% more often than in children of the control group.

The study results show that interventions based on motor learning, the principles of solving specific tasks with the active participation of the child, training parents and changing the environment have a positive effect on the child's motor development.

CONCLUSIONS / ВИСНОВКИ

A complex of medical, habilitation, pedagogical, logopedic therapy, and other measures should be started already in the first year of life. It is important to ensure the sequence of stages of recovery measures. Habilitation started at the wrong time can be ineffective and difficult to implement. A detailed neurological and psychological-pedagogical examination of children in the first year of life makes it possible to identify these patients, and rehabilitation and habilitation programs for children with lesions of the nervous system are the foundation for the restoration of impaired functions and partial or full adaptation of children in society.

Timely implemented rehabilitation measures allow reducing the number of disabled children. Beginning at an early stage of treatment and rehabilitation measures for children born with congenital pathology and injuries improves their social and environmental adaptation and allows to improve the quality of life not only for children but also for their families.

All interventions are individualized for each child, carried out with the support and supervision of an occupational therapist and carried out in close cooperation with parents and physical therapists/occupational therapists.

PROSPECTS FOR FUTURE RESEARCH / ПЕРСПЕКТИВИ ПОДАЛЬШИХ ДОСЛІДЖЕНЬ

Prospects for further research suggest investigations in other perinatal pathologies in children.

CONFLICT OF INTEREST / КОНФЛІКТ ІНТЕРЕСІВ

The authors declare no conflict of interest.

FUNDING / ДЖЕРЕЛА ФІНАНСУВАННЯ

None.

AUTHOR CONTRIBUTIONS / ВКЛАД АВТОРІВ

All authors substantively contributed to the drafting of the initial and revised versions of this paper. They take full responsibility for the integrity of all aspects of the work.

REFERENCES/СПИСОК ЛІТЕРАТУРИ

1. Wang H, Dwyer-Lindgren L, Lofgren KT. Age-specific and sex-specific mortality in 187 countries, 1970-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012;380 (9859):2071–2094.
2. Hardefeldt LY, Semrad SD, Crump PM [et al.]. Effects of gestational age on physical findings of immaturity, body weight, and survival in neonatal alpacas (2002–2010). *J. Vet. Intern. Med.* 2013;27(5):1234–1237.
3. Freitas DA, Chaves GSS, Santino TA, Ribeiro CTD, Dias FAL, Guerra RO, & Mendonça KMPP. (2018). Standard (head-down tilt) versus modified (without head-down tilt) postural drainage in infants and young children with cystic fibrosis. *Cochrane Database of Systematic Reviews*, 2015;3:CD010297.
4. Haley S, Coster W, Dumas H, Fragalapinkham M and Moed R. PEDI-CAT: Development, Standardization and Administration Manual. Trustees of Boston University, *Disabil. Rehabil.* 2012;34(5):393– 401.
5. Shunko YeYe. [Introduction of the concept of further development of perinatal care in Ukraine]. *Neonatology, surgery and perinatal medicine*. 2011;1(1):10–16.
6. Besio S, Bulgarelli D, Stancheva-Popkostadinova Play development in children with disabilites. 2017. 228 p. Retrieved from:

https://www.degruyter.com/document/doi/10.1515/9783110522143/html
7. Standards Follow-up and continuing care: Topic Expert Group // EFCNI European Standards of Care for Newborn Health. Retrieved from: https://newborn-healthstandards.org/
8. Ottenbacher KJ, Msall ME, Lyon N, Duffy LC, Ziviani J, Granger CV, Braun S, Feidler RC. The WeeFIM instrument: its utility in detecting change in children with developmental disabilities. *Arch Phys Med Rehabil.* 2000;81: 1317-26.
9. Khurana S, Kane AE, Brown SE, Tarver T, Dusing SC. Effect of neonatal therapy on the motor, cognitive, and behavioral development of infants born preterm: a systematic review. *Dev Med Child Neurol*. 2020;62(6):684-692.
10. Case-Smith J and Clifford O'Brien J. Occupational therapy for children. 6th ed. Maryland Heights, Mo.: Mosby/Elsevier, 2010. 857 p.
11. Kuruvilla S. The Global strategy for women's, children's and adolescents' health (2016-2030): a roadmap based on evidence and country experience. *Bull World Health Organ*. 2016;94(5): 398–400.
12. Kuksa NV, Karpenko YuM. *Fizychna terapiia v neiroreabilitatsii* [Physical therapy in neurorehabilitation]. Sumy: University book, 2017. 230 p.

Received 02.11.2022
Accepted 18.11.2022

Одержано 02.11.2022
Затверджено до друку 18.11.2022

INFORMATION ABOUT THE AUTHORS / ВІДОМОСТІ ПРО АВТОРІВ

Голюк Катерина Олегівна, к.мед.н., асистент кафедри педіатрії Навчально-наукового медичного інституту СумДУ, e-mail: k.holiuk@med.sumdu.edu.ua, тел.: 0509315816

Кукса Наталія Вікторівна, к.пед.н., доцент кафедри здоров'я, фізичної терапії, реабілітації та ерготерапії Навчально-наукового інституту фізичної культури СумДПУ ім. А. С. Макаренка, e-mail: kuksa95nat@gmail.com, тел.: 0506490264

Тарамак Людмила Вікторівна, аспірант кафедри педіатрії Навчально-наукового медичного інституту СумДУ, e-mail: l.taramak@med.sumdu.edu.ua, тел.: 0993023249

Кліщ Ольга Олександрівна, аспірант кафедри педіатрії Навчально-наукового медичного інституту СумДУ, e-mail: o.klishch@med.sumdu.edu.ua, тел.: 0669379016