ST. PETERSBURG STATE PEDIATRIC MEDICAL UNIVERSITY

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SCIENTIFIC SUBSTANTIATION OF IMPROVING THE ORGANISATION OF SPECIALIZED MEDICAL CARE FOR CHILDREN OF THE FIRST YEAR OF LIFE

Scientific specialty 3.2.3. Public health, healthcare organization and sociology, medical and social expertise

Thesis
for the degree of
Candidate of Medical Sciences

Translation from Russian

Scientific advisor:
Doctor of Medical Sciences
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St. Petersburg – 2024

TABLE OF CONTENTS

INTRODUCTION

Relevance of the research

An important direction in the demographic policy of the Russian Federation at the stage of implementation of the National Projects remains the reduction of infant mortality, which directly correlates with the level of organization of pediatric care [68, 85, 166, 168, 211]. Infant mortality is a social indicator reflecting the efficiency of provision of medical care to children, therefore the problem of saving the life of every newborn becomes the main task of any state [10, 23, 24, 26, 36, 63]. In modern conditions, the priority directions of effective development of domestic healthcare, both in the short and medium term, are the development of specialized pediatric medical care [3, 7, 16, 19, 28, 48]. This is primarily due to the social, economic and political conditions for the development of medical science and the introduction of technologies that provide the possibility to ensure the availability and quality of medical care, especially for children of the first year of life [73, 118, 119].

In recent years, the frequency of premature births has increased in a large part of the regions of our country [107]. The causes of this phenomenon are diverse and are explained by the influence of a number of factors. On the one hand, this is due to a significant share of preterm births, where endogenous factors include such as the growth of extragenital and obstetric pathology. On the other hand, it concerns the care of children, including those born with very low and extremely low body weight, which is largely due to the introduction of high technologies in obstetrics, perinatology, neonatology and pediatrics [106, 121, 136, 175]. An increase in the prematurity rate and, in general, an improvement in the diagnostic capabilities of medical organizations of the maternal and child health system had a significant impact on increasing the frequency of development and detection of various functional abnormalities in children of the first year of life, during the period when the most pronounced negative shifts in health occur and the child is most vulnerable. The introduction of algorithms and federal standards of medical care in the pediatric service made it possible to improve medical care for infants at the earliest stages of the disease, which provided an opportunity to prevent the formation of chronic

diseases and disabilities, and to increase the potential for medical preventive and rehabilitative measures to preserve and strengthen the health of the child population [6, 9, 32, 64]. The introduction of advanced technologies in children's healthcare has qualitatively changed the trends in the organization of specialized, including high-tech medical care for children of the first year of life, which became possible in the conditions of a three-level system of its provision [185, 191, 192, 195].

Despite significant progress in reducing infant mortality, the incidence rate of children of the first year remains quite high, which necessitates further improvement of specialized medical care, both on an outpatient and inpatient stages, which determined the relevance of the chosen research topic.

The degree of elaboration of the research topic

The search for optimization in the provision of specialized medical care to children at the outpatient stage in the subject of the Russian Federation was carried out by D.V. Shutov [196]. A.V. Korablev was engaged in the development of measures to optimize inpatient care for first-year children as a reserve for reducing infant mortality and child disability [84]. The state and ways to optimize specialized therapeutic and preventive care for children in city outpatient clinics was the topic of research by E.V. Zelenova [64]. The choice of directions in improving the organization and quality of specialized inpatient care for young children in a large city formed the basis of the work of R.I. Magomedov [93]. The improvement of the organization and management of medical care for children was studied by N.N. Gribina [48]. Ways to improve the organization of preventive work of a children's city outpatient clinic with children of the first year were identified in the research carried by A.V. Alekseeva [5]. K.E. Moiseeva assessed the state and identified ways to improve the organization of medical care for newborns in obstetric organizations [107]. A number of other scientific studies carried out in various regions of the Russian Federation are also devoted to the provision of specialized medical care to children. However, no studies have previously been carried out to improve specialized medical care for children of the first year of life in a three-level system of organization of pediatric care, both on an outpatient and inpatient stages.

The aim of the research

Based on the assessment of the organization of specialized medical care for children of the first year of life in a three-level system of its provision, to develop and scientifically substantiate a set of measures aimed at improving it.

The main objectives of the research

1. To assess the state of health and accessibility of specialized medical care for children of the first year of life in the megalopolis.

2. To evaluate the organization of specialized medical care for children under one year old at the outpatient stage.

3. To evaluate the use of telemedicine technologies as an important component in the treatment and diagnosis of diseases in children of the first year of life.

4. To study the organization of specialized medical care in inpatient settings for children under one year old, depending on the level of the pediatric facility.

5. To assess the impact of the new coronavirus infection on the organization of specialized care for children of the first year of life.

6. To develop measures of a medical and organizational nature aimed at improving the organization of specialized medical care for children of the first year of life at the outpatient and inpatient stages.

Object of the research

Children of the first year of life receiving specialized medical care in outpatient and inpatient settings, living in a megalopolis.

Subject of the research

Assessment of the organization of specialized medical care for children of the first year of life.

Scientific novelty of the study

An assessment of the trend in children's health indicators in the first year of life and indicators of provision of pediatricians, specialists of the main profiles of specialized care, as well as pediatric beds (including specialized ones) in 2018-2022 was carried out. In addition, the following data were obtained:

- on the organization of specialized medical care for children under one year old, including in the first month of life, at the outpatient stage and an assessment of its quality and accessibility to children of this age group was carried out;

- the continuity in the work of medical organizations providing medical care in outpatient and inpatient settings was analyzed;

- data were obtained on the inpatient admission incidence of children of the first year of life, on the organization of specialized medical care in inpatient settings for children of this age, depending on the level of pediatric facility, and an assessment of its quality and accessibility was carried out;

- the main problems of the organization of specialized medical care at the outpatient and inpatient stages in modern conditions were identified;

- the main problems of using telemedicine technologies as an important component in the treatment and diagnosis of diseases in children of the first year of life were identified;

- medical and organizational measures aimed at improving the organization of specialized medical care for children of the first year of life at the outpatient and inpatient stages were developed and scientifically substantiated.

Theoretical and practical significance of the research

The theoretical significance of the research lies in the application of a set of basic methods for assessing the health of children of the first year of life and the organization of specialized medical care for them. The conducted assessment of the organization of specialized medical care for children under one year old made it possible to identify the main issues of its provision at the outpatient and inpatient stages in medical organizations of the megalopolis in the conditions of a three-level system of organization of pediatric care.

The evaluation of the center for telemedicine technologies revealed that the remote contact of the attending physician with the consultant using modern telecommunications facilities expanded the possibilities of providing specialized care to children. An important aspect of the video consultation is the discussion of all unclear issues of diagnosis, treatment, and rehabilitation by the attending physician directly with

the consultant. The economic efficiency of one teleconsultation as a result of subsequent treatment of a child at the place of residence is determined by the exclusion of transportation costs, the cost of accommodation for parents and the lower cost of a bed-day compared to those in specialized medical centers.

Provisions have been proved that, based on the assessment of the organization of specialized medical care for children of the first year of life, helped to develop and scientifically substantiate recommendations of a medical and organizational nature that contribute to improving the organization of medical care for this category of children in outpatient and inpatient settings.

The practical significance of the research is confirmed by the fact that the obtained results made it possible to develop a set of practical recommendations to improve the organization of specialized medical care for children of the first year of life in a three-level system of organization of pediatric care.

The results of the research were used in the development of the patent: "Register of inpatient admissions of children of the first year of life" database (Database Registration Certificate No.2023622333 dated 11.07.2023).

The practical recommendations developed based on the results of this research were implemented in the activities and are used in the work of the following healthcare institutions: St. Petersburg SHCI "City Polyclinic No.11. Child outpatient department No.23" (Implementation certificate dated 16.09.2023); St. Petersburg SHCI "City Polyclinic No.3. Child outpatient department No.24" (Implementation certificate dated 28.09.2023); St. Petersburg SHCI “Children’s city outpatient clinic No.49” (Implementation certificate dated 30.10.2023); St. Petersburg SHCI "City Polyclinic No.78. Child outpatient department No.32 (Implementation certificate dated 17.10.2023); Children's Clinical Hospital of the Saint Petersburg State Pediatric Medical University of the Ministry of Health of the Russian Federation (Implementation certificate dated 25.11.2023), Consultative and Diagnostic Center of the Saint Petersburg State Pediatric Medical University of the Ministry of Health of the Russian Federation (Implementation certificate dated 30.11.2023), St. Petersburg SHCI "St. Nicholas the Wonderworker Children's City Hospital No.17" (Implementation certificate dated 06.12.2023), St.

Petersburg SHCI "Mary Magdalene Children's City Hospital No.2" (Implementation certificate dated 18.12.2023).

Some results and the main provisions of the thesis are used in the training of students of pediatric and medical faculties, clinical residents at the departments of public health (Implementation certificate dated 05.09.2023), neonatology with courses of neurology and obstetrics-gynecology on the Faculty of Postgraduate and Further Professional Education of the Saint Petersburg State Pediatric Medical University of the Ministry of Health of the Russian Federation (Implementation certificate dated 08.09.2023).

Research methodology and methods

A set of methods and techniques was used in the study: the PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions, data extracts from medical records, sociological (questionnaire, interviewing and web survey), graphical and analytical, and qualimetry. In the formation of the statistical population, continuous and selective methods were used. The data of descriptive statistics are reflected in the form of quantitative and qualitative, extensive and intensive indicators, weighted arithmetic mean with standard error The choice of the criterion for testing the significance of differences between the analyzed statistical indicators was based on the nature of data distribution. The degree of compliance of the empirical distribution with the normal distribution of the studied samples was carried out using the Kolmogorov-Smirnov (K-S) criterion: normal distribution if $p<0.05$; the distribution is not considered normal if $p>0.05$. When comparing two groups of independent samples, Student's t-test or its non-parametric analogue, Mann-Whitney rank U-test, was used, Wilcoxon signed-rank test was used in linked samples. Database creation, processing, analysis and visualization of the results were carried out using Microsoft Office Excel 2019 (Word, Excel). Statistical analysis was carried out using StatSoft-Statistica 10.0.

Basic provisions for the thesis defense:

1. Significant deviations at birth in the health indicators of the child population in megalopolis lead to an increase in the incidence of the first-year children. The high availability and quality of medical care for children in St. Petersburg is due to the high availability of pediatric physicians and beds, which leads to a decrease in infant mortality.

2. Despite of certain shortcomings, the three-level system of providing specialized medical care to children has shown a high level of its organization, both on the outpatient and inpatient stages.

3. The use of telemedicine technologies makes it possible to improve the therapeutic and diagnostic capabilities of medical organizations in providing specialized care to children of the first year of life.

4. The pandemic of the new coronavirus infection has had a significant impact on the health of children of the first year of life and the organization of medical care for them.

5. The developed medical and organizational measures aimed at improving the organization of specialized medical care for children of the first year of life at the outpatient and inpatient stages are put forward for defense.

Main scientific results

The scientific research was carried out on the basis of an indicative sample using epidemiological, statistical, retrospective, analytical and sociological methods in the period from 2018 to 2022. In the formation of the statistical population, continuous and selective methods were used. Extracted data from the Child Development History (Form 112/u) served as the basis for the formation of a register of inpatient admissions of children of the first year of life living in the megalopolis. The results of the parents' survey revealed the main disadvantages of providing primary specialized and specialized, including high-tech, medical care for the subsequent development of management decisions in order to improve the quality of medical care in megalopolis healthcare organizations [70, 71, 74, 79, 104, 105, 110, 111].

The obtained research results are used in the process of teaching students of pediatric and medical faculties, clinical residents at the departments of Public Health and

Public Health, neonatology with courses in neurology and obstetrics and Gynecology of the Federal State-Funded Educational Institution of Higher Education "Saint Petersburg State Pediatric Medical University" of the Ministry of Health of the Russian Federation.

The recommendations proposed based on the results of the work aimed at improving the organization of specialized medical care for children of the first year of life were introduced into the practical activities of medical organizations of the three-level pediatric healthcare system in St. Petersburg.

The main results and provisions of the scientific research are presented:

1. Alekseeva A.V., Moiseeva K.E., Danilova V.V., Harbedia Sh.D., Glushchenko V.A. Some aspects of improving the organization of primary specialized care for children of the first year of life. In the collection: Issues of urban health care. Collection of scientific papers. Edited by N.I. Vishnyakov. St. Petersburg, 2023. pp. 247-253.

2. Alekseeva A.V., Moiseeva K.E., Yuryev V.K., Glushchenko V.A., Danilova V.V. Some results of the assessment of the quality of primary specialized care for children of the first year of life. Forcipe, 2023. Vol. 6. No. S1. pp. 39-40.

3. Danilova V.V. Some aspects of the organization of inpatient medical care for children of the first year of life. In the book: VI week of education at the Elizabethan Hospital. Collection of abstracts of the multidisciplinary medical forum. Moscow, 2022. pp. 9-10.

4. Danilova V.V. Some results of the evaluation of indicators characterizing the provision of specialized medical care to children of the first month of life in a children's multidisciplinary hospital. Forcipe, 2023. Vol. 6. No. S1. pp. 204-205.

5. Danilova V.V. Regulatory and organizational aspects of the transition of medical organizations to electronic document management. In the collection: Issues of urban health. Collection of scientific papers. St. Petersburg, 2022. pp. 188-190.

6. Danilova V.V. The main directions of the introduction of digital technologies in modern healthcare. Forcipe. 2022. Vol. 5. No. S2. pp. 172-173.

7. Danilova V.V. The problems of introducing digital technologies in modern healthcare. In the collection: Issues of urban health. Collection of scientific papers. St. Petersburg, 2022. pp. 196-199.

8. Danilova V.V., Moiseeva K.E., Alekseeva A.V. Historical aspects of the development of telemedicine technologies. In the collection: Modern achievements and prospects for the development of public health protection. Materials of the V International Scientific and Practical Conference. Tashkent, 2023. pp. 41-50.

9. Ivanov D.O., Moiseeva K.E., Vinogradova I.V., Alekseeva A.V., Yuryev V.K., Komissarova M.Yu., Danilova V.V. Assessment of the impact of the place of residence and the Covid-19 pandemic on the inpatient admission of children of the first year of life. Social aspects of public health. 2023. Vol. 69. No. 4.

10. Ivanov D.O., Moiseeva K.E., Komissarova M.Yu., Danilova V.V., Alekseeva A.V., Puzyrev V.G. Assessment of the dynamics of inpatient morbidity in children of the first year of life. Medicine and healthcare organization. 2023. Vol. 8, No. 3. pp. 4-12.

11. Ivanov D.O., Moiseeva K.E., Yuryev V.K., Karailanov M.G., Danilova V.V. Database "Register of inpatient admissions of children of the first year of life". Database registration certificate RU 2023622333 dd. 11.07.2023. Application No.2023621941 dated 26.06.2023.

12. Ivanov D.O., Moiseeva K.E., Yuryev V.K., Komissarova M.Yu., Danilova V.V., Alekseeva A.V., Puzyrev V.G. Characteristics of inpatient admissions of children of the first month of life in a multidisciplinary children's hospital. Medicine and healthcare organization. 2023. Vol. 8. No. 2. pp. 4-14.

13. Moiseeva K.E., Alekseeva A.V., Berezkina E.N., Harbedia Sh.D., Puzyrev V.G., Danilova V.V. Assessment of the level of inpatient admission and the average length of stay of children in the first year of life in a children's multidisciplinary hospital, depending on the area of residence in the megalopolis. Problems of standardization in healthcare. 2023. No. 3-4. pp. 49-54.

14. Moiseeva K.E., Alekseeva A.V., Danilova V.V. Some results of studying the health of children of the first year of life. In the book: Vorontsov readings. St. Petersburg, 2023. Collection of materials of the XVI All-Russian scientific and practical conference.

Dedicated to the memory of Professor Igor Mikhailovich Vorontsov. St. Petersburg, 2023. pp. 44-46.

15. Moiseeva K.E., Glushchenko V.A., Alekseeva A.V., Harbediya Sh.D., Berezkina E.N., Levadneva M.I., Danilova V.V., Khvedelidze M.G., Simonova O.V. The current state and main organizational problems of medical care for newborns. Medicine and healthcare organization. 2023. Vol. 8. No. 1. pp. 116-128.

16. Moiseeva K.E., Ivanov D.O., Yuryev V.K., Alekseeva A.V., Shevtsova K.G., Harbediya Sh.D., Zastupova A.A., Danilova V.V. Birth weight deviation as a risk factor for a child's health. Social aspects of public health. 2023. Vol. 69. No. 2.

17. Moiseeva K.E., Shevtsova K.G., Mezhidov K.S., Danilova V.V. Some aspects of assessing the health of children under the age of one year. In the book: Abstracts of the IX All-Russian conference marathon "Perinatal medicine: from pre-pregnancy preparation to healthy motherhood and childhood" and the II Scientific and Practical Conference "Pediatrics of the XXI century: new paradigms in modern realities". Moscow, 2023. pp. 74-75.

18. Moiseeva K.E., Yuryev V.K., Alekseeva A.V., Shevtsova K.G., Sokolova V.V., Harbediya Sh.D., Danilova V.V., Zastupova A.A. The effect of complicated childbirth on the health of newborns. Modern issues of healthcare and medical statistics. 2023. No.2. pp. 845-869.

The degree of reliability and approbation of the research results

The degree of reliability of the results obtained during the study is confirmed by the use of a sufficient amount and representativeness of the data set. In total, 20 forms of reporting medical documentation; 3128 forms of accounting medical documentation; 15 statistical materials from the Federal State Statistics Service; 10 statistical materials from the Central Research Institute of Health Care Organization and Informatization of the Ministry of Health of the Russian Federation; 10967 observation units from the Ariadna medical information system; 2157 forms of sociological survey "Questionnaire for mothers of children of the first year of life who received inpatient care", "Questionnaire for mothers of children who received primary specialized care in the first year of life in a children's outpatient department" and "Questionnaire for mother of a child who received

primary specialized care at the diagnostic consultative center" were analyzed. To process the dataset modern parametric and non-parametric methods of statistical analysis were used. The total number of information units in the study was 16297.

Approbation of the research results: the materials of the thesis were presented and discussed at: congress with international participation "Healthy children - the future of the country" (St. Petersburg, 2022), II Scientific and Practical Conference "Pediatrics of the XXI century: new paradigms in modern realities" (St. Petersburg, 2023), XVI All-Russian Scientific and Practical Conference "Vorontsov Readings" (St. Petersburg, 2023), XV All-Russian Scientific and Practical Conference with international participation "Human Health in the XXI century. Quality of Life" (Kazan, 2023), XI All-Russian conference "FLORES VITAE. Pediatrics and Neonatology" (Moscow, 2023), V International Scientific and Practical Conference "Modern Achievements and Prospects of Population Health Protection" (Tashkent, 2023), XVII All-Russian Forum "Children's Health. Modern Strategy of Prevention and Therapy of Leading Diseases" First All-Russian Congress "Legacy of Professor Shabalov N.P.: Constants and Variables of Pediatrics" (St. Petersburg, 2023), V All-Russian Medical Congress "Baltic Spring - 2023" (Kaliningrad, 2023), XIII Baltic Congress on Child Neurology with international participation (St. Petersburg, 2023), Congress with international participation "Healthy Children - the Future of the Country" (St. Petersburg, 2023), All-Russian Scientific and Practical Conference "Relevant Problems of Maternal and Child Health Care: Priority for Prevention" (Moscow, 2023), VIII All-Russian Forum "Modern Pediatrics. St. Petersburg - White Nights - 2023" (St. Petersburg, 2023), XIII All-Russian Conference "FLORES VITAE. Contraversions in Neonatal Medicine and Pediatrics" (Sochi, 2023).

Personal contribution of the author

The author independently analyzed the literature sources on the subject under study, conducted the preparatory stage for the development of the research design, carried out statistical processing of the obtained results, analyzed the data, formulated conclusions and developed practical recommendations. A questionnaire survey of mothers in the neonatal and premature infant pathology departments of a perinatal centre

and a multi-specialized children's inpatient facility, as well as in children's outpatient departments was carried out.

Publications

18 scientific papers have been published on the topic of the thesis, including 7 in peer-reviewed scientific journals recommended by the State Commission for Academic Degrees and Titles of the Ministry of Education and Science of Russia.

The structure and scope of the thesis

The thesis is presented on 165 pages of typewritten text (in Russian) and consists of an introduction, a review of the literature on the research topic, three chapters of the results of the author's own research, conclusion, findings, practical recommendations, prospects for further development of the topic, a list of references and 4 appendices. The list of references includes 238 sources, including 223 of domestic and 15 of foreign authors. The work is illustrated with 32 figures and 29 tables.

Chapter 1 MEDICAL, SOCIAL AND ORGANIZATIONAL ISSUES OF SPECIALIZED MEDICAL CARE FOR CHILDREN UNDER ONE YEAR OF AGE IN RUSSIA (LITERATURE REVIEW)

1.1. History of the development of pediatric services in Russia

Since the early days of Russian pediatrics, there was a pronounced public pediatric activity of the era of the noble Empire (XVIII-XIX centuries). Children's healthcare in the early stages of this period is characterized by various organizational forms, limited to providing medical care to the army and navy (1715 - 1717). Medical care for civilians, including children, was entrusted to monasteries and churches, whose donations went to the construction of shelters and almshouses. Influenced by the ideas of enlightened tsarism, along with other educational institutions, I.I. Betskoy establishes a Foundling Hospital (1771) with a maternity hospital attached to it. The emergence of departments for sick children in foster homes was due to the high incidence and mortality of children. All these institutions were later united into a special department (1797), which includes the Midwifery Institute for the Training of Midwives and the Mariinsky Hospital (1803) for the poor. It is worth noting that there were no children's hospitals and departments, and medical care for children was provided in outpatient facilities for adults. Hospital schools and medical and surgical schools later turned into the Medical and Surgical Academy (1798), in which in 1806 a children's one-ward department was opened, but three years later it was closed by the president of the academy Willie, who considered the provision of obstetric and pediatric care unnecessary [8, 80, 82].

In the late 20s, near St. Petersburg, an attempt was made to organize a specialized medical and preventive institution for children with rickets. The first hospital for children (with 100 beds) was opened with charitable funds in St. Petersburg (1834), and in 1842 in Moscow. It should be noted that medical care was provided only to children over three years old, based on foreign experience of avoiding inpatient admission of infants and newborns due to the high mortality of such patients. This was primarily due to a lack of knowledge on the physiology and pathology of children of this age group, as well as a lack of understanding of the organization of inpatient care for them. The solution to this

problem was the opening of the Clinical Hospital for young children in St. Petersburg (1843), where children from birth to four years of age were admitted. Since 1848, about 300-400 children have been admitted to the inpatient facility annually, and the average number of outpatient visits amounted to 7 thousand per year. Since 1847, the children's hospital of the Moscow orphanage has also begun to admit infants. It is worth noting that Russia was ahead of foreign countries in the organization of inpatient care, but the situation with the maintenance of newly opened hospitals was unfavorable. By the end of the fifties, the bed stock in Moscow and St. Petersburg amounted to 240 beds, but the issue of providing inpatient care in other cities and counties remained open. In connection with the introduction of a course of pediatric diseases at the Faculty of Medicine in the therapeutic clinic of Professor Zakharyin, two wards for children were allocated (Moscow, 1866). Children with infectious diseases were placed in communicating (passageway) rooms of the hospital building, which undoubtedly led to a large-scale spread of nosocomial infection and thereby increased the time spent by children in beds. The same problem existed in outpatient clinics at hospitals located in very cramped rooms. With such an imperfect layout in outpatient clinics, the introduction and spread of infectious diseases in hospitals was inevitable [130, 164].

In 1869, in St. Petersburg, according to the program developed by K.A. Rauhfus, a new children's hospital was opened. For the first time in the domestic practice of hospital construction, a separate isolation building with four separate departments and a probationary ward were organized. Rauhfus used an example of such a hospital project in its full form during the construction of the Vladimir Children's Hospital in Moscow. Soon, isolation wards were organized in all children's hospitals in the cities. Ten years later, the Vladimir Children's Hospital was opened in Moscow. The 80s were characterized by the expansion of the Sofia Children's Hospital, the organization of the Olginsky Hospital in Moscow (children's tuberculosis hospital) and the construction of the Khludovskaya Hospital for the children's clinic of the Medical Faculty of Moscow University.

From 1901 to 1905, a large children's Morozov hospital was organized in Moscow, and in 1910, on the initiative of G.N. Speransky, a hospital for young children was

opened. In the same year, Melzer boxes for infectious patients and infectious disease wards are put into operation during the construction of hospitals.

Since all hospitals were maintained from charity funds, they were often under threat of closure. The treatment of children in hospitals was chargeable, except for those children whose parents documented their poverty and were exempted from paying for their child's hospital treatment. The only hospital that provided free medical care to children was the Elizabethan Hospital. In September 1884, the transfer of the hospital fund from the Board of Trustees to the town's public administration took place. The first years after the transfer of hospitals to the City Public Administration were marked by a significant improvement in the material and technical equipment of hospitals and, as a result, an increase in the quality of pediatric care. According to Professor V.N. Reitz, the chief physician of the Elizabethan Hospital, the mortality rate among admitted children was very high. Reitz attributed the high mortality rate to the extremely poor health status of incoming children (exhaustion, starvation, presence of chronic diseases). The lack of knowledge about the peculiarities of the development of the child's body, the irrational organization of departments for newborns and infants, low material security contributed to high incidence and mortality among children. At the beginning of the 19th century, children's health issues almost disappeared from the practice of public activity. Significant breakthrough in the development of pediatrics during this period was associated with the activities of a talented pediatrician S.F. Hotovitsky. He was not only a practicing physician, teacher, and renowned scientist, but also a prominent advocate for children's healthcare. He devoted the end of his life to the essential and valuable work - "Pediatrics", which became the basis for the existence of pediatrics as an independent discipline, with its own goals and objectives.

The peculiarity of the practical and scientific activity of S.F. Hotovitsky was an inextricable connection of pediatrics, obstetrics, gynecology with the issues of public health and "medical police" (hygiene).

In the first half of the XIX century, a vast number of scientific works were published, so A.I. Danilevsky dealt with issues of prenatal care of children, newborns and premature babies; G. Tikhomirov was engaged in the organization of children's health

care; A. Soboleva was engaged in the prevention of diseases in children; major researches on pediatric topics were carried out by A.I. Klementovsky, A.N. Nikitin, V.A. Golitsinsky and many other pediatricians of the Moscow and St. Petersburg schools.

The important transformations taking place in the political, economic and historical development of Russia affected the organization of pediatrics and the protection of motherhood and childhood, which were laid down before 1917.

After the end of the October Revolution, the issues of maternity and childhood protection became the subject of close attention from the government, for the first time taking care of the health of mothers and children became a state task. In January 1918, V.I. Lenin signed a decree on the organization of a department dealing with the protection of motherhood and childhood, and on May 17, 1919 he signed a decree according to which children under the age of 14 received food at the expense of the state. Scientists and well-known pediatricians took an active part in the activities of this department (V.I. Molchanov, A.A. Koltypin, G.M. Speransky, A.F. Tur and many others). Since 1920, pedagogical work was carried out to improve the skills of pediatricians and train nurses to care for newborns (healthy and sick children).

The first years of the Soviet power were particularly stressful and difficult for our country. The main efforts were aimed at combating maternal and child mortality. In this regard, children's homes, nurseries, maternity hospitals, children's and women's consultations, mother and child homes have been greatly developed.

In the period from 1932 to 1933, children's outpatient clinics engaged in preventive work were reorganized into medical and preventive institutions, and two years later they were formed into children's outpatient clinics. Reorganized medical institutions not only changed the structure of medical care, but also expanded their functionality.

As a result of the social and economic growth of the country and the development of medical and preventive institutions for women and children, the health indicators of the population have significantly improved, and many particularly dangerous infectious diseases were completely eliminated. Along with the economic growth of the country, the system of maternity and childhood protection developed and improved, including the structure of the pediatric service based on the principles of unity of preventive and

curative work (regular medical check-up, sanitary work among pregnant women, mothers and children).

The Great Patriotic War (WWII, 1941-1945) ssignificantly changed the life and fate of the Soviet people, who defended their Homeland in this difficult struggle. The war caused not only a decrease in the birth rate, but also an increase in child and infant mortality. Despite the prerequisites for the growth and spread of infectious diseases, the pediatric service was able to prevent large-scale epidemic disasters.

After the end of the Second World War, there were changes in the structure and activities of pediatric institutions. The leading method of work of such institutions has become the medical examination of children, in order to identify and prevent early forms of diseases. Compared with the beginning of the Second World War, the network of medical institutions for children was expanded almost 2.5 times. Physicians and medical healthcare personnel in the post-war period worked on the principle of precincts, which means that the area of service of outpatient clinic or consultation was divided into territorial precincts according to population size. The district pediatrician not only provided medical care, but also carried out anti-epidemic and preventive measures.

In a short time, the material and technical base was strengthened and the work of medical institutions based on scientific achievements in the field of pediatrics was organized.

The situation in post-Soviet Russia was not simple at all; during this period, the main task was to preserve the traditions and scientific achievements of Russian pediatrics, the priority of which was to provide children with highly qualified medical care [179, 180].

In modern conditions, a significant contribution to the formation of the health resource of the child population in the realities of modern society is made by the system of pediatric care [199, 202, 204, 205, 210].

1.2. Organization of a three-level system of pediatric care

Children's health is an important foundation for the economic, strategic and effective development of society [13, 20, 25, 30, 52, 65, 72, 77]. The demographic situation and transformation in the field of Russia's political structure, which affected the level of health of the child and adult population, as well as negative shifts in the state of the health care system, required completely new transformations and reforms in this area [159, 182, 183, 208, 209]. While preserving most of the relevant and established Soviet traditions of medical care, the Russian healthcare system is still undergoing a number of significant financial, organizational and managerial changes. One of the stages in the implementation of these changes is the development of a three-level system of pediatric care, which involves the expansion and introduction of specialized care at the inpatient and outpatient stages, as well as the use of high-tech care and digital technologies. The use of such a system makes it possible to apply the existing arsenal of healthcare at each stage of medical, preventive and rehabilitation care for children [73, 165, 170, 176, 198, 199].

To improve the accessibility, effective routing and continuity of medical care for children, including children of the first year of life, a three-level system of organization of pediatric care is being improved, allowing for the correct allocation of personnel and logistical resources, the use of unified treatment algorithms and modern medical technologies [31, 151, 152, 202, 204, 205, 210]. The three-level system of pediatric care is shown in Figure 1.1.

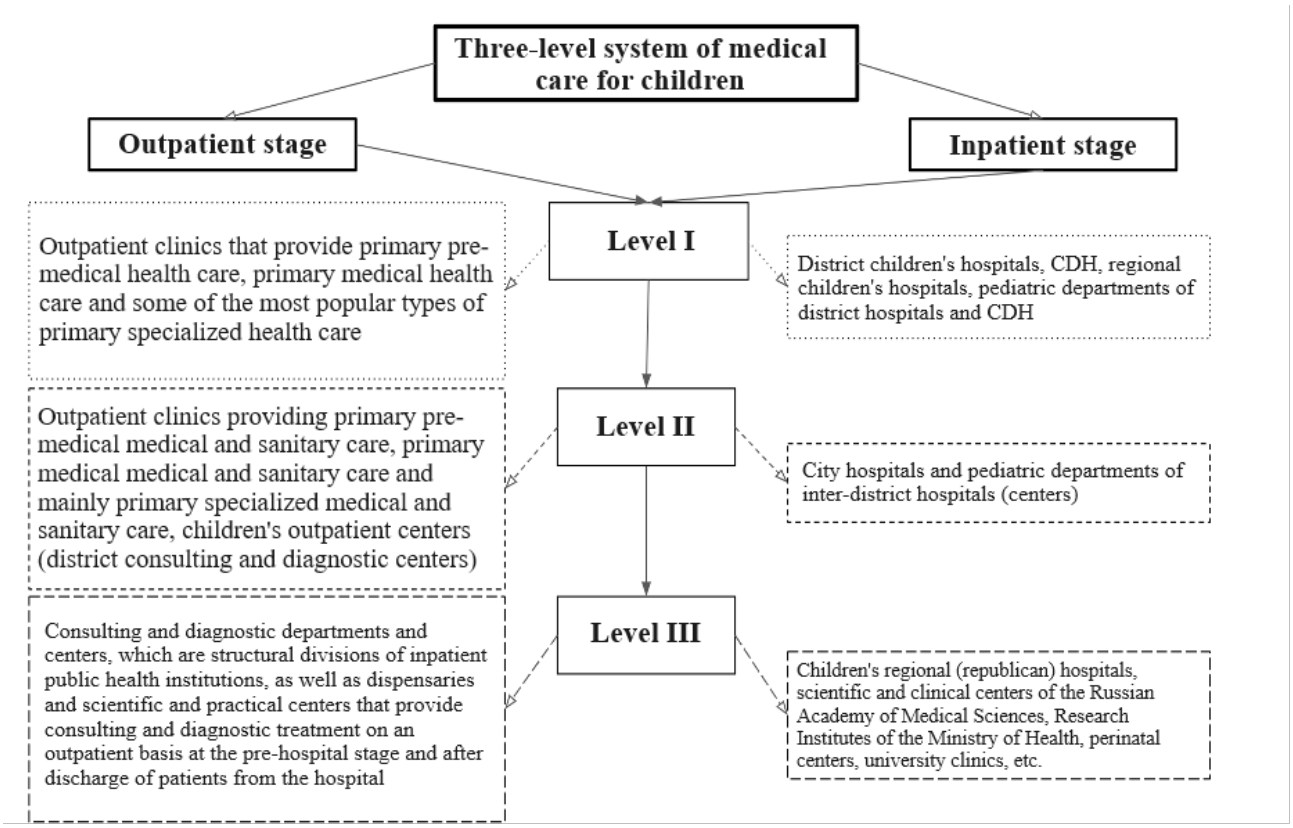

Figure 1.1 - Three-level pediatric care system

Level I of pediatric care includes the provision of primary health care (pre-medical, medical, specialized) and inpatient care in medical organizations, taking into account the needs of children, as well as considering trends in social and demographic indicators characterizing the health resource of the child population (outpatient and inpatient stages). It is worth noting that the provision of medical services, including specialized pediatric care, is regulated by the order of the Ministry of Health (MOH) of the Russian Federation (RF) dated 22.01.2001 No.12 "On the introduction of the industry standard "Terms and definitions of the standardization system in healthcare" [114, 115, 116, 137]. Modern reforming of the health care system is inextricably linked to the active introduction of electronic document management in medical practice, which is confirmed by the order of the Ministry of Health of Russia dated 07.09.2020 No.947n "The procedure for organizing the document management system in the field of health protection in terms of maintaining medical records in the form of electronic documents" [117, 122, 127, 148, 181]. Regardless of the type of medical activity, the registration of medical

documentation is carried out in accordance with the requirements of the relevant regulations or procedures for the organization of pediatric care [49, 50, 51].

For example, the organization of primary health care (PHC) is regulated by the Order of the Ministry of Health of the Russian Federation dated 07.03.2018 No.92n "On approval of the Rules on the organization of primary health care for children" [73, 147, 165, 170, 176, 198]. PHC is provided according to the child's place of residence, taking into account the principle of neighborhood and accessibility established in the post-war period. The allocation of children into districts is entrusted to the heads of departments, taking into account the number of the population served, medical health care personnel and the material and technical equipment of the medical institution. In the absence of specialized institutions in sparsely populated regions of the Russian Federation, the organization of primary health care for children is carried out by general practitioners or a family physician, and if it is impossible to provide pediatric care at the place of residence, the organization of primary health care is assigned to mobile teams, according to the order of the Ministry of Health of the Russian Federation dated 15.05.2012 No.543n "On approval of the Rules for the provision of primary health care for adults" [2 ,3, 22, 44, 91, 129, 138].

During the implementation and in accordance with the Federal Law (FZ) dated 21.11.2011 No.323-FZ "On the basics of protecting the health of citizens in the Russian Federation" local governments ensure the availability of pediatric care [177]. The principle of accessibility of medical care to children in the required volume and without charging for medical services is confirmed by the Program of state guarantees of free medical care [84, 95, 112, 113, 177].

For rational routing, planning, placement and personnel support, all medical organizations (MO) are divided into three levels. MO level I provide PHC, palliative, emergency and specialized medical care to the children's population mainly of their municipal district [39, 45, 57].

As a rule, in the first year of life, primary health care for children is provided on the basis of a district outpatient clinic, and if necessary, they are routed to a specialist. Specialized pediatric care (for diseases or pathological processes requiring special

diagnostic and treatment methods) is provided by pediatricians of narrow specialties of the three-level healthcare system [58, 62, 79, 155, 156, 174, 184].

At the same level of pediatric care, children of this age group are visited by physicians of narrow specialties during medical examinations or regular medical check-up. The algorithm of medical check-up of children of the first year of life is regulated by the Order of the Ministry of Health of Russia dated 10.08.2017 No.514N "On the procedure for preventive medical examinations of minors" [143]. Specialized pediatric care at the inpatient stage is provided at the bases of municipal children's hospitals (CH), central district hospitals (CDH), district children's hospitals, pediatric departments of district hospitals and CDH [37, 55, 59, 78, 190, 213].

Level III of pediatric medical care includes the provision of specialized outpatient and inpatient medical care to children in inter-municipal treatment and diagnostic departments and centers (outpatient and inpatient stages) and is established by the Order of the Ministry of Health of the Russian Federation dated 02.12.2014 No.796n (ed. 27.08.2015) "On approval of the Rules on the organization of specialized, including high-tech, medical care" [141]. Outpatient medical institutions are consultative and diagnostic centers (CDC) or consultative and diagnostic departments, where medical care is provided both within the framework of compulsory medical insurance (CHI) and from the personal funds of parents [114, 115, 116, 117, 122, 127, 181]. Medical institutions of this type are equipped with high-tech equipment for effective diagnosis, treatment, and regenerative medicine. In case of emergency medical care for children, as well as in case of inpatient admission, regardless of the level, emergency medical care is regulated by the Order of the Ministry of Health of Russia dated 20.06.2013 (ed. 21.02. 2020) No.388n "On approval of the Procedure for the provision of emergency, including specialized emergency medical care" and the Order of the Ministry of Health and Social Development of the Russian Federation dated 02.12.2009 (ed. 15.09.2020) No.942 "On approval of statistical tools of the station (department), emergency hospital" [139, 144].

MO level II provide mainly specialized pediatric care (CDC - outpatient stage; inpatient level II - inpatient stage), increasing the availability of medical care to the child population [83, 98].

Patients in need of palliative care are routed to specialized inpatient facilities or hospices, whose work is coordinated by the orders of the Ministry of Health of the Russian Federation No.345n and the Ministry of Labor of the Russian Federation dated 31.05.2019 No.372n "On Approval of the Regulations on the Organization of Palliative Care, including the procedure for interaction of medical organizations, social service organizations and public associations, other non-profit organizations carrying out their activities in the field of health protection" [142].

Level III of pediatric medical care is organized in specialized medical institutions (centers) using high medical technologies (outpatient and inpatient stages) and is regulated by the Order of the Ministry of Health of the Russian Federation dated 02.12.2014 No.796n "On Approval of the Regulations on the organization of specialized, including high-tech, medical care" (with amendments and additions) [60, 66, 67, 69, 74, 141]. MO level III provide specialized pediatric care using high medical technologies (HMT): CDC, dispensaries – outpatient stage; children's regional (republican) hospitals, scientific and clinical centers of the Russian Academy of Medical Sciences, Research Institutes of the Ministry of Health, perinatal centers, university clinics, etc. – inpatient stage) [149, 157, 197, 206, 207].

1.3. Telemedicine technologies in pediatrics as an essential tool for providing specialized care

The health resource of the child population is a priority area of state policy. Close attention of the state to the issues of preserving and strengthening the potential of child health is reflected in the Decree of the President of the Russian Federation, according to which the period 2018-2027 is declared the "Decade of Childhood" in Russia. The implementation of National programs to improve the provision of pediatric medical care is inextricably linked with the modernization of healthcare, including the active introduction of digital technologies [49, 50, 51].

The leading place among modern digital developments belongs to telemedicine technologies (TMT) with the use of a doctor-physician telemedicine consultation in

practice. TMT is a way to resolve issues related to clarifying the diagnosis and treatment of the patient, as well as the expediency of routing the patient to medical (specialized) organizations of level II or medical evacuation in accordance with the order of the Ministry of Health of Russia dated 30.11.2017 No.965n "On approval of the Procedure for organizing and providing medical care using telemedicine technologies" [42, 56, 76, 86, 109, 145]. The ability to provide real-time consultations allows not only scheduled, but also emergency telemedicine consultations (TMC), which is of particular importance in an urgent case. TMC with the participation of highly qualified specialists in the field of pediatrics and neonatology is rapidly taking its place in the system of medical care for children [29, 33, 41, 167].

The new coronavirus infection (COVID-19) brought significant changes in the daily routine of the population of the whole country, including significant changes in the organization of medical care, including the provision of medical services to children of the first year of life [29, 35, 56, 58]. According to scientific studies and official statistics, the majority of children tolerated COVID-19 in a mild or asymptomatic form and only 0.2% of patients had a severe course of the disease. It is known that the moderate and severe form of the course of this infection was observed in children of the first year of life [67, 69, 84 ,89, 110, 113, 156, 157].

Quarantine restrictions imposed to reduce the spread of COVID-19 prevented routine pediatric care. In this case, TMC allowed effective implementation of communication between regional and federal medical organizations (MO) to receive high-tech and specialized medical care without face-to-face consultation [182, 183, 186, 187, 188, 201].

1.4. The main issues of the organization of specialized pediatric care

Infancy is the period of a child's development that affects the formation of his health potential in the future. According to a number of authors, the increasing incidence of children of the first year of life forms a cohort of frequently ill children, as well as

children with chronic diseases belonging to health groups III, IV and V [71, 94, 104, 133, 150, 158, 161, 162, 182].

According to statistical analysis, as one of the important integral indicators, the health of the child population depends on medical, genetic, social, political and economic, as well as a number of behavioral factors [46, 75, 175].

The improvement of specialized care for children is directly correlated with the effective organization of a three-level maternity care system, including medical and preventive work aimed at preserving and strengthening the reproductive health of expectant parents [87, 110, 111, 120, 121, 136].

A burdened obstetric history, the presence of chronic diseases, bad habits, occupational hazards and many other negative factors affect the course and outcome of pregnancy. The imperfection of preventive and curative work at the outpatient stage, including pregravid preparation, as well as specialized perinatal care, has a negative impact on medical and demographic indicators [100, 107, 171]. The lack of continuity of women's consultations and children's city outpatient clinics, as well as children's outpatient departments and inpatient facilities, is a significant obstacle to improving the organization of pediatric care. The effective organization of medical care for pregnant women and women in labor will allow the implementation of preventive measures aimed at an integrated approach to monitoring the health of children. One of the stages of this approach is antenatal fetal protection, which is implemented in outpatient clinics during prenatal nursing [14, 53, 61, 96, 108].

It is worth noting that improvements in perinatal and nursing technologies for premature infants with abnormal physical development (low, very low and extremely low birth weight) have a positive impact on increasing live birth rates and survival rates [15, 88, 92, 97, 99, 121, 136, 175, 189]. However, the increase in the proportion of children with these anthropometric indicators in the dynamics of the first year of life has a negative impact on the indicators characterizing children's health status. The assessment of indicators of physical development and incidence makes it possible to judge the efficiency of specialized pediatric care. The analysis of the health level of the child population in the Russian Federation allows us to trace the unfavorable dynamics in the structure of

incidence of children of this age group. High incidence rates and significant deviations in birth weight are prerequisites for the implementation of medical and organizational programs aimed at improving the availability and quality of specialized medical care for children [4, 21, 27, 43, 92, 102, 103, 131].

Considering the problems of providing medical care in a three-level system of children's healthcare, it should be noted that the organization of primary specialized care is imperfect. In her study, P.B. Abdurashidova notes the low availability of medical care for children in rural areas. Taking into account the negative trends in the state of children's health, it is especially important to provide the child population with specialized care at the pre-hospital stage [1].

A number of authors point to the heterogeneous level of financing and management of the healthcare system in many regions of Russia, which does not allow to offset negative trends in the health of children of the first year of life. The management bodies and public health officials face an important task to provide such regions with the necessary material and technical base, as well as to provide medical organizations with the necessary medical personnel. In his scientific work, Yu.S. Nevolin characterizes the existing problems of medical-organizational and medical-informational nature [114, 153, 160].

Recent years have been characterized by the active introduction of high medical technologies into the children's healthcare system, however, in modern economic conditions, the possibility of such material and technical equipment is realized only in the level III inpatient facilities.

Insufficient funding, resource provision and personnel shortages lead to inconsistencies in the organization and availability of specialized pediatric care, depending on the level of the inpatient facility [12, 34, 163, 193, 194, 203, 212].

In modern conditions of the organization of pediatric care, the implementation of National programs should also be noted. According to A.L. Timofeev, it is necessary to build priority areas, taking into account changes in the health status of the child population, as well as to use methodological techniques in accordance with the goals and objectives of medical and preventive research [40, 47, 70, 101, 169, 178].

Infancy is undoubtedly a period of active growth and development of a child. Any negative endogenous and exogenous factors can change the course of this period of life. Dynamic monitoring of pediatricians over the state of children's health, preventive medical examination and regular medical check-up, make it possible to identify negative factors and significantly affect the incidence. However, in conditions requiring round-the-clock specialized medical care, the child needs to be admitted to an inpatient facility, where, in accordance with his disease, he receives all the necessary amount of highly qualified care [81, 89, 90, 93, 105, 128, 159, 182, 183, 208, 209].

The studied literature on the organization of pediatric care allowed us to conclude that it is necessary to improve specialized medical care for children of the first year of life, which predetermined the scientific interest of our research.

Chapter 2 MATERIALS AND METHODS OF RESEARCH

The present thesis research was carried out at the Department of Public Health and Health Care of the Federal State-Funded Educational Institution of Higher Education "Saint Petersburg State Pediatric Medical University of the Ministry of Health of the Russian Federation" of the Ministry of Health of the Russian Federation in accordance with the plan of complex research work on the topic "Medical, social and organizational problems of public health care in the North-West" (state registration No.AAAA-A16-116031710019).

2.1. Research base

The present study was conducted in the federal city of St. Petersburg (St. Petersburg), which is a separate subject of the Russian Federation, and is part of the Northwestern Federal District (NWFD). The administrative-territorial division of the city is represented by 18 municipal districts. This megalopolis is the second most populous city in the country, where the number of children under one year old in 2018 amounted to 64023 people, in 2019 - 58870, in 2020 - 55350, in 2021 - 53347, in 2022 – 50437. The decrease in five years was 21.2%.

Inpatient care for the children of St. Petersburg was provided in healthcare institutions in 13 city and 12 federal medical organizations (Tables 2.1 and 2.2). As of 01.01.2023, 5169 beds for children were deployed in the megalopolis, of which 3327 (64.0%) beds were in inpatient facilities under municipal supervision. The city's bed stock includes: 2 children's multidisciplinary clinical centers of high medical technologies, 5 multidisciplinary children's city hospitals,1 children's hospice, 1 children's infectious diseases hospital, 3 children's departments in the structure of multi-specialized inpatient facilities of the city. The federal bed stock is 1842 (35.6%) beds.

Table 2.1 - Indicators of bed stock use in children's inpatient departments in St. Petersburg in 2022

	Name of the medical organization	Bed operation	Average duration	Bed turnover	Bed downtime
1	2	3	4	5	6
Health Committee	St. Petersburg SHCI "Children's City Multidisciplinary Clinical Specialized Centre of High Medical Technologies"	406.91	5.09	79.95	-0.52
	St. Petersburg SHCI "St. Mary Magdalene Children's City Hospital No.2"	446.61	9.86	45.3	-1.8
	St. Petersburg SHCI "Children's Infectious Diseases Hospital No. 3"	187.82	6.1	30.78	5.75
	St. Petersburg SHCI "St. Olga's Children's Hospital No. 4"	280.09	7.37	38	2.23
	St. Petersburg SHCI "Children's City Clinical Hospital No.5 named after N.F. Filatov"	273.25	6.27	43.56	2.1
	St. Petersburg SHCI "Children's City Hospital No.17"	341.55	24.92	13.7	1.71
	St. Petersburg SHCI "Children's City Hospital No.19 named after K.A. Rauhfus"	331.99	5.46	60.78	0.54
	St. Petersburg SHCI "Children's City Hospital No.22"	282.32	7.82	36.1	2.29
	Children's department of St. Petersburg SHCI "Children's City Hospital No.36"	68.6	18.38	3.73	79.46
	Children's department of St. Petersburg SHCI "Children's City Hospital No.40"	394.9	23.74	16.63	-1.79
	Children's Department of St. Petersburg SHCI "Clinical Infectious Diseases Hospital named after S.P. Botkin"	96.85	8.22	11.78	22.76
	State Public Medical Institution of Leningrad region "Druzhnoselsk Psychiatric Hospital No.9"	297.66	42.99	6.92	9.73
	St. Petersburg SHCI "Oncological Center named after N.P. Napalkov"	263.81	10.85	24.31	4.16
	St. Petersburg SHCI "City Perinatal Center No.1"	141.14	6.0	23.54	9.5
	St. Petersburg SAHCI "Children's Hospice"	355.85	34.46	10.33	0.88
Ministry of Health of the Russian Federation	St. Petersburg Research Institute of Ear, Throat, Nose and Speech of the Ministry of Health of the Russian Federation (SRI)	209.02	6.1	34.27	4.55
	FSAI "Intersectoral Scientific and Technical Complex "Eye Microsurgery named after Acad. S.N. Fedorov" of the Ministry of Health of the Russian Federation	411.33	3.98	103.33	-0.44

Continuation of Table 2.1

	FSBI "National Medical Research Center of Pediatric Traumatology and Orthopedics named after G.I. Turner" of the Ministry of Health of the Russian Federation	232.54	11.34	20.5	6.46
	Children's Department of the "N.N. Petrov National Medical Research Center of Oncology" of the Ministry of Health of the Russian Federation	288.46	14.24	20.26	3.77
	FSBI "St. Petersburg SRI of Phthisiology" of the Ministry of Health of the Russian Federation	386.88	6.52	23.43	-0.93
	FSBI "National Medical Research Center named after V.M. Bekhterev"	281.08	28.33	9.92	8.45
	FSBI "National Medical Research Center named after V. A. Almazov" of the Ministry of Health of the Russian Federation	277.46	11.28	24.6	8.82
	FSBSI "The Research Institute of Obsterics, Gynecology and Reproductology named after D.O. Ott"	172.1	12.03	14.3	13.48
	FSBI "Scientific and Clinical Centre of Infectious Diseases" FMBA of Russia	281.35	17.46	16.12	5.18
	Children's Clinic of the First St. Petersburg State Medical University named after Acad. I.P. Pavlov	285.87	12.73	22.45	3.52
	FSFEI HE "Saint Petersburg State Pediatric Medical University" of the Ministry of Health of the Russian Federation	354.02	8.11	43.66	0.25

Table 2.2 - Operation of pediatric, including specialized, beds in St. Petersburg in 2022

	Name of the medical organization	Used total	Bed-days spent	Deaths total	Mortality
1	2	3	4	5	6
Health Committee of St. Petersburg	St. Petersburg SHCI "Children's City Multidisciplinary Clinical Specialized Centre of High Medical Technologies"	47729	242925	100	0.21
	St. Petersburg SHCI "St. Mary Magdalene Children's City Hospital No.2"	16216.5	159888	5	0.03
	St. Petersburg SHCI "Children's Infectious Diseases Hospital No. 3"	5694.5	34746	0	0
	St. Petersburg SHCI "St. Olga's Children's Hospital No. 4"	11286.5	83187	3	0.03
	St. Petersburg SHCI "Children's City Clinical Hospital No.5 named after N.F. Filatov"	26225.5	164494	25	0.1
	St. Petersburg SHCI "Children's City Hospital No.17"	1644.5	40986	1	0.06
	St. Petersburg SHCI "Children's City Hospital No.19 named after K.A. Rauhfus"	21879	119515	17	0.08

Continuation of Table 2.2

	St. Petersburg SHCI "Children's City Hospital No.22"	10939.5	85543	5	0.05
	Children's department of St. Petersburg SHCI "Children's City Hospital No.36"	56	1029	0	0
	Children's department of St. Petersburg SHCI "Children's City Hospital No.40"	1364	32382	0	0
Ministry of Health of the Russian Federation	Children's Department of St. Petersburg SHCI "Clinical Infectious Diseases Hospital named after S.P. Botkin"	542	4455	0	0
	State Public Medical Institution of Leningrad region "Druzhnoselsk Psychiatric Hospital No.9"	1938.5	83345	0	0
	St. Petersburg SHCI "Oncological Center named after N.P. Napalkov"	778	8442	1	0.13
	St. Petersburg SHCI "City Perinatal Center No.1"	659	3952	0	0
	St. Petersburg SAHCI "Children's Hospice"	268.5	9252	18	6.7
	St. Petersburg Research Institute of Ear, Throat, Nose and Speech of the Ministry of Health of the Russian Federation (SRI)	2879	17558	0	0
	FSAI "Intersectoral Scientific and Technical Complex "Eye Microsurgery named after Acad. S.N. Fedorov" of the Ministry of Health of Russian Federation	310	1234	0	0
	FSBI "National Medical Research Center of Pediatric Traumatology and Orthopedics named after G.I. Turner" of the Ministry of Health of the Russian Federation	7646.5	86737	1	0.01
	Children's Department of the "N.N. Petrov National Medical Research Center of Oncology" of the Ministry of Health of the Russian Federation	709	10096	4	0.56
	FSBI "St. Petersburg SRI of Phthisiology" of the Ministry of Health of the Russian Federation	1874	30950	1	0.05
	FSBI "National Medical Research Center named after V.M. Bekhterev"	496	14054	0	0
	FSBI "National Medical Research Center named after V. A. Almazov" of the Ministry of Health of the Russian Federation	7577	85457	36	0.48
	FSBSI "The Research Institute of Obsterics, Gynecology and Reproductology named after D.O. Ott"	143	1721	0	0
	FSBI "Scientific and Clinical Centre of Infectious Diseases" FMBA of Russia	886.5	15474	0	0
	First St. Petersburg State Medical University named after Acad. I.P. Pavlov	2335	29730	3	0.13

Continuation of Table 2.2

	FSFEI HE "Saint Petersburg State Pediatric Medical University" of the Ministry of Health of the Russian Federation	33925.5	275076	63	0.19

In the megalopolis, taking into account the unfavorable epidemiological situation associated with the new coronavirus infection, in 2020 in St. Petersburg SHCI "Children's City Clinical Hospital No.5 named after N.F. Filatov" and FSFEI HE "Saint Petersburg State Pediatric Medical University" of the Ministry of Health of the Russian Federation beds were deployed to provide round-the-clock specialized emergency and urgent medical care to children with coronavirus infection. In addition, in 2022, the beds of St. Petersburg SHCI "St. Olga's Children's Hospital No.4" and "Children's City Hospital No.22", Children's Department of St. Petersburg SHCI "Clinical Infectious Diseases Hospital named after S.P. Botkin" were also used.

Primary specialized care for children of the first year of life is provided in 106 medical organizations, of which 18 are city children's city outpatient clinics and 56 are children's outpatient departments (COD).

The bases of this study for the assessment of specialized care in outpatient and inpatient settings were the city's medical organizations, Children's Outpatient Department No.43 of St. Petersburg SHCI "City Polyclinic No.19", Children's Outpatient Department No.5 of St. Petersburg SHCI "City Polyclinic No.3", Children's outpatient Department No.41 (level I) of St. Petersburg SHCI "City Polyclinic No.44", Consultative and Diagnostic Centre of Saint Petersburg State Pediatric Medical University (level II), Children's Multi-specialized Inpatient Facility of Saint Petersburg State Pediatric Medical University (level III), Centre of Telemedicine Technologies of Saint Petersburg State Pediatric Medical University (level III).

2.2. Research program

The subject of the study was the assessment of the organization of specialized medical care for children of the first year of life.

The object of the study were children of the first year of life receiving specialized

medical care in outpatient and inpatient settings, living in a megalopolis.

The unit of the study is a child of the first year of life.

The study included 4 stages.

At the first stage, the purpose and objectives of the study were formed, the research design was developed, the research instruments were selected and the criteria for selecting children were determined, and a regulatory and legal assessment of the current system of organization of specialized medical care for children of the first year of life was carried out. To study the state of the problem, the sources of domestic and foreign literature on the organization of specialized care for children of this age were examined.

The second stage involved interviewing (face-to-face survey) of mothers, copying data from medical records and official statistics.

At the third stage, the health status of children in the first year of life was studied, their access to medical care was analyzed, an objective and subjective assessment of the organization of specialized care in outpatient and inpatient settings was carried out, statistical analysis of the results obtained and their visualization were carried out.

At the fourth stage, based on the generalization of the information received and the results of the study, practical recommendations of a medical and organizational nature were developed aimed at improving the organization of specialized medical care for children of the first year of life at the outpatient and inpatient stages.

The statistical materials of the Federal State Statistics Service (Rosstat), statistical collections of the Federal State Budgetary Institution "Central Research Institute of Health Care Organization and Informatization" of the Ministry of Health of the Russian Federation (CRIHCOI), data from the Ariadna medical information system (MIS Ariadna), forms of Federal Statistical Monitoring (FSM form) were used in this work [183, 184, 185, 186, 187, 219, 220, 221, 222]. The total number of information units in the study was 16297. The purpose of the study is, based on the assessment of the organization of specialized medical care for children of the first year of life in a three-level system of its provision, to develop and scientifically substantiate a set of measures aimed at improving it. The research program in accordance with the purpose and objectives is presented in Table 2.3.

Table 2.3 - Research program

N	Research objectives	Research methods	Records and scope of observations
1.	To assess the state of health and accessibility of specialized medical care for children of the first year of life in the megalopolis	Epidemiological, statistical, retrospective analysis, analytical	-Statistical materials of Rosstat "Demography"; N=5 - Statistical collections "Main indicators of maternal and child health, activities of child protection and obstetrics services in the Russian Federation" 2018-2022; N=5 - Statistical collections "Resources of medical organizations. Medical personnel" 2018-2022; N=5 - FSN F. 12 "Information on the number of diseases registered in patients residing in the area served by the medical organization" 2018-2022, summary for Russia and St. Petersburg; N=10 - FSN F. 32 "Information on medical care for pregnant women, women in labour and maternity" 2018-2022, summary for Russia and St. Petersburg; N=10
2.	To evaluate the organization of specialized medical care for children under one year old at the outpatient stage	Epidemiological, statistical, retrospective analysis, sociological, analytical	- Extract from CDC's MIS Ariadna for 2020-2022; N=6599 - Extract from "Child's record" (form 112/u); N=1870 - "Questionnaire for mothers of children of their first year of life (COD)"; N=1381 - "Questionnaire for mother of the first year of life of consultative diagnostic center (CDC)"; N=317
3	To evaluate the use of telemedicine technologies as an important component in the treatment and diagnosis of diseases in children of the first year of life	Statistical, analytical	- Extract from MIS Ariadna on telemedicine consultations for 2020-2022; N=997

Continuation of Table 2.3

4.	To study the organization of specialized medical care in inpatient settings for children under one year old, depending on the level of the pediatric inpatient facility	Statistical, sociological, analytical	- Extract from MIS Ariadne inpatient facility for 2020-2022; N=3371 -"Questionnaire for mothers of children of the first year of life who received inpatient care"; N=459 - Extracted data from inpatient facility discharge epicrisis; N=3128
5.	To develop measures of a medical and organizational nature aimed at improving the organization of specialized medical care for children of the first year of life at the outpatient and inpatient stages	Analytical	- Materials and results of the conducted research.

This study was conducted according to a special program, the theoretical and methodological basis of which was the work of scientists in the field of public health and healthcare organization, neonatology and pediatrics, as well as regulatory documents. In accordance with the ***first objective set***, the health indicators of children under one year old were studied. To this end, an assessment of medical and demographic indicators was carried out - fertility and infant mortality, the frequency of birth of children with a deviation in birth weight, the incidence of newborns and children of the first year of life were calculated and analyzed. To assess the availability of specialized medical care, the indicators of availability of physicians and pediatric beds (including specialized ones) were analyzed. According to the Nomenclature of positions of medical and pharmaceutical workers presented in the Order of the Ministry of Health of the Russian Federation dated May 2, 2023 No.205n "On Approval of the Nomenclature of Positions of Medical and Pharmaceutical Workers" [149], most specialist doctors do not have a separate pediatric specialization and serve the entire population. The following are specialized in servicing only the child population: a pediatric cardiologist; a pediatric oncologist; a pediatric oncologist-hematologist; a pediatric urologist-andrologist; a

pediatric surgeon; a pediatric endocrinologist; a neonatologist; a pediatrician; a district pediatrician; a pediatric psychiatrist. Based on this regulatory legal act, specialized outpatient and inpatient care is provided by all of the above, except for the pediatrician of the district service, which was used in the study.

To fulfil the ***second objective*** of the study, an objective assessment of the organization of specialized medical care for children up to one year old at the outpatient stage was carried out on the basis of extracts from medical records 112/u and CDC's MIS Ariadna. The subjective assessment of primary specialized care in COD and CDC was carried out by random sampling based on an anonymous questionnaire of parents of children of the first year of life. The assessment of the organization of primary specialized care in the COD was carried out using an offline survey in the COD, an online survey on social networks and on parent forums (Google form), in the CDC when interviewing (face-to-face sociological survey).

1381 respondents took part in the assessment of primary specialized care in the COD. An anonymous web-based survey of 1122 mothers of first-year children receiving medical care in megalopolis COD in 2022 was conducted using the online form "Questionnaire for mothers of children of their first year of life (COD)". A total of 259 mothers were interviewed in the COD. A total of 317 mothers were questioned in the CDC using the form "Questionnaire for mothers of children of their first year of life (CDC)". The consent to participate in the study was to fill out a questionnaire. The questionnaire included 33 closed and open-ended questions and was divided into two parts (Appendices 1 and 2). The 1st part of the questionnaire contained questions to assess the medical and social characteristics of the family. The second part of the questionnaire dealt with questions to assess the organization of specialized care in outpatient studies.

In complex medical and social research, an approximate required number of observations can be used in advance, depending on the desired accuracy in the research results (Otdelnova K.A., 1980) [131]. For the present study, a sample size corresponding to medium precision studies with a confidence coefficient equal to 2, corresponding to a probability of 0.954, was taken. Based on the data provided, with the chosen accuracy, the volume of the study should be at least 100 observation units, which is observed in this

study. The representativeness of the samples was verified using the methodology of prof. A.M. Merkov (Formula 1):

$$\Delta = t \times \sqrt{\frac{\sigma^2}{n} \times \left((1 - \frac{n}{N}) \right)} \qquad (2)$$

where Δ - measure of precision;
t - confidence coefficient (in this study t = 2, which corresponds to a probability of 0.954); N - general population: in COD – the number of children of the first year of life in a megalopolis in 2022 (50437), in CDC - the number of patients of the first year of life who received medical care; n - sample: in COD it amounted to 1381 children, in the control group – 317 children; σ^2 - variance of the sample population (assuming that $\sigma^2 = 0.25$, the calculated value of the average error will be the maximum, and we guarantee that its true dimensions will not exceed those calculated by us).

Substituting the values into formula 1, we obtain that the study error will not exceed 2.2 per cent for the COD and 4.0 per cent for the CDC, which is acceptable.

To solve the ***third objective***, statistical analysis of data from the MIS Ariadna on telemedicine consultations for three years conducted at the federal TMT center was carried out. Data was extracted for 294 children in 2020, for 324 children in 2021 and for 379 children in 2022 (a total of 997 children).

To solve the ***fourth objective***, an objective assessment of the organization of specialized medical care in inpatient settings was carried out using data extracted from the MIS Ariadna and inpatient facility epicrises. The study assessed the following indicators: the structure of admitted patients according to the sources of funding for treatment, the nature of inpatient admission and methods of delivery to the inpatient facility and the profile of departments, the average length of stay of a patient in a bed and the frequency of inpatient admissions depending on the ICD-10 class. A total of 3371 children were selected for the level II inpatient study: 1024 children in 2020, 1093 children in 2021, and 1011 children in 2022. Of all children in the first year of life, 196 were first month babies: 54 in 2020, 78 in 2021, and 64 in 2022. A total of 3371 children

were selected for the level III inpatient study, of which: 1124 children in 2020, 1119 children in 2021, 1128 children in 2022. Of all children in the first year of life, 267 were first month babies: 69 in 2020, 103 in 2021, and 95 in 2022.

Subjective assessment was carried out on the basis of an anonymous web survey conducted randomly using a specially designed online form "Questionnaire for mothers of children who received inpatient care" (Appendix 3). The study involved 459 mothers whose children were admitted to city inpatient facilities in the first year of life. The representativeness of the sample was tested using formula 1. The number of children of the first year of life in the megalopolis in 2022 was taken as the general population, since all of them could need medical care in inpatient settings. The study error will not exceed 3.0%, which is acceptable.

Based on the questionnaire survey conducted in the course of the research, a medical and social characterization of the families of the first-year children who participated in the study was compiled (Table 2.4). The highest average age was found to be among mothers in the CDC, where the proportion of women aged 30-39 years was 55.3%. Although the lowest average age was for mothers in the COD, where the largest proportion of mothers were aged 25-34 years (56.8%), the proportion of mothers in this age group in the children's inpatient department was 65.0%. The average number of children per family in the study groups was approximately the same, but there were more single-child families in the COD and children's inpatient department, than mothers in the CDC (42.9% and 45.1% vs. 39.1%). In terms of social status, housewives were predominant with 35.2% and 48.3% respectively in the CDC and children's inpatient department, while employees (36.4%) were predominant in the COD. An assessment of the distribution of mothers by level of education showed that the largest proportion of mothers in COD and CDC was represented by respondents with higher education, but in the CDC the proportion of such women was 1.9 times higher (36.3% vs. 68.3%). In children's inpatient departments, the largest proportion was made up of mothers with secondary specialized education (33.3%). When assessing the financial situation, it was revealed that the majority of mothers believed that they lived on average and had enough money for a normal life. The proportion of such mothers was highest in the CDC (63.6%),

and the lowest in the COD (53.3%), where, moreover, more than a third of mothers believed that they lived below average and had enough money only for minimal expenses (35.6%). The study showed that the majority of the respondents lived in a registered marriage, however, the proportion of these mothers was highest in COD and CDC (79.1% and 78.3%, respectively), and the least high among mothers in children's inpatient departments (66.7%). In the same group, the highest proportion of women in civil marriage (14.0%) and unmarried (9.7%) was observed.

Table 2.4 - Distribution of mothers by medical and social characteristics, depending on the medical organization where the child received specialized medical care (%)

Characteristic	COD	CDC	Children's inpatient department
Age			
Up to 20 years old	2.3	0.5	1.1
20-24 years old	15.9	1.2	10.6
25-29 years old	29.5	16.9	33.0
30-34 years old	27.3	29.2	32.0
35-39 years old	15.9	26.1	14.8
40-44 years old	6.8	21.7	5.3
45 and older	2.3	4.3	3.2
Average age	30.16±1.44	35.23±1.15	30.67±1.23
Number of children in the family			
1	42.9	39.1	45.1
2	35.7	37.7	37.4
3	16.7	21.7	12.0
4	4.8	1.4	4.4
5 and more	-	-	1.1
	1.86±0.8	1.82±0.9	1.80±0.7
Social status			
working	15.9	18.7	19.4
employee	36.4	26.7	23.7
entrepreneur	6.8	13.0	5.4
housewife	31.8	35.2	48.3
student	6.8	4.3	3.2
other	2.3	2.1	-
Education			
primary	2.6	-	5.6
secondary	17.9	4.3	21.1
specialized secondary	30.3	18.7	33.3
incomplete higher	12.8	13.0	12.2
higher	36.3	68.3	27.8

Continuation of Table 2.4.

Financial situation			
I live poorly	4.4	4.5	5.3
I live below average	35.6	9.1	12.8
I live average	53.3	63.6	60.7
I have no problems with money	6.7	22.7	20.2
I consider myself a rich woman	-	-	1.0
Marital status			
in a registered marriage	79.1	78.3	66.7
in a civil marriage	9.3	8.7	14.0
divorced	7.0	7.5	7.5
widow	2.3	1.2	2.1
I am not married and I have not been	4.7	4.3	9.7

According to the results of the study, to solve the ***fifth objective***, measures of a medical and organizational nature were developed aimed at improving the organization of specialized medical care for children of the first year of life at the outpatient and inpatient stages.

A set of methods and techniques was used in the study: the PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions, data extracts from medical records, sociological (questionnaire, interviewing and web survey), graphical and analytical, and qualimetry. In the formation of the statistical population, continuous and selective methods were used. The data of descriptive statistics are reflected in the form of quantitative and qualitative, extensive and intensive indicators, weighted arithmetic mean with standard error The choice of the criterion for testing the significance of differences between the analysed statistical indicators was based on the nature of data distribution. The degree of compliance of the empirical distribution with the normal distribution of the studied samples was carried out using the Kolmogorov-Smirnov (K-S) criterion: normal distribution if $p<0.05$; the distribution is not considered normal if $p>0.05$. When comparing two groups of independent samples, Student's t-test or its non-parametric analogue, Mann-Whitney rank U-test, was used, Wilcoxon signed-rank test was used in linked samples.

Database creation, processing, analysis and visualization of the results were carried out using Microsoft Office Excel 2019 (Word, Excel). Statistical analysis was carried out using StatSoft-Statistica 10.0.

Chapter 3 HEALTH STATUS AND ACCESS TO MEDICAL CARE FOR CHILDREN OF THE FIRST YEAR OF LIFE

3.1. Monitoring of the health indicators of children of the first year of life

Negative trends in the demographic situation in Russia, observed in recent years, are largely due to the problems of population reproduction [4, 5]. The Northwest Federal District is a region with a traditionally low birth rate. The assessment of the dynamics of the NWFD birth rate revealed that in the period from 2018 to 2022, the level of indicators was below the national average and decreased by 16.7%. At the same time, in St. Petersburg, which is more favorable in this respect, the birth rate fell much more and the overall decline amounted to 21.7% over five years. The dynamics of fertility in Russia, NWFD and St. Petersburg in 2018-2022 is shown in Figure 3.1.

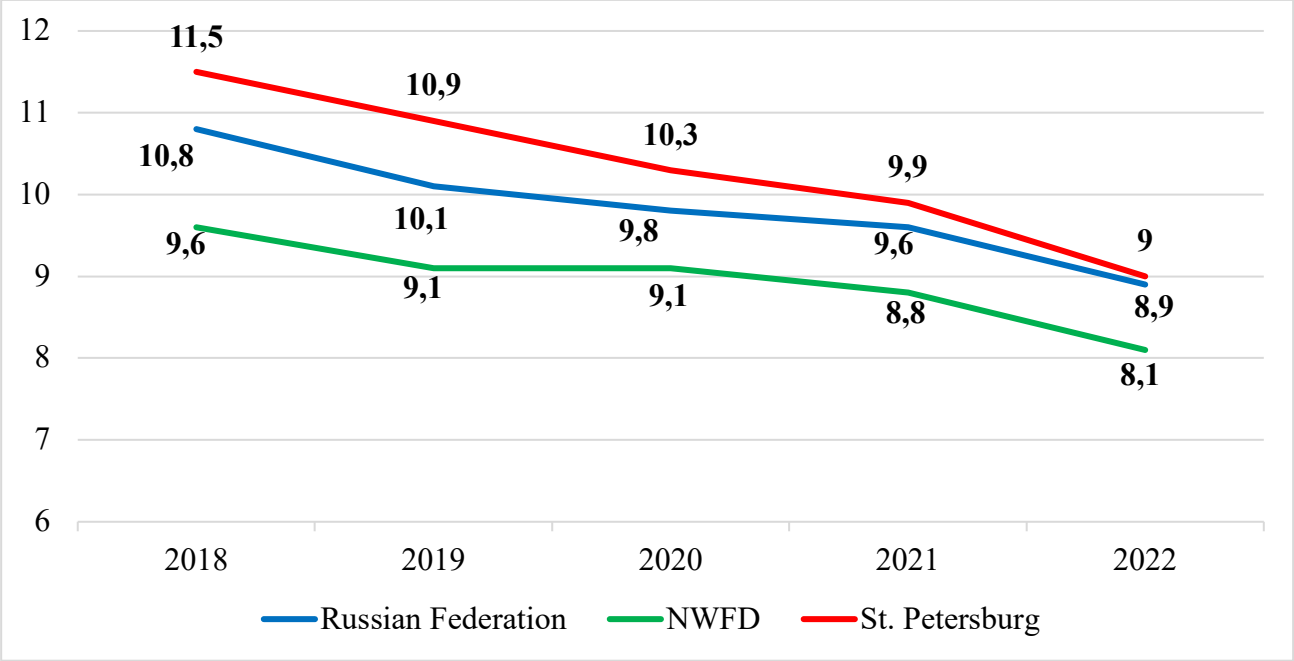

Figure 3.1 – Fertility dynamics in Russia, NWFD and St. Petersburg in 2018-2022 (per 1000 population)

The largest contributor to the county's birth rate is its constituent megalopolis. 50437 children were born in St. Petersburg in 2022. In conditions of low fertility, the struggle for the life and health of each newborn child becomes especially important, therefore close attention should be paid to the health of children in the first year of life [6]. The analysis revealed that the proportion of children of the first year of life in the

megalopolis in the total number of children of the first year of life in the federal district ranged from 44.0% in 2018 to 44.5% in 2022. The dynamics of the proportion of children of the first year of life in St. Petersburg in the total number of children of the first year of life in the Northwestern Federal District in 2018-2022 is shown in Figure 3.2.

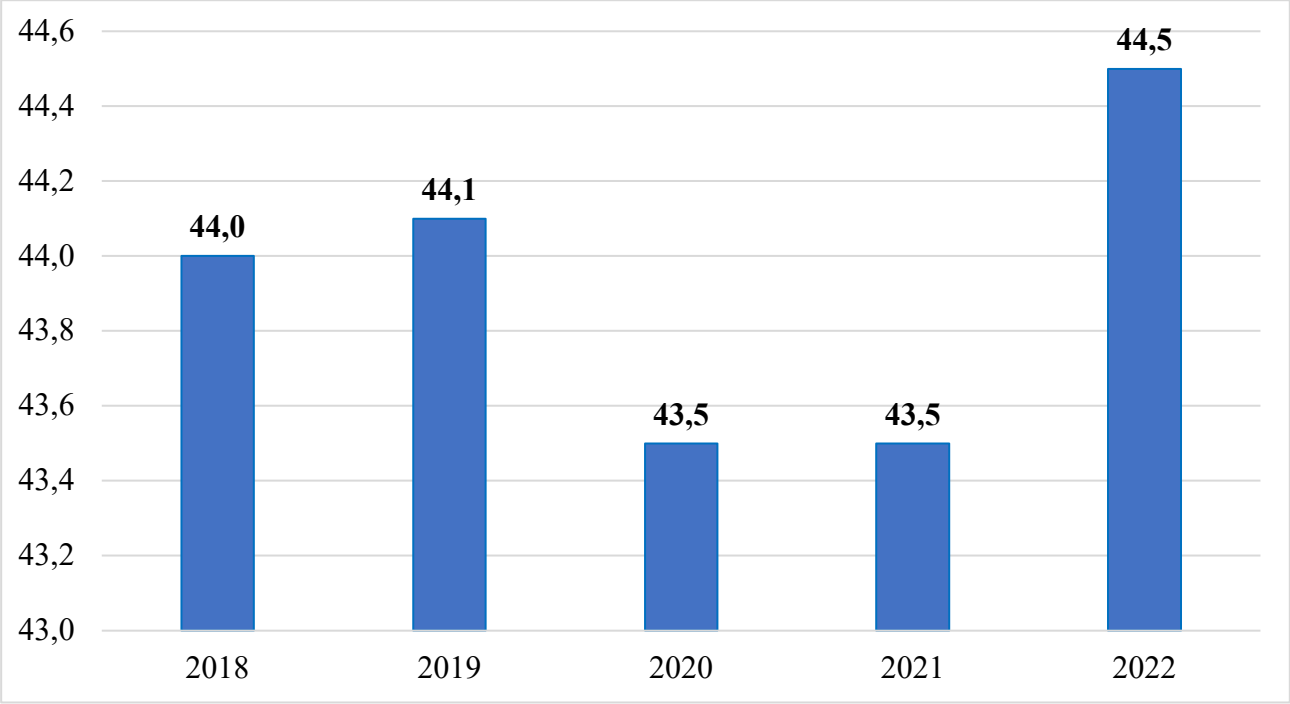

Figure 3.2 – Dynamics of the proportion of children of the first year of life in St. Petersburg in the total number of children of the first year of life in the Northwestern Federal District in 2018-2022 (%)

Given the significant contribution of the megapolis to the demographic situation of the region as a whole, the assessment of the health of children of the first year of life in the megalopolis is of particular importance. The health indicators of children of this age are directly correlated with the health status and obstetric history of the mother, the nature of her delivery, the impact of medical and social risk factors, the duration of natural feeding of the child, the parents' commitment to a healthy lifestyle and prevention, as well as in the dynamic regular medical check-up of children for the early detection of diseases [7, 8]. Of particular importance for the health of children of the first year of life is the newborn period, when pathological conditions that are not detected in time can have a significant impact on the child's health in subsequent years. As Figure 3.3 shows, in the megalopolis in the period 2018-2022, the incidence of newborns in obstetric care organizations was higher than the national average and had an upward trend. If in Russia

the incidence of newborns in 2022 decreased by 6.5% compared to the level of 2018, then in the megalopolis it increased by 24.0% over five years.

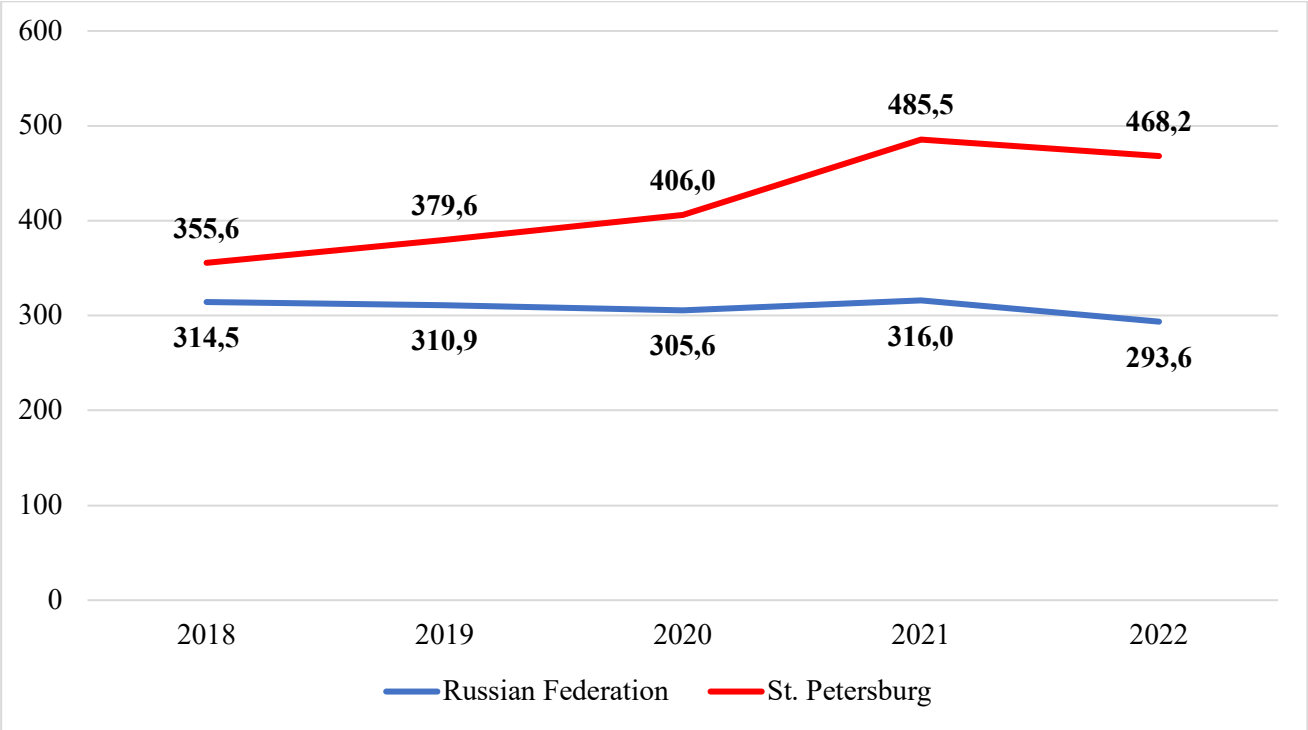

Figure 3.3 - Level and dynamics of incidence rates of newborns in obstetric care organizations in Russia and St. Petersburg in 2018-2022 (per 1000 children under one year old)

An assessment of the incidence structure of newborns in maternity care organizations revealed that in 2022 in St. Petersburg 94.7% were certain conditions that occur in the perinatal period (PP). The proportion of congenital anomalies (malformations, CM), deformities and chromosomal abnormalities was 5.3%. Among the certain conditions occurring in PP, the most common forms are neonatal jaundice due to excessive hemolysis, other and unspecified causes (11.6%), growth retardation and malnutrition (7.6%), and neonatal respiratory disorders occurring in PP (7.0%). The incidence rates of newborns with certain classes of diseases in St. Petersburg in obstetric care organizations in 2022 are shown in Table 3.1.

Table 3.1 - Incidence rates of newborns with certain classes of diseases in St. Petersburg in obstetric care organizations in 2022 (per 1000 children under one year old)

Name of diseases	Born sick and became ill	Specific weight (in %)
Total newborns born sick and became ill	468.2	-
Certain conditions occurring in PP - total	588.0	94.7
Stunted growth and malnutrition	47.1	7.6
Birth trauma - total	22.7	3.6

Continuation of Table 3.1.

Intrauterine hypoxia, asphyxia during childbirth	28.2	4.5
Respiratory disorders in newborns that occurred in PP – total including respiratory distress in newborns	43.8 21.1	7.0 3.4
Infectious diseases specific to PP - total	15.4	2.5
Perinatal hematological disorders	8.4	1.3
intraventricular hemorrhages	0.9	0.1
Hemolytic disease of the fetus and newborn, fetal dropsy caused by hemolytic disease; nuclear jaundice	15.8	2.5
Neonatal jaundice due to excessive hemolysis, other and unspecified causes	72.4	11.6
Other cerebral disorders of the newborn	2.5	0.4
Congenital malformation (CM)	32.4	5.3
Other diseases	0.3	0.05
Number of cases of diseases - total	620.7	100.0

The incidence rate of children of the first year of life in St. Petersburg in 2018-2020 was lower than the average in Russia, and in 2021-2022 exceeded the national average. The incidence rate of children of this age in the megalopolis in 2022 was 37.5% higher than the national average ($p<0.05$). Evaluation of the dynamics of incidence of children of the first year of life in the megalopolis revealed that in 2021 and 2022 the increase in incidence to the level of 2020 was 33.0% and 36.7%, respectively. The annual increase in 2022 was 5.8%, and in general, over five years, the incidence of children in the first year of life increased slightly - by 1.0% (from 3762.9‰ to 2373.3‰; $p>0.05$). The level and dynamics of incidence rates of children of the first year of life in Russia and St. Petersburg in 2018-2022 are shown in Figure 3.4.

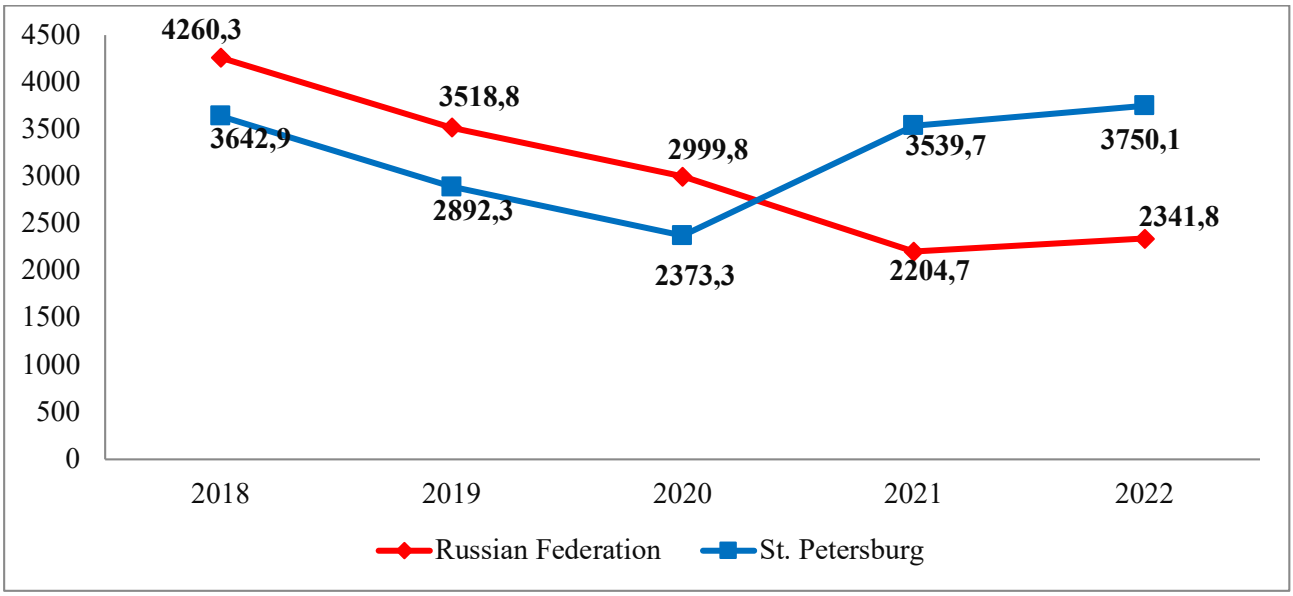

Figure 3.4 - Level and dynamics of incidence rates of children of the first year of life in Russia and St. Petersburg in 2018-2022 (per 1000 children under one year old)

An assessment of the incidence of certain forms of diseases in children of the first year of life in St. Petersburg allowed us to establish (Table 3.2.) that in 2022, by the level of 2018, there was an increase in incidence for all classes of diseases, except for diseases of the blood, hematopoietic organs and individual disorders involving the immune mechanism (blood diseases) ($p>0.05$), ear diseases and mastoid process ($p<0.05$), respiratory diseases ($p>0.05$) and injuries, poisoning and some other consequences of external causes ($p<0.05$). It was found that in 2020, there was a decrease in all classes of ICD-10 diseases, both to the level of 2018 and to the level of 2022, except for certain conditions that occur in the perinatal period, and CM. The incidence rate of a new coronavirus infection in 2021 increased 5.2 times compared to 2020 in children of the first year of life, and 11.1 times in 2022.

Table 3.2 - Dynamics of incidence of first-year children in St. Petersburg with certain classes of diseases in 2018-2022 (per 1000 children of the first year of life)

Class of diseases	2018	2019	2020	2021	2022	Growth /decrease rate (in %)	p
Certain infectious and parasitic diseases	78.91	59.78	51.13	69.41	79.85	+1.2	>0.05
Neoplasms	49.71	43.91	47.30	67.13	57.86	+14.1	<0.05
Blood diseases	36.95	28.91	23.83	29.67	35.17	-4.8	>0.05

Continuation of Table 3.2.

Endocrine system diseases	72.68	68.37	62.22	62.93	56.30	+22.5	<0.05
Nervous system diseases	440.01	429.74	409.41	493.79	456.28	+3.6	<0.05
Diseases of the eye and its appendages	235.95	205.05	208.87	224.08	219.18	+7.1	<0.05
Ear and mastoid diseases	61.36	43.91	40.74	48.74	45.44	-26.0	<0.05
Respiratory diseases	1495.98	1431.93	1160.89	1359.63	1486.54	-0.6	>0.05
Digestive system diseases	272.28	256.90	242.30	285.90	292.98	+7.0	<0.05
Diseases of the skin and subcutaneous tissue	236.74	236.44	226.90	246.29	257.09	+8.0	<0.05
Diseases of the musculoskeletal system and connective tissue	100.00	96.76	91.00	99.14	113.01	+11.5	<0.05
Genitourinary system diseases	96.28	87.79	75.10	97.44	97.97	+1.7	>0.05
Certain conditions occurring in PP	168.43	188.43	208.42	183.97	196.16	+14.1	<0.05
Congenital malformation (CM)	114.20	123.82	123.18	148.29	142.70	+20.0	<0.05
Injuries, poisoning and some other consequences of external causes	46.86	54.19	47.18	36.68	41.02	-12.5	<0.05
COVID-19	-	-	14.91	77.81	165.96	+100.0	<0.05

The assessment of the incidence structure of children of the first year of life in the megalopolis showed that respiratory diseases prevailed in it, the specific weight of which in 2022 amounted to 39.6%. Diseases of the nervous system took the second place (12.2%) and diseases of the digestive system took the third place (7.8%). It has been established that the pandemic of a new coronavirus infection has made adjustments to the structure of incidence in children of this age group. In 2020, the proportion of all classes of diseases increased, except for some infectious and parasitic diseases and respiratory diseases. By 2022, apart from the above two classes of diseases, all other classes of diseases have increased. However, the proportion of respiratory diseases in 2022 increased slightly to the level of 2020 (+3.5%), and the growth of COVID-19 amounted to 7.3 times. The structure of incidence of first-year children in St. Petersburg in 2018, 2020 and 2022 is shown in Table 3.3.

Table 3.3 - Structure of incidence of first-year children in St. Petersburg in 2018, 2020 and 2022 (% of total)

Class of diseases	2018	2020	2022	Growth/decrease rate (%)	p
Respiratory diseases	42.6 (-)	38.2 (-10.3)	39.6 (+3.5)	-7.0	<0.05
Nervous system diseases	12.5 (-)	13.3 (+6.0)	12.2 (-8.3)	-2.4	<0.05
Digestive system diseases	7.7 (-)	8.0 (+3.8)	7.8 (-)	+1.3	>0.05
Diseases of the skin and subcutaneous tissue	6.8 (-)	7.4 (+2.5)	7.0 (-5.4)	+2.8	<0.05
Diseases of the eye and its appendages	6.7 (-)	6.9 (+2.9)	5.8 (-16.0)	-13.4	<0.05
Certain conditions occurring in PP	4.8 (-)	6.9 (+30.4)	5.2 (-24.6)	+7.7	<0.05
Congenital malformation (CM)	3.2 (-)	4.1 (+22.0)	3.8 (-7.3)	+15.8	<0.05
Certain infectious and parasitic diseases	2.3 (-)	1.7 (-26.0)	2.1 (+19.0)	-8.7	<0.05
Diseases of the musculoskeletal system and connective tissue	2.8 (-)	3.0 (+6.7)	3.0 (-)	+6.7	<0.05
COVID-19	- (-)	0.6 (+100.0)	4.4 (+86.4)	+100.0	<0.05
Other	10.6 (-)	9.9 (-6.6)	9.1 (-8.0)	-14.2	<0.05
Total	100.0	100.0	100.0	-	-

The comparative assessment of incidence rates of children of the first year of life by separate classes of diseases revealed that in the megalopolis the incidence of all classes of diseases was statistically significantly higher, except for certain conditions arising in PP (1.1 times). The most significant difference was observed in the prevalence of diseases of the musculoskeletal system and connective tissue (4.4 times), the eye and its appendage (2.6 times), digestive organs (2.6 times), genitourinary system (2.3 times), skin and subcutaneous tissue (2.2 times) and COVID-19 (2.2 times). In the incidence structure, the proportion of certain conditions occurring in PP (1.8 times), respiratory diseases (1.6 times), CM (1.1 times) and diseases of the endocrine system (1.1 times) was lower than the average in Russia. Comparison of incidence and specific weight of certain classes of diseases in the structure of incidence of children of the first year in Russia and St. Petersburg in 2022 is given in Table 3.4.

Table 3.4 - Comparison of incidence and the proportion of certain classes of diseases in the structure of incidence of first-year children in Russia and St. Petersburg in 2022 (per 1000 children of the first year of life and in %)

Class of diseases	Incidence (%)				Specific weight (%)		
	RF	SPb	Comparison with RF (times)	p	RF	SPb	Comparison with RF (times)
1	2	3	4	5	6	7	8
Certain infectious and parasitic diseases	46.73	79.85	>1.7	<0.05	2.0	2.1	>1.1
Endocrine system diseases	38.71	56.30	>1.5	<0.05	1.7	1.5	<1.1
Nervous system diseases	215.86	456.28	>2.1	<0.05	9.2	12.2	>1.3
Diseases of the eye and its appendages	85.78	219.18	>2.6	<0.05	3.7	5.8	>1.6
Ear and mastoid diseases	29.27	45.44	>1.6	<0.05	1.1	1.2	>1.1
Respiratory diseases	1118.44	1486.54	>1.3	<0.05	47.8	39.6	<1.2
Digestive system diseases	111.78	292.98	>2.6	<0.05	4.8	7.8	>1.6
Diseases of the skin and subcutaneous tissue	116.78	257.09	>2.2	<0.05	5.0	7.0	>1.4
Diseases of the musculoskeletal system and connective tissue	25.49	113.01	>4.4	<0.05	1.1	3.0	>2.7
Genitourinary system diseases	42.20	97.97	>2.3	<0.05	1.8	2.6	>1.4
Certain conditions occurring in PP	217.11	196.16	<1.1	<0.05	9.3	5.2	<1.8
Congenital malformation (CM)	97.68	142.70	>1.5	<0.05	4.2	3.8	<1.1
COVID-19	74.71	165.96	>2.2	<0.05	3.2	4.4	>1.4

Thus, in the megalopolis the incidence of children of the first year of life significantly exceeds the average Russian level, both in general and in individual classes of diseases, and has peculiarities in the structure: lower than the Russian average specific weight of certain conditions arising in PP (1.8 times), respiratory diseases (1.6 times), CHD (1.1 times) and diseases of the endocrine system (1.1 times) and higher for all other classes of diseases. The decrease in the incidence of children in 2020 was due not to an increase in the health of the child population, but to a lack of circulation to medical

organizations related to the epidemiological situation in the city. Thus, the COVID-19 pandemic has had an impact on the routine care, especially in outpatient settings.

One of the most important indicators of public health is indicators of physical development. The assessment of physical development acquires a special role in the first year of life, when the formation of the child's body is proceeding at an accelerated pace and every month of the child's life is important. Therefore, analyzing deviations in birth weight makes it possible to assess the baseline health resource of children. The study showed that in the megalopolis in 2018-2022, the birth rate of children with a body weight of up to 2500 g exceeded the national average. It was found that in St. Petersburg, during the study period, all indicators for underweight children decreased. However, the birth rate of children with a body weight of up to 2500 g, with an almost annual decrease in 2022, actually returned to the level of 2018, so the five-year dynamics of the indicator was only -0.5% and reached a value of 59.8 cases per 1000 children born alive. The frequency of birth of children with a deviation in body weight at birth in Russia and St. Petersburg in 2018-2022 is shown in Table 3.5.

Table 3.5 - Frequency of births with deviated birth weight in Russia and St. Petersburg in 2018-2022 (per 1000 children born alive)

Administrative and territorial division	2018	2019	2020	2021	2022	Dynamics (%)
	Extremely low birth weight					
Russian Federation	3.9	4.0	3.9	4.1	3.8	-2.6
Saint-Petersburg	4.6	4.4	4.5	4.8	3.6	-21.7
	Very low birth weight					
Russian Federation	10.5	10.6	10.4	10.3	9.6	-8.6
Saint-Petersburg	11.2	10.8	10.7	11.5	9.8	-12.5
	Up to 2500 g					
Russian Federation	62.0	62.4	59.2	60.5	47.2	-23.9
Saint-Petersburg	60.1	57.2	57.6	55.8	59.8	-0.5
	4000 g or more					
Russian Federation	97.1	97.4	101.4	101.2	97.8	+0.7
Saint-Petersburg	116.6	88.8	119.1	118.0	116.6	0.0

Respiration of low birth weight babies is an indicator of the quality of medical care in the context of the use of high-tech methods of treatment for children of this weight category. If, up to and including 2021, the birth rate of children with extremely low body weight (ELBW) tended to increase, then in 2022 the indicator decreased by 21.7% (to

3.6%). When assessing the frequency of birth of children with very low body weight (VLBW), a similar trend was observed, with the exception of 2021, when the indicator increased by 7.0%, and then decreased by 14.8% (to 9.8%).

In the last five years, St. Petersburg has had a higher frequency of births with a birth weight of 4000 g or more compared to the national average. As with low birth weight babies, the incidence of large births in 2022 equaled the 2018 level at 116.6 cases per 1000 live births.

Thus, the assessment of the physical development indicators of children by birth weight revealed a reduction in the incidence of prematurity, indicating more effective measures for prolongation of pregnancy. However, the consistently high frequency of births with extremely and very low body weight, birth weight of 4000 g and more is an additional risk factor for children's health, including in the first year of life. Given that mothers of children born in 2021 were pregnant during the most active period of the COVID-19 pandemic, the increased incidence of extremely and very low body weight indicates the impact of the new coronavirus infection on delivery and, as a result, on children's health.

In addition to the efficiency of nursing low birth weight babies, the infant mortality rate is an indicator of the quality of medical care for children of the first year of life. In 2018-2022, this indicator in the megalopolis was below the national average. In both Russia and St. Petersburg, all the years studied, the mortality of children in the first year decreased, with the exception of 2021, when there was a slight increase in infant mortality. The National Project "Health Care" declares the reduction of infant mortality to 4.5 cases per 1000 births by 2024 as a target. In the subject city, the overall decrease in the indicator over five years was 13.7% and in 2022 this indicator reached the level of 3.5 cases per 1000 children born alive, which makes it possible to speak of a fairly high level of medical care for children. The dynamics of infant mortality in the Russian Federation and St. Petersburg in 2018-2022 is shown in Figure 3.5.

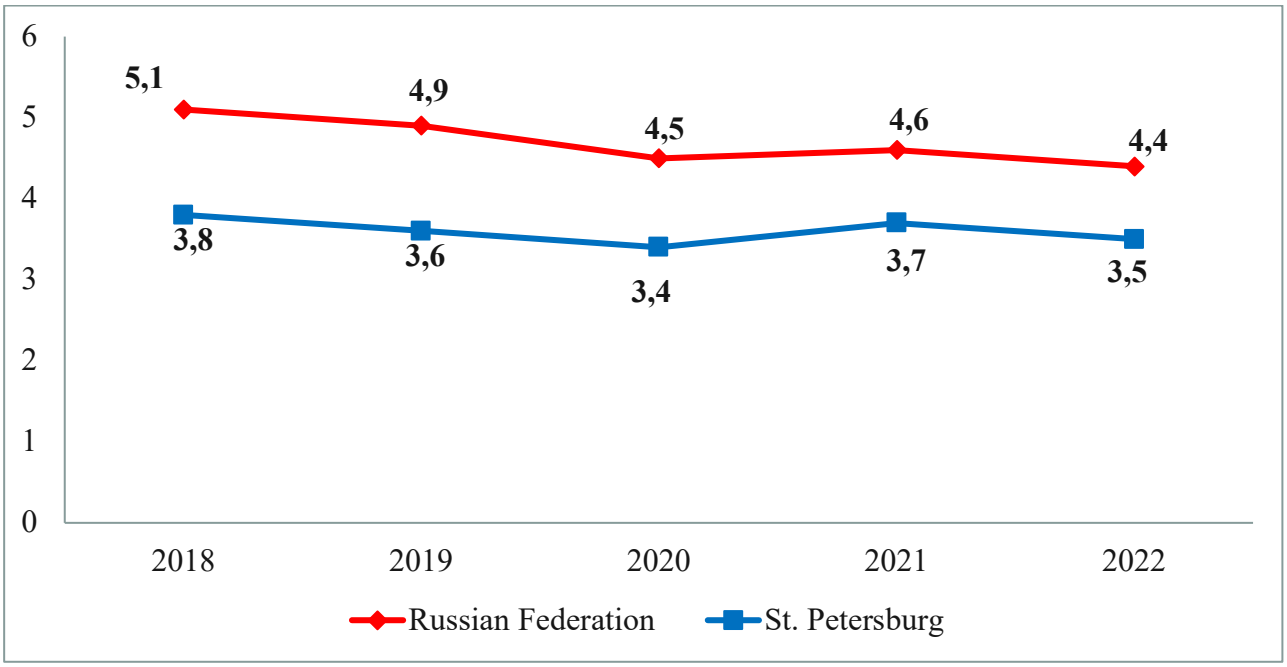

Figure 3.5 - Dynamics of infant mortality in the Russian Federation and St. Petersburg in 2018-2022 (‰)

Thus, the megalopolis has a lower birth rate and infant mortality with a high birth rate of children with extremely and very low body weight and a body weight of 4000 g or more. The children of the megalopolis are characterized by a fairly high incidence of newborns and children of the first year of life. The obtained data on the health status of children at birth and by the end of the first year of life showed the expediency of studying the organization of specialized medical care at the outpatient and hospital stages in megalopolis medical institutions.

3.2. Assessment of the availability of specialized care to the children's population of St. Petersburg

The increase in incidence of children in the first year of life in St. Petersburg with a simultaneous growth of children with deviations in body weight at birth in the period 2018-2022, showed the expediency of analyzing the indicators of accessibility of medical care to the child population, such as availability of physicians and pediatric beds.

The study showed that in the megalopolis, the provision of doctors of all studied specialties during all the studied years was higher than the average in the Russian

Federation. Neonatologists were 1.1 times higher than the national average (+8.9%), pediatricians (total) – 1.8 times (+45.7%); pediatricians (without precinct) – 2.5 times (+60.6%), pediatric cardiologists – 2.8 times (+64.5%), pediatric oncologists – 3.1 times (68.2%), pediatric psychiatrists – 3.0 times (66.2%), pediatric urologists-andrologists – 2.4 times (+69.4%), pediatric surgeons – 2.0 times (+51.0%) and pediatric endocrinologists – 2.8 times (64.2%). The dynamics of provision of pediatricians in Russia and St. Petersburg in 2018-2022 is presented in Table 3.6.

In the megalopolis, during the period under study, the indicators of provision with physicians increased almost annually. The provision of pediatric endocrinologists increased most significantly (+36.7%; from 0.69‰ to 1.09‰), pediatric oncologists (+27.3%; from 0.32‰ to 0.44‰), pediatric cardiologists (+26.4%; from 0.81‰ to 1.10‰) and neonatologists (+10.0%; from 36.89‰ to 38.97‰).

Table 3.6 - The dynamics of provision of pediatricians in Russia and St. Petersburg in 2018-2022 (‰)

Specialization		2018	2019	2020	2021	2022	Growth/decrease rate (in %)	p
Neonatologists	RF	36.89	39.18	38.64	39.94	38.97	+5.3	<0.05
	SPb	38.50	39.44	40.13	46.14	42.79	+10.0	>0.05
Pediatricians (total)	RF	16.31	16.29	16.39	16.23	16.08	-1.4	>0.05
	SPb	27.04	27.02	28.34	29.17	29.60	+8.6	<0.05
Pediatricians (without precinct)	RF	7.11	7.02	6.93	6.86	6.66	-6.3	<0.05
	SPb	15.88	16.05	16.20	16.86	16.89	+6.0	>0.05
Pediatric cardiologists	RF	0.36	0.38	0.38	0.38	0.39	+7.7	>0.05
	SPb	0.81	0.79	0.92	1.00	1.10	+26.4	>0.05
Pediatric oncologists	RF	0.11	0.11	0.12	0.13	0.14	+21.4	>0.05
	SPb	0.32	0.34	0.40	0.41	0.44	+27.3	>0.05
Pediatric psychiatrists	RF	0.53	0.53	0.51	0.52	0.50	-5.7	>0.05
	SPb	1.45	1.47	1.42	1.48	1.48	+2.0	>0.05
Pediatric urologists-andrologists	RF	0.12	0.13	0.13	0.13	0.14	+14.3	>0.05
	SPb	0.28	0.29	0.32	0.33	0.33	+15.2	>0.05
Pediatric surgeons	RF	1.08	1.10	1.09	1.08	1.08	0.0	0.0
	SPb	2.09	2.16	2.15	2.26	2.27	+7.9	>0.05
Pediatric endocrinologists	RF	0.34	0.35	0.36	0.37	0.39	+12.8	>0.05
	SPb	0.69	0.80	0.86	0.98	1.09	+36.7	>0.05

Despite the fact that the provision of pediatric (including specialized) beds in the country as a whole and in the megalopolis tended to decrease, these indicators in the subject city were higher than the national average for the entire analyzed period. In 2022,

the provision of beds in the megalopolis exceeded the national average by 11.2% and amounted to 52.0 per 10 thousand children aged 0-17 years (against 46.2 per 10 thousand children of the Russian Federation). Accordingly, we can talk about a higher availability of inpatient medical care to the children's population of St. Petersburg than in the whole country. The dynamics of the availability of pediatric beds (including specialized ones) in Russia and St. Petersburg in 2018-2022 is shown in Figure 3.6.

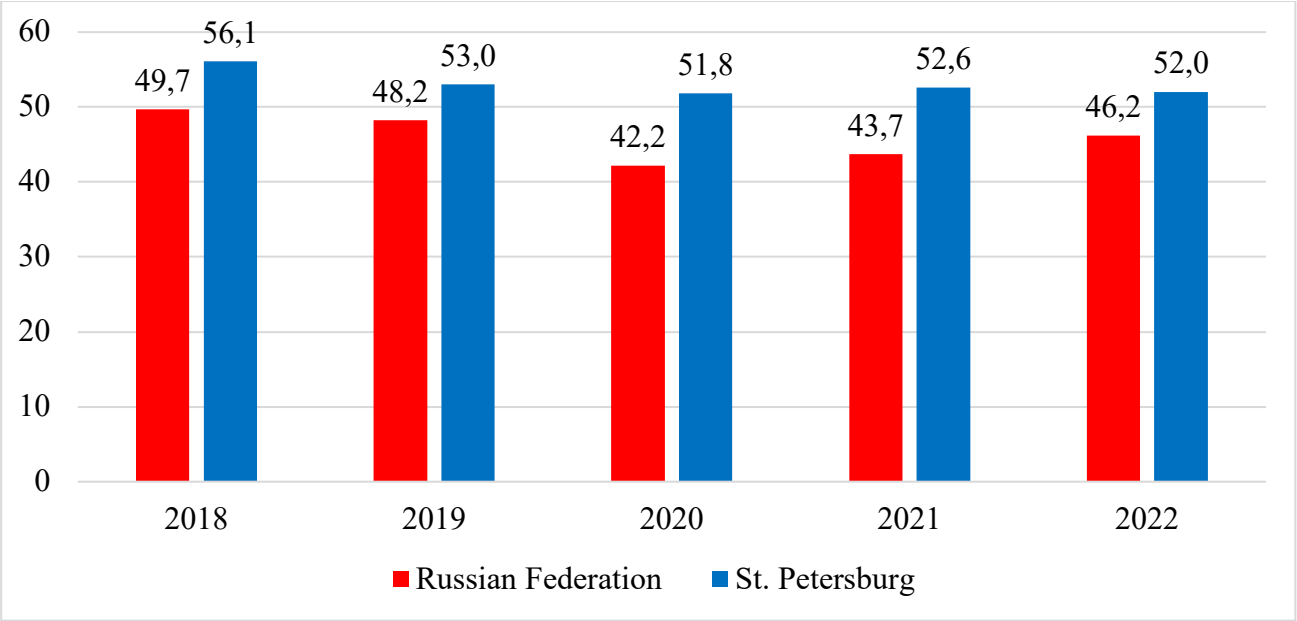

Figure 3.6 - Dynamics of availability of pediatric beds (including specialized ones) in Russia and St. Petersburg in 2018-2022 (‰)

The assessment of the provision of pediatric (general-purpose) beds revealed that the provision of the city on average over the five years studied was 2.6 times lower than the values in the country (46.2 versus 52.0 beds per 10000 children in 2022). In both the Russian Federation and St. Petersburg, the provision of these beds tended to decrease (11.3% and 12.1%, respectively). The dynamics of the provision of pediatric beds in Russia and St. Petersburg in 2018-2022 is shown in Figure 3.7.

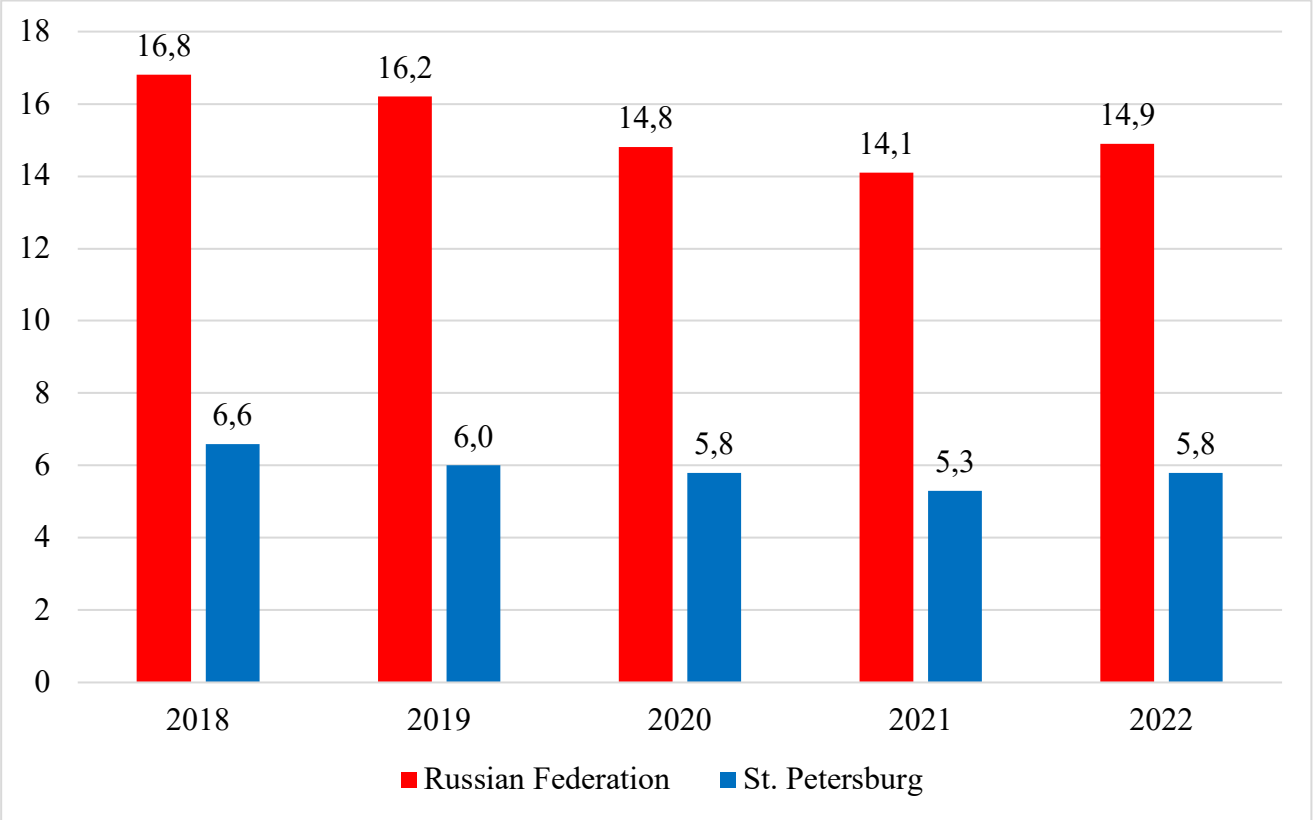

Figure 3.7 - Dynamics of provision of pediatric beds in Russia and St. Petersburg in 2018-2022 (‰)

As the study showed, the provision of specialized beds in the megalopolis was significantly higher, which exceeded the average Russian values on average in 2018-2022 by 1.6 times (5.8 versus 14.9 beds per 10 thousand children in 2022). In St. Petersburg, as in the whole country, specialized beds decreased, but the decrease was less significant (11.6% vs. 3.0%). The dynamics of provision of specialized pediatric beds in Russia and St. Petersburg in 2018-2022 is shown in Figure 3.8.

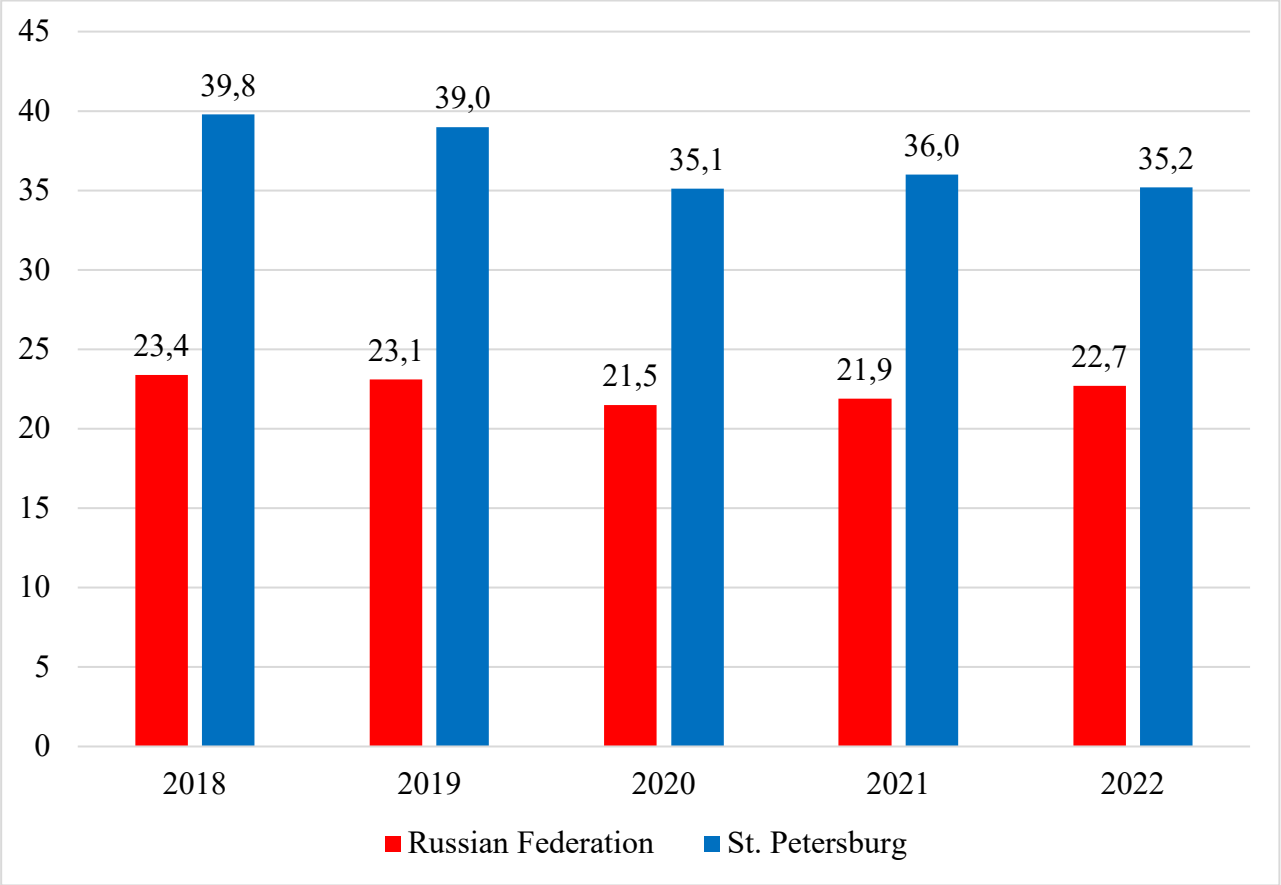

Figure 3.8 - Dynamics of provision of specialized pediatric beds in Russia and St. Petersburg in 2018-2022 (‰)

Given such significant differences in the availability of pediatric beds in children's health care, a comparative assessment of the share of specialized beds in the total number of pediatric beds was carried out. It was found that in the megalopolis, on average, over the five years studied, the indicators were 1.4 times lower than the values for the Russian Federation (49.6% versus 67.0 in 2022). Both in the whole country and in St. Petersburg, the share of specialized beds in the total number of pediatric beds decreased slightly (4.3% versus 5.5%, respectively). The share of specialized beds in the total number of pediatric beds is shown in Figure 3.9.

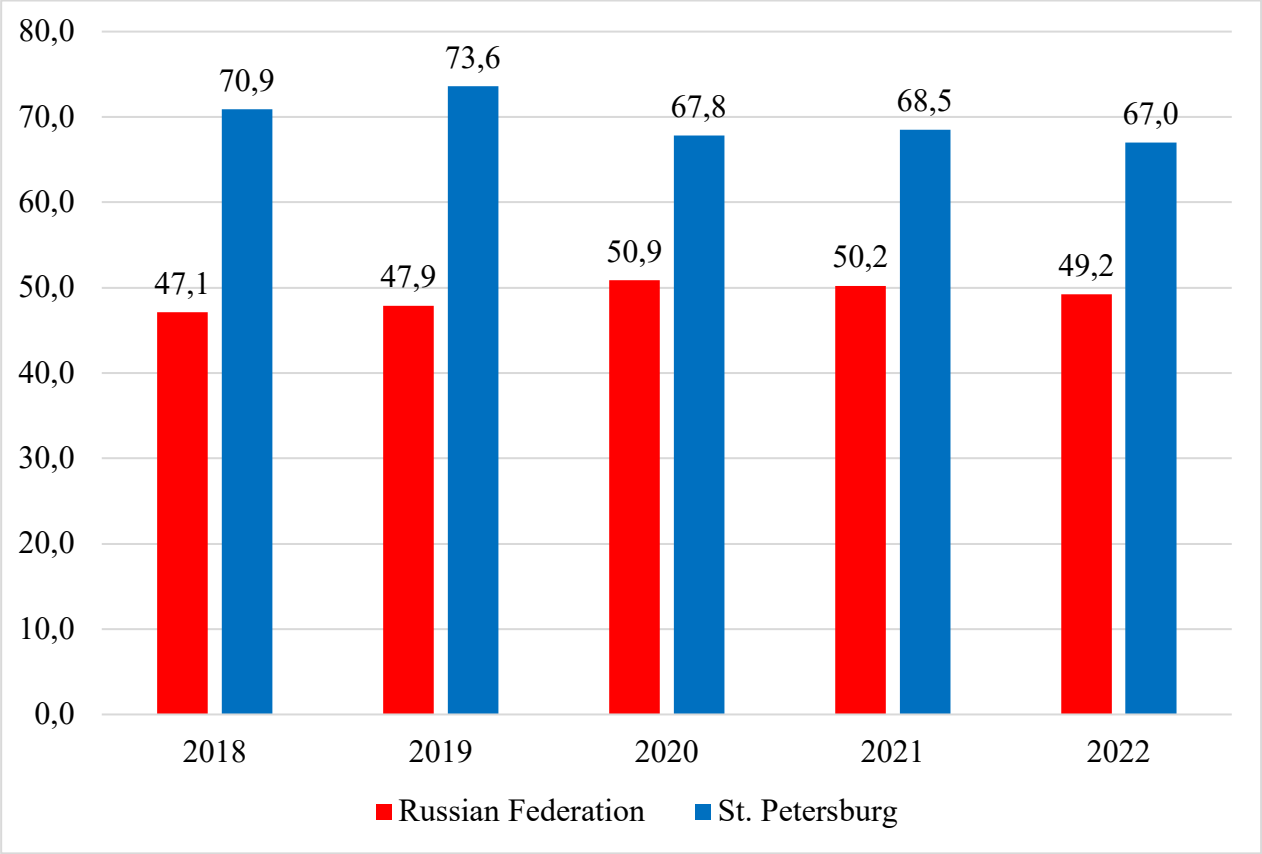

Figure 3.9 - The share of specialized beds in the total number of pediatric beds (%)

Thus, the higher availability of specialists, pediatric beds in general and specialized beds in particular in the megalopolis suggests that specialized care for children in the first year of life is more accessible there than in the Russian Federation as a whole. Compared to Russia, St. Petersburg is more oriented towards highly specialized care for children, which can be explained by the fact that the city has only two levels of specialized inpatient care. The decrease in the provision of pediatric beds with an increase in the provision of pediatricians and specialists indicates a re-orientation of specialized care in inpatient settings to specialized care in outpatient settings.

Chapter 4 ORGANIZATION OF SPECIALIZED MEDICAL CARE FOR CHILDREN OF THE FIRST YEAR OF LIFE AT THE OUTPATIENT STAGE. APPLICATION OF TELEMEDICINE TECHNOLOGIES IN PEDIATRICS

4.1. Objective assessment of the organization of primary specialized medical care for children of the first year of life in children's outpatient clinics and consultative diagnostic centers in the megalopolis

The first stage of providing specialized care to children is children's outpatient departments (COD). According to the order of the Ministry of Health of the Russian Federation dated August 10, 2017 No.514n "On the Procedure for conducting preventive medical examinations of minors", children of the first year of life begin to receive primary specialized medical care at 1 month, when parents and their child are invited to the COD for preventive examinations by a neurologist, pediatric surgeon, ophthalmologist, pediatric dentist and ultrasound specialist [146]. Then children are examined prophylactically at 3 months (orthopedic traumatologist) and at 12 months (neurologist, pediatric surgeon, otorhinolaryngologist, orthopedic traumatologist and ophthalmologist). In case of diseases and pathological conditions, as well as in case of their detection during medical examinations, medical assistance is provided by physicians, specialists of the COD. Based on the results of treatment, children are placed for a regular medical check-up for further examination.

The study showed (Table 4.1) that children with diseases of the nervous system and digestive organs, as well as certain conditions occurring in the perinatal period, were most often registered for medical check-up in children's city outpatient clinics in the first year of life. An assessment of the dynamics of indicators revealed that in 2020-2022 there was a statistically significant increase in the frequency of children under regular medical check-up being registered during the first year of life with diseases of the nervous system (+12.2%); diseases of the eye and its appendages (+32.0%); diseases of the digestive organs (+44.3%); diseases of the skin and subcutaneous tissue (+38.5%); diseases of the musculoskeletal system and connective tissue (+45.5%); diseases of the genitourinary system (+28.6%) and COVID-19 (+89.7%). At the same time, the proportion of children

with respiratory diseases (-31.3%) and with certain conditions occurring in the perinatal period decreased (-5.8%).

Table 4.1 - Frequency of children under regular medical check-up during the first year of life by certain classes of diseases in 2020-2022 (per 100 children of the first year of life)

ICD-10 class	2020	2021	2022	Dynamics / level of significance between 2020 and 2022, p
Endocrine system diseases	4.1	3.8	4.4	+6.8% / >0.05
Nervous system diseases	18.7	20.9	21.3	+12.2% / <0.05
Diseases of the eye and its appendages	9.6	9.0	14.1	+32.0% / <0.05
Respiratory diseases	11.5	12.3	7.9	-31.3% / <0.05
Digestive system diseases	11.3	12.4	20.3	+44.3% / <0.05
Diseases of the skin and subcutaneous tissue	3.2	3.7	5.2	+38.5% / <0.05
Diseases of the musculoskeletal system and connective tissue	4.2	4.8	7.7	+45.5% / <0.05
Genitourinary system diseases	3.0	3.6	4.2	+28.6% / <0.05
Certain conditions occurring in PP	20.8	18.4	19.6	-5.8% / <0.05
Congenital malformation (CM)	7.1	7.1	8.1	+12.3% / >0.05
COVID-19	0.4	1.6	3.9	+89.7% / <0.05
Other	6.0	7.5	6.9	+13.0% / >0.05

In 2020-2022, patients with diseases of the nervous system, diseases of the digestive system, diseases of the eye and its appendages, as well as with CM remained under further regular medical check-up in children's city outpatient clinics (Table 4.2). The study showed that during the period under study, there was a statistically significant increase in the frequency of continuing regular medical check-up after the first year of life for certain classes of diseases in children with diseases of the eye and its appendage (1.9 times); diseases of the digestive organs (1.9 times); diseases of the musculoskeletal system and connective tissue (2.1 times) and COVID-19 (7.0 times).

Table 4.2 - Frequency of continuing regular medical check-up after the first year of life for certain classes of diseases in 2020-2022 (per 100 children in the first year of life)

ICD-10 class	2020	2021	2022	Dynamics / level of significance between 2020 and 2022, p
Endocrine system diseases	1.3	1.3	2.0	+35.0% / >0.05
Nervous system diseases	8.4	10.1	9.3	+9.7% / >0.05
Diseases of the eye and its appendages	4.3	3.5	8.3	+48.2% / <0.05
Respiratory diseases	0.9	0.6	0.4	-55.6% / >0.05
Digestive system diseases	4.9	3.4	9.3	+47.3% / <0.05
Diseases of the skin and subcutaneous tissue	1.6	1.8	2.3	+30.4% / >0.05
Diseases of the musculoskeletal system and connective tissue	2.2	1.7	4.6	+52.2% / <0.05
Genitourinary system diseases	1.7	1.6	2.0	+15.0% / >0.05
Certain conditions occurring in PP	1.6	1.5	1.6	- / >0.05
Congenital malformation (CM)	4.9	5.0	5.8	+15.5% / >0.05
COVID-19	0.2	0.6	1.4	+85.7% / <0.05
Other	2.4	3.0	3.2	25.0% / >0.05

The largest proportion of children of the first year of life who remained under medical check-up in the COD from those who were registered during the year (Table 4.3), while the values of the indicators increased, was observed in patients with diseases of the eye and its appendages (+23.3%); diseases of the musculoskeletal system and connective tissue (+21.6%); diseases of the digestive organs (+4.6) and with CM (+2.1).

Table 4.3 - The proportion of first-year children who remained under medical check-up from those registered during the year in 2020-2022 (%)

ICD-10 class	2020	2021	2022	Dynamics
Endocrine system diseases	30.4	32.7	44.4	+31.5
Nervous system diseases	44.9	48.1	43.8	-2.4
Diseases of the eye and its appendages	44.8	39.4	58.8	+23.3
Respiratory diseases	8.1	4.9	5.4	-33.3
Digestive system diseases	43.8	27.6	45.9	+4.6
Diseases of the skin and subcutaneous tissue	50.2	48.9	44.0	-12.3
Diseases of the musculoskeletal system and connective tissue	46.8	36.2	59.7	+21.6
Genitourinary system diseases	55.2	43.7	47.9	-13.2
Certain conditions occurring in PP	7.7	8.3	8.4	+8.3
Congenital malformation (CM)	69.8	70.1	71.3	+2.1
COVID-19	39.6	36.1	37.3	-5.8
Other	40.0	40.6	42.8	+6.5

It was found that a noticeable decrease in indicators was observed in patients with respiratory diseases (-33.3%), diseases of the genitourinary system (-13.2%) and diseases of the skin and subcutaneous tissue (-12.3%).

In the case of a disease or pathological condition requiring in-depth consultation or treatment, children in the first year of life are referred for primary specialized care to children's CDC (CDD).

An assessment of the age and gender composition of children in the first year of life in the CDC showed that the majority of patients were boys, and the average age of children was 5.26±0.08 months in 2020, 5.23±0.06 months in 2021, and 4.88±0.07 months in 2022 ($p>0.05$). In the age structure of the CDC patients during the study period, children aged 1-3 months and 4-6 months had the highest proportion of over 60%. At the same time, there were only 0.8-2.5% of patients of the first month of life during 2020-2022, which is due to the peculiarity of the appeal of this age group for medical care in the first month of life on an outpatient basis. In complex cases, newborns are treated in inpatient settings according to the routing.

Table 4.4 - Distribution of the CDC patients of the first year of life by age and gender (%)

Characteristic	2020	2021	2022
Total	100.0	100.0	100.0
Average age	5.26±0.08	5.23±0.06	4.88±0.07
Age (months)			
First month	1.7	2.5	0.8
1-3 months	32.7	33.4	44.4
4-6 months	32.1	29.5	29.6
7-9 months	20.9	21.8	5.5
10-12 months	12.6	12.8	19.7
Gender			
Boys	56.2	54.8	55.0
Girls	43.8	45.2	45.0

The study showed (Table 4.5) that during the first month of life in 2020-2022, the most frequently seen specialists in the CDC were neonatologist, surgeon, neurologist and ultrasound specialist. At the same time, the most common diagnosis according to the ICD-10 were factors affecting the state of health and treatment in healthcare institutions (Z00-Z99); congenital anomalies (malformations), deformities and chromosomal abnormalities (Q00-Q99) and diseases of the nervous system (G00-G99). In the first year of life, the

highest attendance was to the following specialists: chiropractor, ultrasound diagnostics (ultrasound) and X-ray diagnostics, gastroenterologist and dermatovenerologist (Table 4.5). The conducted statistical analysis showed no statistically significant differences between the indicators of the share of visits to the CDC of certain specialists by patients of the first year of life in 2020-2022 ($p>0.05$).

Table 4.5 - Proportion of visits to CDC of certain specialists by patients of the first year of life (%)

Profile	2020	2021	2022	Dynamics (in %)
Allergologist-immunologist	6.5	5.9	4.9	-24.3
Functional diagnostics physician	3.1	3.4	1.9	-41.0
Gastroenterologist	6.5	7.7	6.8	+4.6
Hematologist	4.9	4.8	3.4	-30.0
Dermatovenerologist	6.9	6.4	6.3	-9.6
Pediatric cardiologist	1.9	1.7	1.6	-17.6
Pediatric urologist-andrologist	0.7	2.3	2.5	+72.7
Chiropractor	13.7	10.2	9.7	-28.8
Neurologist	13.4	11.0	12.5	-6.2
Nephrologist	7.0	5.8	5.3	-24.7
Orthopedic traumatologist	6.2	4.1	4.1	-33.9
Otolaryngologist	1.9	4.5	6.3	+69.3
Ophthalmologist	3.6	5.9	4.3	+16.3
Pediatrician, neonatologist	3.4	5.4	8.5	+60.4
Pulmonologist	1.2	0.9	1.5	+21.3
Ultrasound diagnostics, X-ray diagnostics	10.8	11.6	9.3	-20.2
Doctors of surgical profile, including pediatric surgeon, vascular surgeon, maxillofacial surgeon, neurosurgeon	4.6	5.3	7.6	+39.0
Other	3.7	3.3	3.5	-4.5

The study showed that the highest proportion of children of the first month of life in 2020 received medical care in connection with congenital malformations (31.9%), while in 2021 and 2022 the most frequent ICD-10 diagnosis was class XXI - factors affecting health status and referrals to health facilities (37.9% and 47.8%, respectively). An assessment of the distribution of the CDC patients of the first year of life by disease classes according to the ICD-10 revealed (Table 4.6) that, regardless of the year, there were factors affecting the state of health and treatment in healthcare institutions in the first rank (25.0-28.8%).

Table 4.6 - Distribution of first-year CDC patients by ICD-10 disease class (in %)

ICD-10 class	2020	2021	2022	Dynamics (%)
Neoplasms (C00-D48)	3.1	2.3	2.8	-7.8
Diseases of the blood, hematopoietic organs and certain disorders involving the immune mechanism (D50-D89)	2.8	3.2	2.4	-16.2
Diseases of the endocrine system, nutritional and metabolic disorders (E00-E90)	0.7	0.8	1.6	+56.8
Diseases of the nervous system (G00-G99)	20.6	17.0	15.8	-23.4
Diseases of the eye of its appendages (H00-H59)	3.6	6.5	4.3	+17.0
Respiratory diseases (J00-J99)	1.4	2.1	2.5	+44.8
Diseases of the digestive system (K00-K93)	7.3	8.6	8.9	+18.8
Diseases of the skin and subcutaneous tissue (L00-L99)	10.6	10.5	10.1	-4.7
Diseases of the musculoskeletal system and connective tissue (M00-M99)	6.0	3.7	5.7	-5.3
Diseases of the genitourinary system (N00-N99)	7.5	6.4	5.7	-24.2
Certain conditions that occur in the perinatal period (P00-P96)	0.3	0.4	0.5	+37.6
Congenital anomalies (malformations), deformities and chromosomal abnormalities (Q00-Q99)	8.3	8.5	11.0	+24.4
Factors affecting health status and referrals to health care institutions (Z00-Z99)	25.1	28.8	26.9	+7.0
Other (A00-B99, F00-F99, H60-H95, I00-I99, S00-T98, V01-Y98)	2.8	2.1	1.7	-37.7
Total	100.0	100.0	100.0	-

In this class of ICD, the most frequent referrals were for child examination or examination for suspected disorder, disease or pathological condition, and treatment including rehabilitation, etc. Children with diseases of the nervous system (15.8-20.6%) were ranked second. Skin and subcutaneous tissue diseases (10.1-10.6%) and CM (8.3-11.0%) shared the third rank depending on the year. During the study period, the highest growth rates were in diseases of the endocrine system, nutritional and metabolic disorders (+56.8%), respiratory diseases (44.8%), CM (24.4%) and diseases of the nervous system (23.4%). The highest decrease was observed in patients with certain conditions occurring in PP (-37.6%), diseases of the genitourinary system (-24.2%) and diseases of the blood, hematopoietic organs and certain disorders involving the immune mechanism (-16.2%).

It was found that there were no significant differences between the indicators in 2020-2022 ($p>0.05$).

Thus, most often children of the first year of life needed examination and treatment in outpatient settings for diseases of the nervous system. Apart from nervous system pathology, digestive diseases and diseases of the eye and its appendages were the leading positions in the provision of primary specialized care in the COD. Unlike children's city outpatient clinics, CDC had a high incidence of children with CM and diseases of the skin and subcutaneous tissue. Most often, medical check-up continued in children's city outpatient clinics after the first year of life for children with diseases of the eye and its appendage, diseases of the digestive system, diseases of the musculoskeletal system and connective tissue, CM and COVID-19.

4.2. Subjective assessment of the organization of primary specialized medical care for children of the first year of life

The conducted research shown that 100.0% of surveyed parents indicated that their children received primary specialized care within the framework of CHI insurance. In the CDC, 65.6% of children received specialized outpatient care at the expense of CHI, 8.2% at the expense of VHI and 26.2% from personal funds.

Since all the children of the interviewed parents in the COD received medical care under CHI, the question of the need for paid medical care provided by specialists outside their children's city outpatient clinic was studied. It was revealed that 67.4% of parents of children in the first year of life did not need or apply for paid medical services, and 32.6% of respondents paid for physicians' appointments in other medical organizations.

The sociological survey showed that most often parents paid for the appointment of specialists in private medical organizations and in the CDC (department) (57.1% and 35.7% of cases, respectively). In addition, 7.1% (98) of respondents paid for the admission of specialists in other children's city outpatient clinics. Most often, these were consultations with an otorhinolaryngologist (ENT specialist) – 42.9%, a surgeon – 28.7%,

an allergist – 15.6%, a neurologist -15.1%, a cardiologist – 14.2%, an ophthalmologist – 9.6% and an endocrinologist – 6.2%.

An assessment of the main reasons for seeking medical services from specialists within the clinic showed that parents most often sought paid medical care due to the absence of this specialist in their children's outpatient clinic - 17.1%, as well as convenient appointment schedules and lack of queues - 12.7%. Trust in the results of examination and treatment was the reason for 8.7% of parents, availability of all doctors of narrow specialties and their high qualification - for 3.8% and individual approach, friendly medical personnel - 2.9%.

In St. Petersburg, the registration of children for an initial appointment with a specialist is carried out by a physician of the city outpatient clinic at the place of attachment; parents or legal representatives of the child independently, through the website "Health of St. Petersburg" or by e-referral number. In order to make an online appointment under the CHI policy at the CDC, an electronic referral (form 057/u-047) is needed to be obtained and then an appointment for the child with the relevant specialist on the website www.gorzdrav.spb.ru is made.

An assessment of the reasons for visiting specialists in children's outpatient clinics revealed that children most often visited doctors during medical examinations conducted in the first year of life - 65.9% [148] or at the referral of a pediatrician - 50.0%. Parents' suspicion of the presence of a child's disease was the reason for visits in 13.6% of children. Medical appointments were associated with regular medical check-up in 6.8% of children. 4.5% of parents independently visited a specialist doctor for preventive care.

It was found that the majority of children of the first year of life were seen by a specialist of the CDC by referral from the city outpatient clinic - 39.1% of children - or by parents' self-referral due to suspicion of a disease in the child - 34.8%. 13.0% of parents decided to go to the specialist themselves for prevention. An additional consultation was required in 8.7% of cases for a child registered at city outpatient clinic. 4.3% of respondents applied to the CDC due to the absence of the required specialist in their clinic.

An assessment of the prevalence of certain types of appointments with specialists showed that the most commonly used types in COD and CDC were electronic records.

However, given the specifics of the organization of activities in the CDC, in comparison with the COD, telephone recording significantly prevailed (15.6% vs. 60.6%). In addition, in the COD, unlike the CDC, there was an appointment with a specialist, which was indicated by 22.2% of parents. The proportion of parents using certain forms of appointment with specialists is shown in Table 4.7.

Table 4.7 - Proportion of parents using certain forms of appointment with specialists (%)

Record form	COD	CDC	Significance level, p
Issuing a ticket at the registration desk	25.6	18.6	>0.05
Electronic record	84.5	65.2	<0.05
By phone	15.6	60.6	<0.01
At a doctor's appointment	22.2	-	-

An assessment of the difficulty of such an appointment with specialists showed (Table 4.8) that most parents sometimes find it difficult to make an appointment for their child (52.9% in the COD and 45.5% in the CDC). It was easy to make an appointment to the city outpatient clinic for an almost equal proportion of respondents, of whom 35.6% were in the clinic and 36.4% in the CDC. A few more parents cited the high difficulty of enrolling in CDC compared to COD (13.6% vs. 11.1%).

Table 4.8 - Distribution of parents by difficulty of appointment to medical specialists (% of total)

Difficulty of recording	COD	CDC	Significance level, p
Easy	35.6	36.4	>0.05
Sometimes it can be difficult	52.9	45.5	>0.05
It's always difficult	11.1	13.6	>0.05
Almost impossible	- (0)	4.5	-
I find it difficult to answer (I don't know)	0.4	- (0)	-
Total	100.0	100.0	-

According to 76.7% of parents in children's city outpatient clinics and 95.5% of respondents in the CDC, the work schedule of narrow specialists is convenient. Accordingly, in contrast to the COD, where 23.3% of parents found the appointment schedule inconvenient, there were only 4.5% of such respondents in the CDC.

The majority of patients in the COD indicated (Table 4.9) that they waited up to 15 minutes for an appointment with a specialist (73.3%), while in the CDC they got an appointment without queuing (50.0%). Despite the fact that in both children's city

outpatient clinics and CDC the average waiting time for an appointment was not statistically significantly different (9.3±1.5 min. and 9.4±1.23 min.; p>0.05), in the CDC there were significantly more parents who reported no queues, waiting time from 15 to 30 min. and from 30 min. to 1 hour, and fewer respondents who waited up to 15 min. for an appointment.

Table 4.9 - Distribution of parents by waiting time for appointments with medical specialists (% of total)

Waiting period for admission	COD	CDC	Significance level, p
There is no queue	15.6	50.0	<0.01
Up to 15 min.	73.3	27.3	<0.01
From 15 to 30 min.	9.9	19.6	>0.05
From 30 min. to 1 hour	1.2	3.1	>0.05
1 hour or more	-	-	-
Total	100.0	100.0	-
On average	9.3±1.5 min.	9.4±1.23 min.	>0.05

According to parents, it is most difficult to get an appointment with a neurologist in children's outpatient clinics and CDC (Table 4.10). This problem was cited by 48.8% of parents in the COD and 31.3% of parents in the CDC. The following specialists also have the greatest difficulty in enrolling in COD: ENT (39.0%), cardiologist (36.6%) and allergist (31.7%). In the CDC, apart from the neurologist, only 4.7% of parents had difficulties in getting an appointment with a surgeon, and 6.3% with an endocrinologist.

Table 4.10 - The proportion of specialists who are the most difficult to get an appointment with (%)

Specialization	COD	CDC	Significance level, p
Neurologist	48.8	31.3	>0.05
Otorhinolaryngologist	39.0	-	-
Ophthalmologist	4.9	-	-
Surgeon	7.3	4.7	>0.05
Cardiologist	36.6	-	-
Orthopedist	0.2	-	-
Allergist	31.7	-	-
Endocrinologist	7.3	6.3	>0.05
Other	- (0)	0.6	-

The survey revealed that only 23.3% of parents believed that their children's outpatient clinics had all the specialists they needed. Among the parents whose children were patients of CDC, more than half (59.1%) were such, while none of their interviewed parents indicated the lack of specialists they needed in this medical organization. 30.2%

of respondents did not seek medical assistance or sought medical assistance for a long time and 40.9% of respondents sought medical assistance in COD and 40.9% in CDC. 46.5% of respondents believed that the specialists needed were not available at their children's outpatient clinic, including: allergist-immunologist 51.5%, cardiologist 44.9% and infectious disease specialist 9.0%.

According to the Territorial Program of state guarantees of free medical care to citizens in St. Petersburg, the satisfaction of citizens with medical care takes the first place among all the criteria listed in it for the availability of medical care. The satisfaction of the population with medical care (% of the number of respondents) for 2022 and 2023 should be at least 80%. In our study, this indicator corresponded to the values (Table 4.11) set for the year of the survey. At the same time, the indicator in CDC was higher, since 87.0% were fully satisfied against 81.2% in COD. In addition, there were no parents in CDC who were completely dissatisfied with the child's specialists.

Table 4.11 - Distribution of parents by satisfaction with their child's care by specialists (% of total)

Degree of satisfaction	COD	CDC	Significance level, p
Yes, pretty much	81.2	87.0	<0.05
Not always	16.9	13.0	>0.05
Not satisfied	1.9	- (0)	-
Total	100.0	100.0	-

Thus, the predominant source of funding for primary specialized care in COD and CDC was CHI funds (100.0% and 65.6%, respectively), but more than a quarter of parents in CDC paid for medical care from personal funds (26.1%). Children most often visited doctors in COD during medical check-ups (65.9%) or on referral from a pediatrician (50.0%), and in CDC - on referral from the COD (39.1%) or independently when a child was suspected of having a disease (34.8%). In both COD and CDC, electronic appointment is the most common, with 11.1% of parents in COD and 13.6% in CDC indicating that it is very difficult to make an appointment. The hardest part of COD and CDC was getting an appointment with a neurologist. About one third of parents paid for medical services in private medical organizations and COD due to the absence of the required specialist doctor (ENT, cardiologist, allergologist-immunologist, etc.), queues and inconvenient schedule of specialists' appointments. Parents' satisfaction with medical

care was higher in CDC than in COD (87.0% vs. 81.2%) and there were no parents who were completely dissatisfied with their child's care in the CDC.

4.3. Organizational bases for the provision of specialized medical care to children of the first year of life in the conditions of the of the center of telemedicine technologies

TMT is successfully used both in primary health care and in the provision of specialized, including HTMC, care in modern conditions [151]. TMC (medical consiliums) are conducted in emergency (from 30 minutes to 2 hours after the request is received), urgent (from 3 to 24 hours) and planned forms. The participants of TMC (physician consiliums) in the provision of specialized medical care, regardless of its form, are the attending physician and either a consultant or physicians who are participants of the consilium. TMC is carried out by medical organizations on the basis of its connection to the telemedicine system of the Ministry of Health of the Russian Federation in a secure mode.

The assessment of the TMT Center's activities revealed that the share of children in the first year of life in the total number of children's consultations in 2020 was 12.0%, in 2021 – 10.1% and in 2022 – 12.9%. Accordingly, over the three years, the proportion of TMC of children in the first year of life increased by 7.0%. It was found (Figure 4.1) that the most frequent need was for consultations in pediatrics (neonatology) and during the study period their share increased 1.8 times from 51.2% to 90.4% ($p<0.05$).

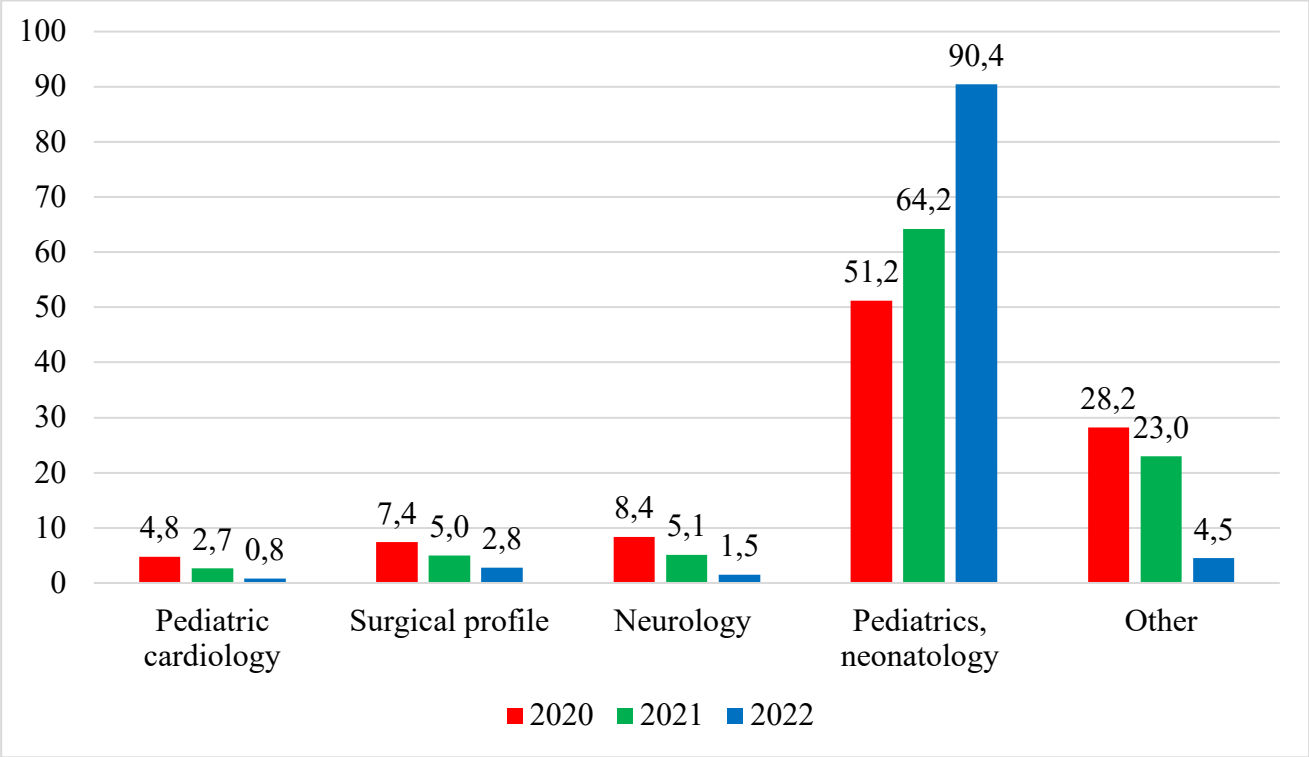

Figure 4.1 - Distribution of telemedicine consultations by pathology profile (%)

At the same time, the share of TMC in surgical profile (2.6 times; $p>0.05$), pediatric cardiology (6.0 times; $p>0.05$), neurology (5.6 times; $p<0.05$) and other pathology profiles (6.3 times; $p<0.05$) significantly decreased.

An assessment of the distribution of TMC by form of healthcare delivery revealed that planned enquiry was the most frequent form of counselling for children of the first year of life, which increased annually between 2020 and 2022, with an overall increase of 24.2% (1.3 times, $p<0.05$) over the three years. The proportion of urgent requests also increased annually, with an increase of 30.0% (1.4 times; $p>0.05$). At the same time, the share of emergency requests decreased from 38.8% to 18.4%, which was 52.6% during the study period (2.1 times; $p<0.05$). The distribution of telemedicine consultations of attending physicians of children of the first year of life by form of medical care is presented in Figure 4.2.

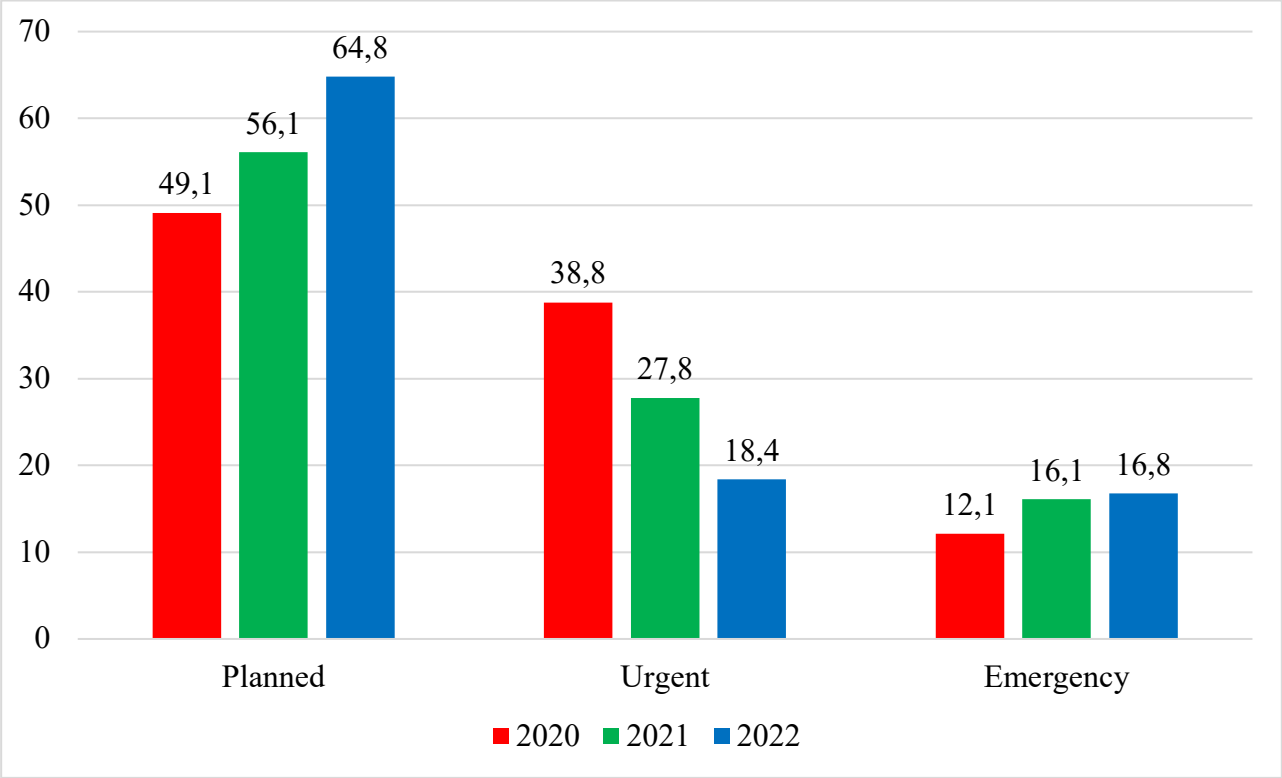

Figure 4.2 - Distribution of telemedicine consultations of attending physicians of children of the first year of life by form of medical care (%)

An analysis of the distribution of TMC by form of medical care allowed us to establish that a similar pattern was observed for emergency requests, where, with an annual decrease over three years, the indicators decreased by 48.4%. An assessment of the proportion of planned requests revealed a decrease in 2021 (-40.8%) and a sharp increase in 2022 (+67.4%) to the level of 2020, but in general, the growth over the period under study was 45.9%. Although the overall 2020-2022 figures for the proportion of urgent requests increased from 14.3% to 19.5% (+26.7%), the 2021 figure to the level of 2020 increased by 60.4% and the 2022 figure fell sharply by 46.0%. The distribution of telemedicine consultations of attending physicians of children of the first month of life by form of medical care is presented in Figure 4.3.

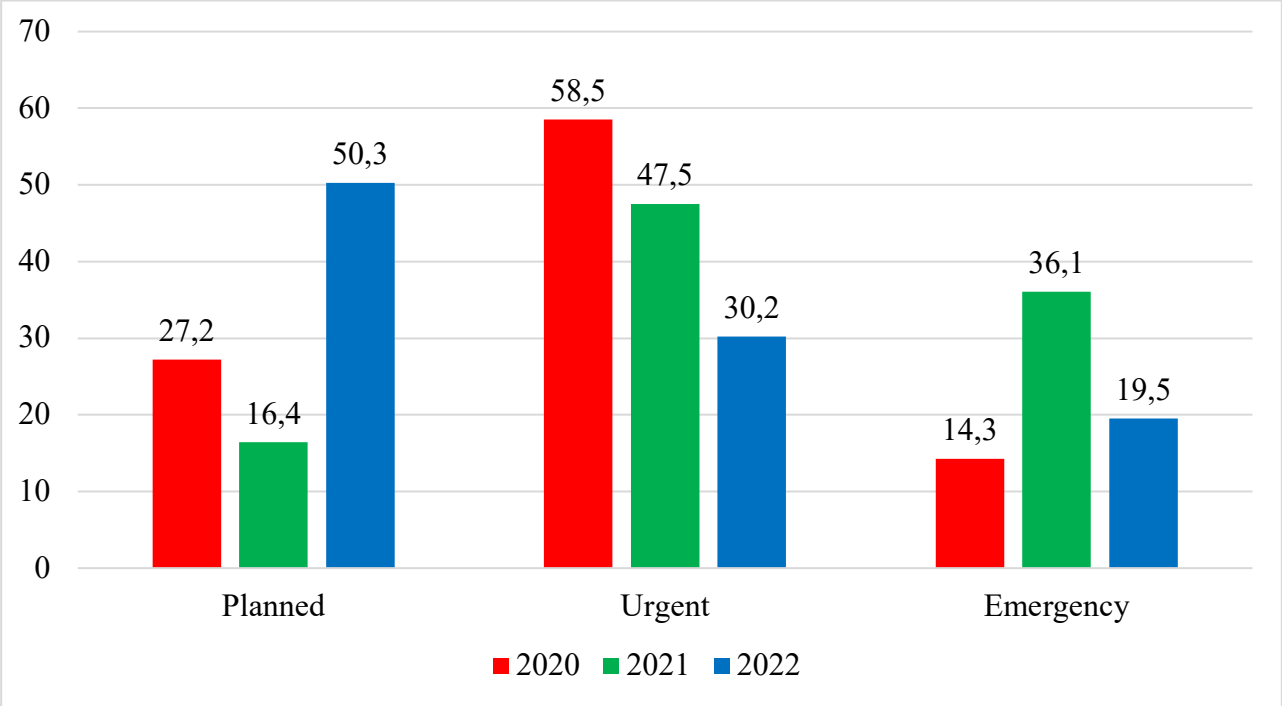

Figure 4.3 - Distribution of telemedicine consultations of attending physicians of children of the first month of life by form of medical care (%)

More than one-third of previously set diagnoses of children of the first year of life were changed or clarified after TMC. The highest frequency of change and clarification of diagnosis was in 2021, when covid restrictions were most active (12.7% and 43.5%, respectively). Previous diagnosis was least frequently changed or clarified in 2020 (5.0% and 25.7%, respectively). In the post-covid period, only slightly more than half of the diagnoses remained unchanged, a third were clarified, and 12.0% changed. In general, in 2020-2022, the share of changed diagnoses increased 2.4 times ($p<0.05$), clarified diagnoses – 1.3 times ($p<0.05$), and diagnoses left unchanged, on the contrary, decreased 1.3 times ($p<0.05$). The distribution of telemedicine consultations of attending physicians of children of the first year of life by the nature of change in diagnosis is shown in Figure 4.4.

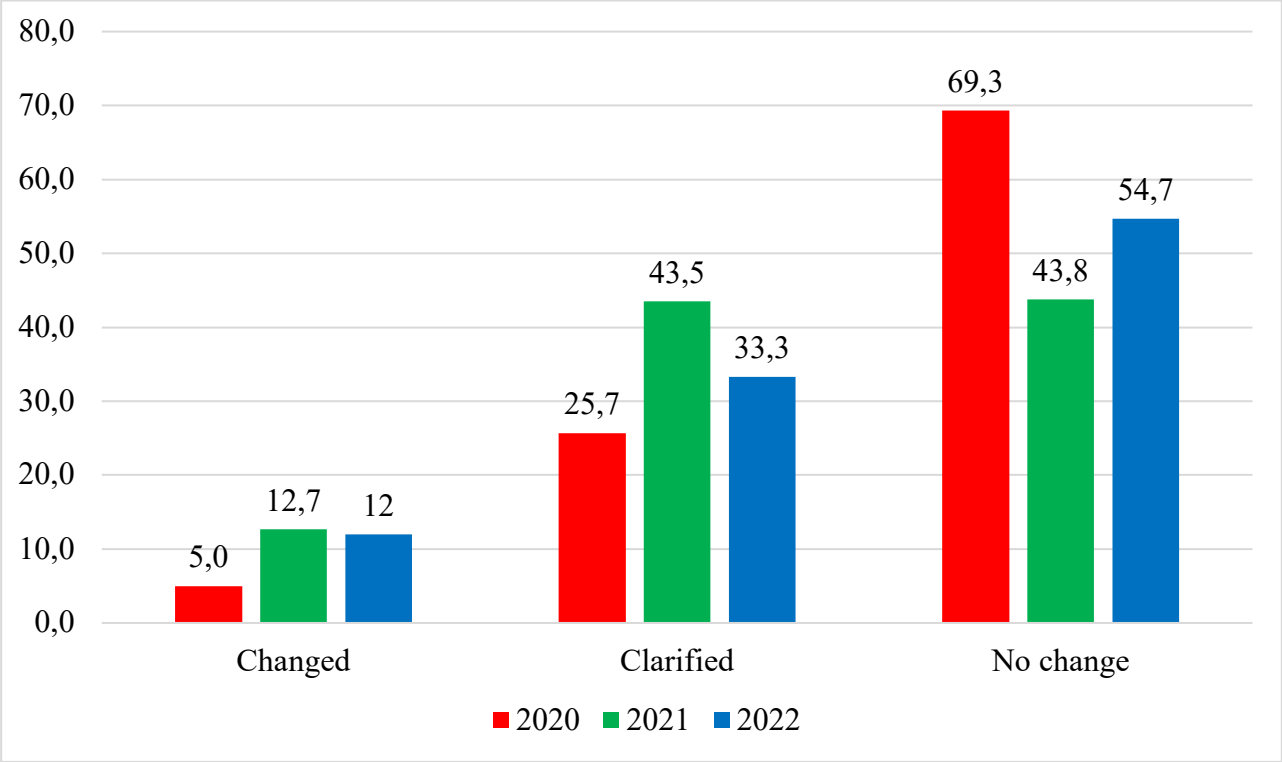

Figure 4.4 - Distribution of telemedicine consultations of attending physicians of children of the first year of life by nature of change in diagnosis (%)

Compared to TMC of children of the first year of life, the diagnosis was more often changed or remained unchanged when consulting the attending physicians. The least frequent change or clarification of diagnosis was in 2020, when the original diagnosis was maintained after the vast majority of TMC (80.3%). An assessment of the dynamics of distribution of telemedicine consultations of attending physicians by the nature of the change in diagnosis revealed that there was an increase in the proportion of consultations where the diagnosis changed and clarified (+70.7% and +49.2%, respectively) and a decrease in consultations where diagnoses remained unchanged (-31.1%). The distribution of telemedicine consultations of attending physicians of children of the first month of life by nature of change in diagnosis is shown in Figure 4.5.

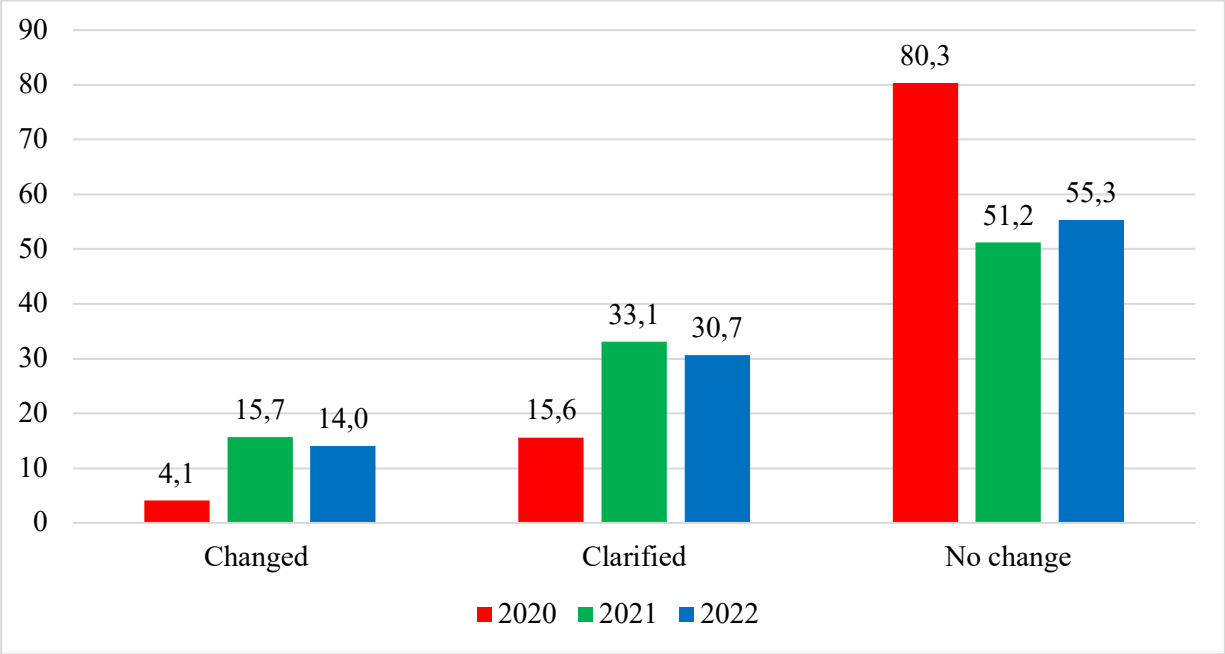

Figure 4.5 - Distribution of telemedicine consultations of attending physicians of children of the first month of life by nature of change in diagnosis (%)

Evaluation of the results of TMC showed that most often children of the first year of life were routed for specialized medical care at the inpatient and outpatient stages to a third-level medical organization. At the same time, the highest value of the specific weight of TMC, which ended with such routing, and the appointment of additional examination at the place of residence was in 2021. The lowest proportion of consultations that ended with the appointment of treatment and examination was in 2020. Overall, over the three years studied, the assignment of routing for children in the first year of life to a level III children's inpatient facility increased by 16.3% ($p>0.05$), for a level III consultation by 8.6% ($p>0.05$) and for an additional examination at the place of residence by 31.3% ($p<0.05$). The proportion of telemedicine consultations of children of the first year of life based on the results of medical care is shown in Figure 4.6.

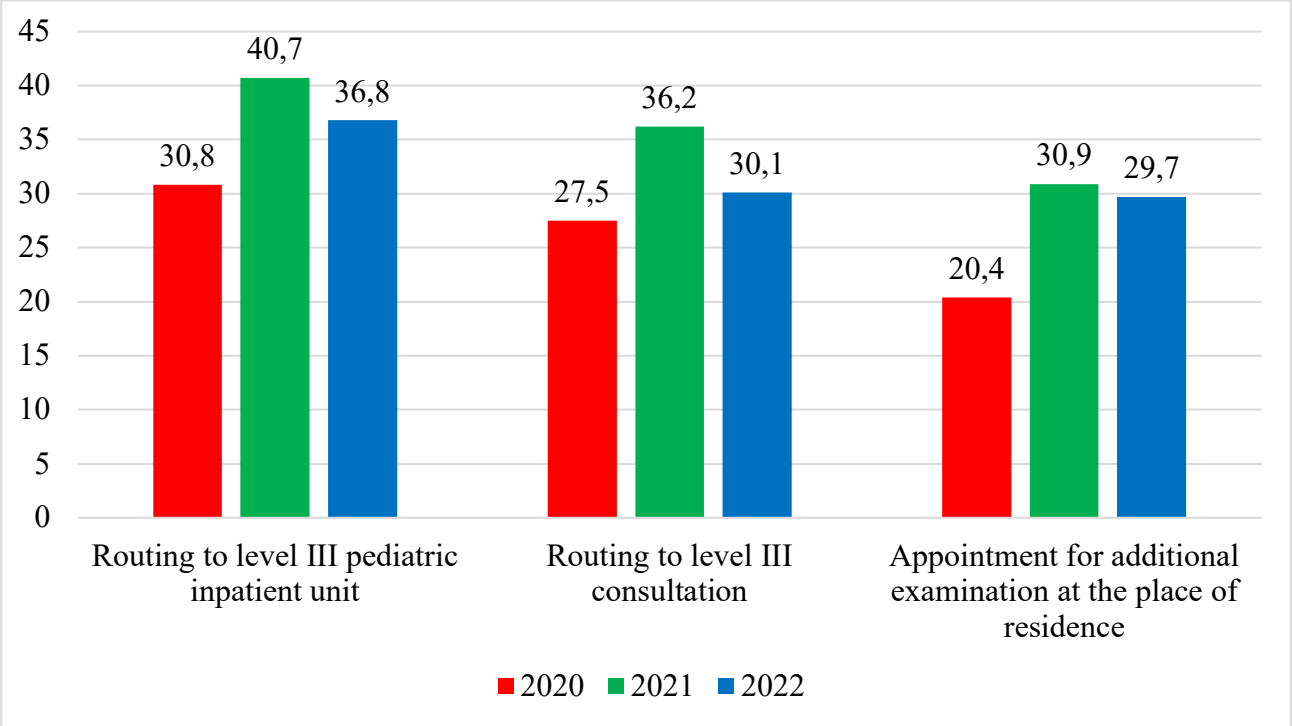

Figure 4.6 - The proportion of telemedicine consultations of children of the first year of life according to the results of medical care (%)

The study showed that in 2020-2021, children of the first month of life, based on the results of telemedicine assistance, were most often left for additional examination and treatment in medical organizations at their place of residence. However, in 2022, the proportion of such recommendations is almost equal to the assignment of routing for treatment and consultation to level III medical organizations (22.3% vs. 21.2% and 23.5% respectively). This was due to the annual increase in referrals of children based on TMC results to the inpatient and outpatient stages in healthcare organizations providing specialized, including HTMC, care. The increase in routing to level III over three years for pediatric inpatient admissions was 57.9% and for consultation was 63.2%. The share of telemedicine consultations of children of the first month of life in the results of medical care is presented in Figure 4.7.

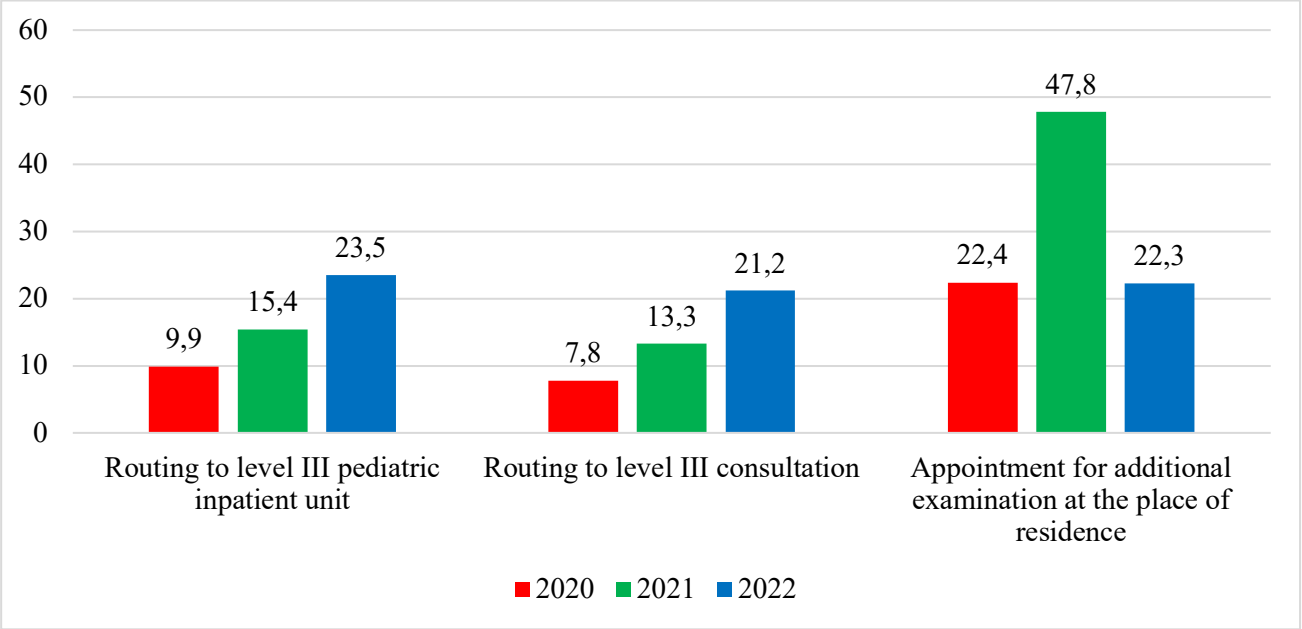

Figure 4.7 - The proportion of telemedicine consultations of children of the first month of life by results of medical care (%)

Thus, a decrease in highly specialized and an increase in general-purpose medical care for children of the first year of life using TMC in 2020-2022 occurred due to a decrease in emergency requests for life-threatening conditions. However, children of the first month of life in the year of active covid restrictions (2021) experienced a dramatic increase in the need for urgent requests due to a decrease in planned TMC. The impact of the new coronavirus pandemic on the results of providing TMC to children of the first year of life has been established: an increase in the proportion of changed and clarified diagnoses, an increase in the number of children being routed for examination and treatment in level III healthcare organizations, as well as for follow-up examinations at their place of residence. Compared to the results of TMC of children of the first year of life, when consulting the attending physicians of children of the first month of life, the most frequently recommended additional examination at the place of residence without routing to other medical organizations of higher level.

Chapter 5 ORGANIZATION OF SPECIALIZED MEDICAL CARE FOR CHILDREN OF THE FIRST YEAR OF LIFE AT THE INPATIENT STAGE

5.1. Characteristics of inpatient admissions of children of the first year of life

In the case of a disease or pathological condition requiring in-depth consultation or treatment, children in the first year of life are referred for primary specialized care to children's multi-specialty inpatient facilities for specialized inpatient care.

It was found that in 2020-2022, the average age of first-year patients admitted to children's inpatient departments, irrespective of their level, was almost unchanged and amounted to just over 5 months. and more than half of the children were male.

Among the sources of financing for children's stay in inpatient departments, CHI funds significantly prevailed, the share of which in level II inpatient facilities was higher (98.1%±1.27 on average over 3 years) than in level III inpatient facilities (96.4%±1.52 on average). The share of patients whose treatment was paid for from personal funds was lower in level II inpatient facilities than in level III in all years under study.

The majority of children were admitted to pediatric inpatient clinics by referral from pediatric outpatient clinics in St. Petersburg, but the proportion of such patients was significantly higher in level II inpatient facilities ($p<0.05$). In level II children's inpatient departments, the proportion of these patients was highest in 2022 (82.2%) and lowest in the year of the pandemic (63.5%). In level III inpatient facilities, the proportion of children admitted by referral from outpatient clinics was 65.9% in 2020, rising to just over half by 2022 due to an increase in the proportion of children transferred from other pediatric inpatient departments and routing within the inpatient facility (+51.1% and 77.8% respectively), as well as those admitted by referral from the CDC (+50.0%) and those admitted by emergency (urgent) care (+6.8%). Level II inpatient facilities had a significantly lower flow of patients admitted by external and internal transfer compared to level III.

The characteristics of admitted patients in the first year of life in level II and level III children's inpatient departments in 2020-2022 are shown in Table 5.1.

Table 5.1 - Characteristics of patients admitted in the first year of life in level II and III children's inpatient departments in 2020-2022 (%)

Characteristic		Inpatient facility level	2020	2021	2022	Dynamics
Average age		Level II	5.38±0.09	5.00±0.07	6.22±0.16	-
		Level III	5.78±0.10	5.08±0.11	5.19±0.10	-
Gender	male	Level II	51.4	54.5	52.0	+1.2
		Level III	58.9	56.56	56.6	-3.9
	female	Level II	48.6	45.5	48.0	+1.2
		Level III	41.1	43.54	43.4	+5.3
Source of financing	CHI (VHI)	Level II	98.2	97.4	98.7	+0.5
		Level III	95.6	96.2	97.5	+2.3
	VHI	Level II	1.5	2.0	1.1	-26.7
		Level III	1.6	0.8	0.6	-62.5
	For a fee	Level II	0.3	0.6	0.2	-33.3
		Level III	2.8	3.0	2.2	-21.4
Type of referral	Outpatient clinic	Level II	79.3	63.5	82.2	+3.5
		Level III	65.9*	55.6	52.3*	-21.9
	Self-examination	Level II	4.2	10.0	5.5	+23.6
		Level III	11.6	9.8	11.3	-2.6
	Transfer from another inpatient facility	Level II	1.7	2.4	1.3	-23.5
		Level III	11.2*	19.2	22.9*	+51.1
	First aid (emergency)	Level II	14.2	23.5	10.2	-28.2
		Level III	10.9	13.6	11.7	+6.8
	Intra-hospital transfer	Level II	0.6	0.6	0.8	+25.0
		Level III	0.4	1.8	1.8	+77.8
Type of inpatient admission	Emergency	Level II	93.1	100.0	95.6	+2.6
		Level III	65.5*	46.7	46.5*	-29.0
	Planned	Level II	6.9	-	4.4	-36.2
		Level III	34.5*	53.3	53.5*	+35.5

*Statistically significant difference between 2020 and 2022 indicators ($p<0.05$)

In level II inpatient facilities, emergency admissions were significantly predominant and the proportion of patients admitted routinely was much lower compared to level III. Level III inpatient facilities had the highest rate of emergency admissions in the year of the COVID-19 pandemic. From 2021 onwards, planned inpatient admissions became predominant and the overall decrease in the flow of emergency patients over the three years was 29.1%.

Assessment of the distribution of patients by profile departments in level II children's inpatient clinics revealed that in 2020-2022, the most frequent patients in the

first year of life were pediatric (including neonatal and infant pathology departments) and infectious diseases departments (Figure 5.1). During the 2021 quarantine restrictions, the proportion of children admitted in surgical, infectious disease and other departments increased and the proportion in pediatric departments decreased.

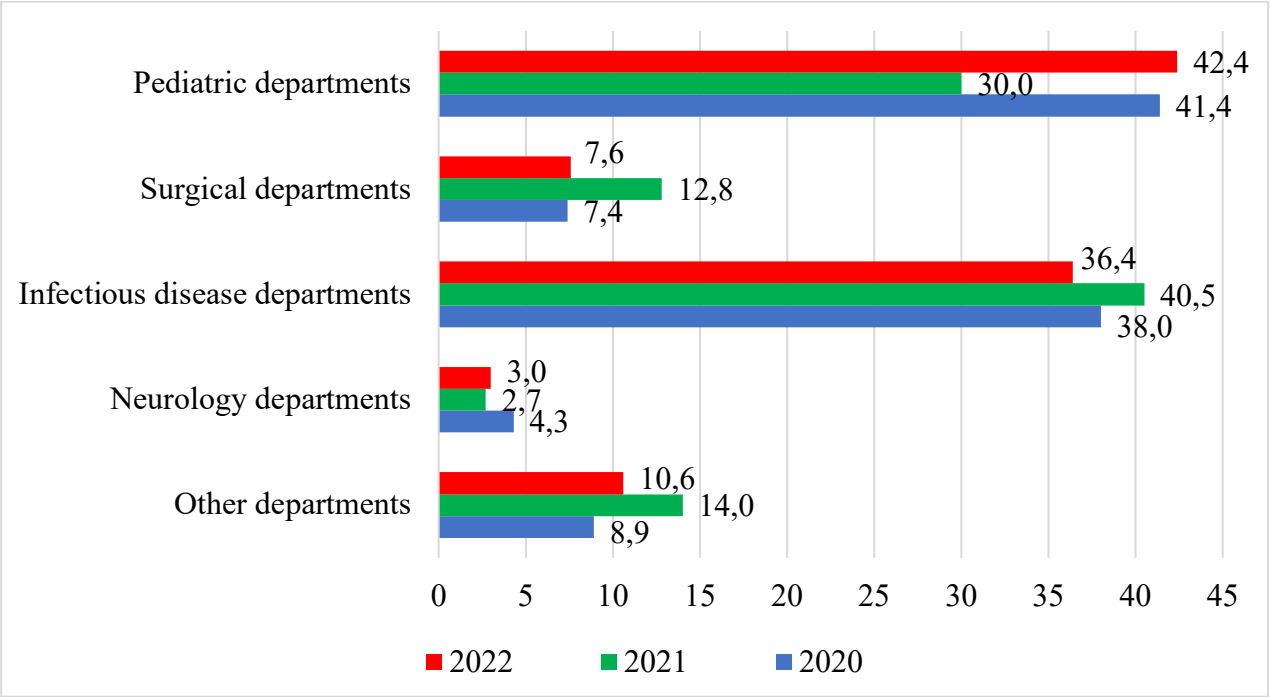

Figure 5.1 - Distribution of admitted patients of the first year of life by profile departments in level II children's inpatient clinics in 2020-2022 (% of total)

Analysis of the distribution of patients by department revealed (Figure 5.2) that in level III children's inpatient clinics, children were most often treated in pediatric and surgical departments, as well as in the ophthalmology department. Over the three years studied, patient flow decreased in pediatric (including neonatal and infant pathology department) (-3.1%) and surgical (-32.6%) departments, and ophthalmology department (-19.1%), and increased in infectious disease (+42.2%), skin and venereology (+39.4%) and other (+30.5%) departments.

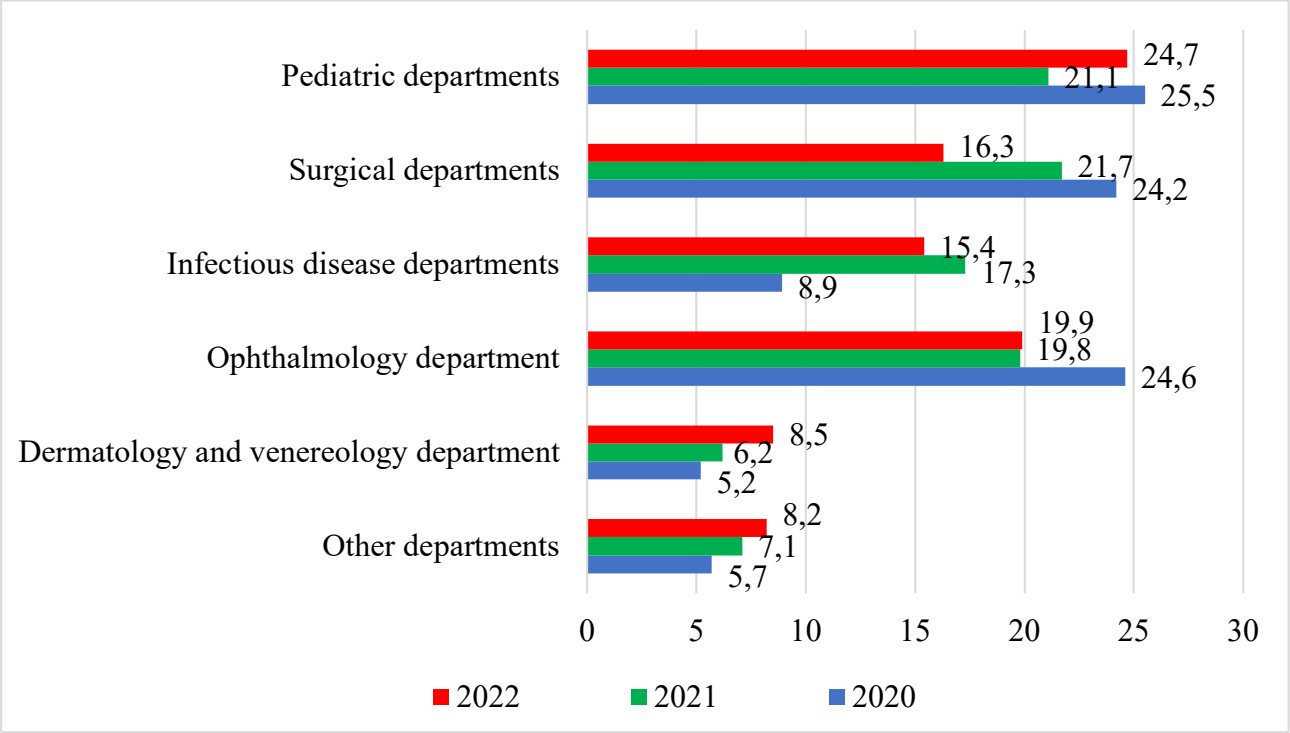

Figure 5.2 - Distribution of admitted patients in the first year of life by specialized departments in a level III children's inpatient clinic in 2020-2022 (% of total)

To assess the need for specialized medical care, the most important indicators are inpatient admission incidence, among which the most important are the frequency of admission and the average length of stay of children in a hospital bed. The assessment of the frequency of inpatient admission of children in the first year of life, depending on the class of diseases according to ICD-10, revealed (Table 5.2) that children were most frequently admitted in level II children's inpatient clinics in 2020-2022 with respiratory diseases; certain conditions occurring in the perinatal period; some infectious and parasitic diseases; and CM. The assessment of the dynamics of the frequency of inpatient admissions of patients made it possible to establish that the rates for all the above classes of diseases were increasing, with the exception of respiratory diseases, which showed a slight decrease in the rate of admissions of children (-4.0%). In addition, the incidence of admission of children with diseases of the genitourinary system (-32.6%), endocrine system (-17.2%), digestive organs (-14.6%) and other classes of diseases (-32.0%), among which was COVID-19, decreased over the three years. An assessment of its impact on inpatient admissions of children of the first year of life revealed that a new coronavirus infection had a significant impact on admission rates. In 2021, compared to 2020 and

2022, there was an increase in admissions of children with respiratory diseases and a decrease - with diseases of the endocrine system, digestive organs, CM, as well as with certain conditions occurring in the perinatal period. Analysis of the frequency of inpatient admissions of children of the first year of life in level III inpatient facilities showed that during the study period, patients with CM, respiratory diseases, and skin and subcutaneous tissue diseases were significantly predominant, with admission rates increasing during 2020-2022 (+17.0%; +4.0% and +22.3%, respectively). In addition, there was a fairly high level of admission of children with digestive diseases, which decreased during the study period (-24.6%). During the three years studied, along with the three leading indicators, the level of admission of patients with certain conditions occurring in the perinatal period (+42.3%) and some infectious and parasitic diseases (+3.7%) increased. At the same time, the frequency of inpatient admissions of children with diseases of the eye and its appendages (-76.0%), the endocrine system (-75.9%), blood, hematopoietic organs and certain disorders involving the immune mechanism (-40.7%), the genitourinary system (-27.3%) and other diseases (-43.0%) decreased. As in the assessment of admissions of children in level II inpatient facilities, the effect of COVID-19 on the level of admissions of patients of the first year of life was established. In 2021, there was an increase in admissions of children with CM and respiratory diseases, with a decrease in the flow of patients with diseases of the eye and its appendages, as well as with some infectious and parasitic diseases. The frequency of inpatient admissions of children of the first year of life depending on the class of diseases according to ICD-10 in 2020-2022 is presented in Table 5.2.

Table 5.2 - Frequency of inpatient admission of children of the first year of life depending on the class of diseases according to ICD-10 in 2020-2022 (‰)

ICD-10 disease class	2020		2021		2022		Average for 3 years / dynamics (%)	
	Level II	Level III	Level II	Level III	Level II	Level III	Level II	Level III
Certain infectious and parasitic diseases (A00-B99)	71.43	21.35	83.33	17.87	95.16	22.16	83.31 /+24.9	20.43 /+3.7

Continuation of Table 5.2

Diseases of the blood, hematopoietic organs and certain disorders involving the immune mechanism (D50-D89)	-	74.73	-	44.68	-	44.33	-	54.58 /-40.7
Diseases of the endocrine system (E00-E90)	19.48	25.80	15.32	10.72	16.13	6.21	16.98 /-17.2	14.24 /-75.9
Diseases of the eye of its appendages (H00-H59)	-	99.64	-	17.87	-	23.94	-	47.15 /-76.0
Respiratory diseases (J00-J99)	285.71	117.44	332.37	147.45	274.19	122.34	297.42 /-4.0	129.04 /+4.0
Diseases of the digestive system (K00-K93)	72.86	105.87	58.56	95.62	62.24	79.79	64.55 /-14.6	93.73 /-24.6
Diseases of the skin and subcutaneous tissue (L00-L99)	-	97.86	-	105.45	-	125.89	-	109.73 /+22.3
Diseases of the genitourinary system (N00-N99)	71.78	85.41	67.78	80.43	48.39	62.06	62.65 /-32.6	75.97 /-27.3
Certain conditions that occur in the perinatal period (P00-P96)	250.00	44.48	224.24	64.34	322.58	77.13	265.61 /+22.5	61.98 /+42.3
Congenital anomalies (malformations), deformities and chromosomal abnormalities (Q00-Q99)	76.41	238.43	55.56	292.23	80.65	287.23	70.87 /+5.3	272.63/+17.0
Other	59.29	6.23	53.34	6.26	40.33	3.55	50.99 /-32.0	5.35 /-43.0

*Statistically significant difference between 2020 and 2022 indicators ($p<0.05$)

A comparative assessment showed that the frequency of admission of patients, depending on the level of the inpatient facility, and revealed significant differences between the indicators. Level II inpatient facilities have significantly more patients

admitted with certain conditions arising in the perinatal period (4.3 times), some infectious and parasitic diseases (4.0 times) and respiratory diseases (2.3 times). And children with CM (3.8 times), digestive diseases (1.5 times) and genitourinary diseases (1.2 times) are more frequently admitted to level III children's inpatient clinics. In addition, there were practically no patients with diseases of the blood, hematopoietic organs and certain disorders involving the immune mechanism, diseases of the eye and its appendages, and diseases of the skin and subcutaneous tissue in level II inpatient facilities, as these patients are admitted for treatment in the first year of life to highly specialized departments of level III children's inpatient clinics for the main diagnosis. The average frequency of admission of children in the first year of life in children's inpatient clinics of levels II and III, depending on the class of diseases according to the ICD-10 in 2020-2022 is shown in Figure 5.3.

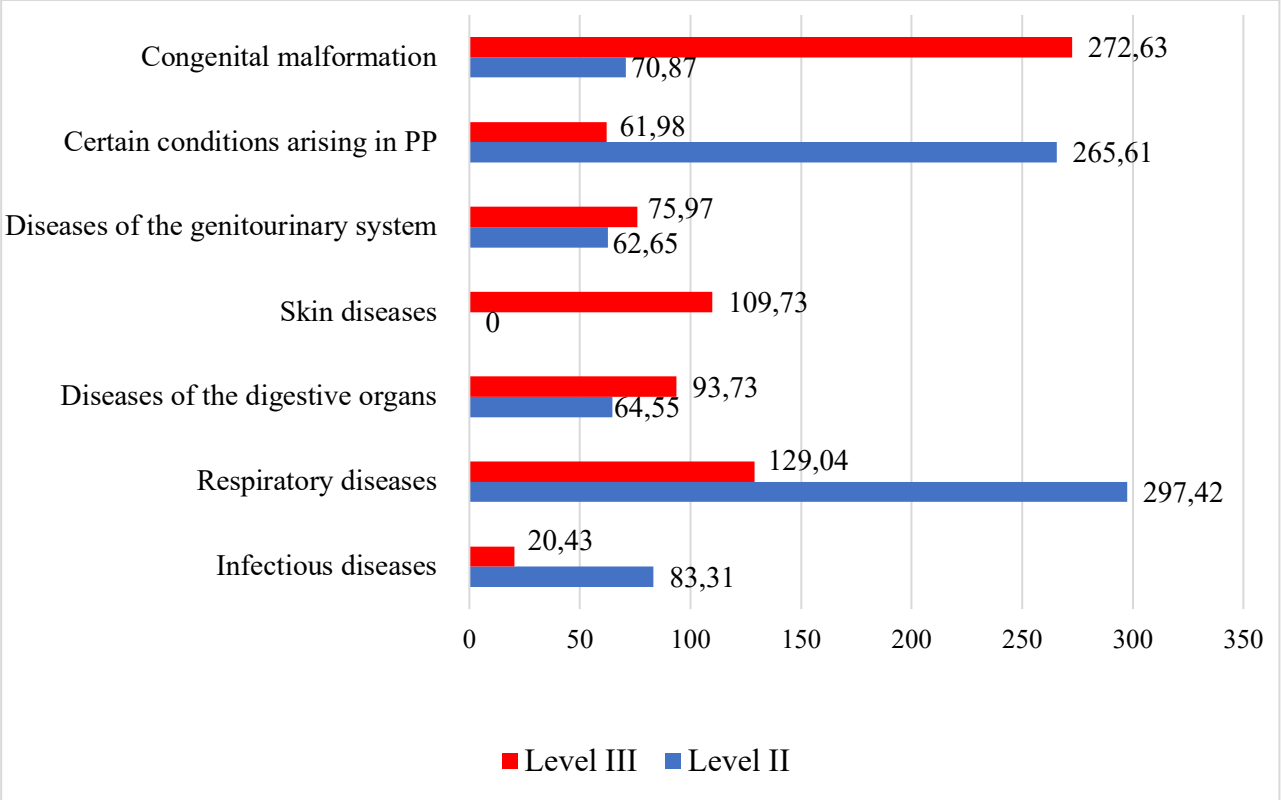

Figure 5.3 - The average frequency of admission of children in the first year of life in children's inpatient clinics of levels II and III depending on the class of diseases according to ICD-10 in 2020-2022 (‰)

According to the study, the longest stay in level II children's inpatient clinics was for children of their first year of life with certain conditions arising in the perinatal period, respiratory, endocrine and genitourinary diseases. It was found that in 2020-2022, the average length of stay of a patient in a bed with some infectious and parasitic diseases (+44.8%), diseases of the endocrine system (+19.1%) and genitourinary system (+16.1%), respiratory diseases (+4.7%) and other diseases (+23.7%) increased and decreased - in children with diseases of the digestive organs (-20.6%) and with CM (-7.6%). The longest average length of stay in a level III pediatric inpatient clinic was for children with diseases of the blood, hematopoietic organs and certain disorders involving the immune mechanism; diseases of the genitourinary and endocrine system; and certain conditions occurring in the perinatal period. An assessment of the dynamics of the average length of stay of a patient of the first year of life in a bed revealed that over the three years, the most significant increase in the length of treatment of children with diseases of the eye and its appendages (+67.2%), some infectious and parasitic diseases (+50.6%) and diseases of the digestive organs (+35.6%) and a decrease in diseases of the endocrine system (-44.0%), certain conditions occurring in the perinatal period (-29.3%) and with CM (28.6%). A comparison of the average length of stay of children in inpatient facilities in the first year of life, depending on the level, revealed that in level II children's inpatient clinics patients stayed longer in all the ICD-10 classes, except for diseases of the genitourinary system (Figure 5.4). The average length of stay of patients of the first year of life in a bed depending on the class of diseases according to ICD-10 in 2020-2022 is presented in Table 5.3. and Figure 5.4.

Table 5.3 - The average length of stay of first-year patients in a bed depending on the ICD-10 disease class in 2020-2022 (M±m days)

ICD-10 disease class	2020		2021		2022		Average for 3 years / dynamics (in %)	
	Level II	Level III	Level II	Level III	Level II	Level III	Level II	Level III
Certain infectious and parasitic diseases (A00-B99)	7.11± 2.98	5.63± 1.19*	8.86± 3.28	8.25± 1.77	12.89± 2.16	11.40± 5.32*	9.62± 2.80 /+44.8	8.43± 2.76 /+50.6

Continuation of Table 5.3

Diseases of the blood, hematopoietic organs and certain disorders involving the immune mechanism (D50-D89)	-	13.33± 11.34	-	8.60± 1.81	-	16.33± 8.31	-	12.75± 7.15 /+18.4
Diseases of the endocrine system (E00-E90)	8.91± 1.96	6.31± 2.53*	13.12± 3.22	14.42± 2.28	11.02± 2.54	11.28± 6.65*	11.02± 2.57 /+19.1	10.67± 3.82 /- 44.0
Diseases of the eye of its appendages (H00-H59)		1.93± 0.23*		4.55± 1.03		5.89± 0.94*	-	4.12± 0.73 /+67.2
Respiratory diseases (J00-J99)	12.00± 3.84	6.51± 0.64	10.17± 1.94	9.05± 2.70	12.59± 5.85	6.49± 0.53	11.58± 3.88 / +4.7	7.35± 1.29 /- 4.7
Diseases of the digestive system (K00-K93)	9.48± 1.76	4.26± 0.83	8.51± 1.57	5.07± 0.95	7.53± 2.13	6.61± 1.74	8.51± 1.81 / - 20.6	5.31± 1.16 /+35.6
Diseases of the skin and subcutaneous tissue (L00-L99)	-	4.65± 0.40	-	4.37± 0.29	-	4.01± 0.31	-	5.44± 0.33 /- 13.8
Diseases of the genitourinary system (N00-N99)	12.02± 5.13	10.31± 0.83	12.78± 4.44	12.74± 1.54	14.33± 6.36	10.80± 0.82	9.71± 5.31 / +16.1	11.28± 1.06 / +4.5
Certain conditions that occur in the perinatal period (P00-P96)	15.43± 2.82	13.72± 3.15*	15.75± 3.40	10.06± 1.18	13.01± 3.83	9.69± 1.94*	14.73± 3.35 / - 15.7	11.16± 2.09 /- 29.3
Congenital anomalies (malformations), deformities and chromosomal abnormalities (Q00-Q99)	8.78± 3.54	6.54± 0.78*	9.01± 4.23	7.43± 0.71	8.11± 3.09	4.67± 0.35*	8.63± 3.62 / - 7.6	6.21± 0.61 /- 28.6
Other	8.75± 4.64	9.13± 2.96	14.32± 6.76	13.8± 5.66	11.47± 4.21	10.13± 3.00	11.51± 5.20 / +23.7	11.02± 3.87 /+9.9

*Statistically significant difference between 2020 and 2022 indicators ($p<0.05$)

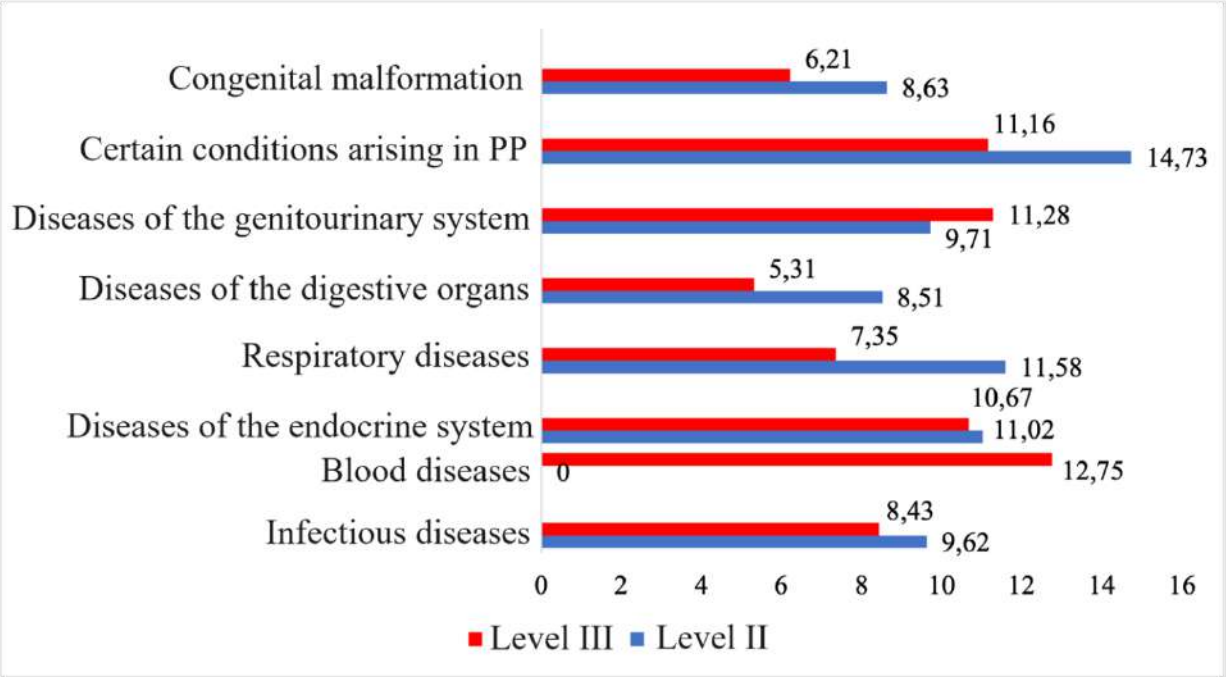

Figure 5.4 - The average length of stay of patients in the first year of life in pediatric inpatient clinics of levels II and III depending on the class of diseases according to ICD-10 in 2020-2022 (in days)

Thus, there are significant differences between the admission rates of patients depending on the level of inpatient facility. Patients of the first year of life in level II inpatient facilities were most often urgently admitted on referral from the outpatient clinic to pediatric and infectious diseases departments with respiratory diseases; certain conditions occurring in PP; some infectious and parasitic diseases and CM. In level III inpatient facilities, more than half of the patients are admitted on a planned basis for external and internal transfer to pediatric and surgical departments with CM, skin and subcutaneous tissue diseases, respiratory and digestive diseases. The length of stay of patients in level II inpatient facilities was higher than in level III for all the ICD-10 classes except for genitourinary diseases. The new coronavirus infection has had a significant impact on inpatient admission rates in children.

5.2. Characteristics of inpatient admissions of children of the first month of life

The study revealed that patients admitted in the first month of life, both in level II and level III inpatient facilities, were approximately equally distributed by gender in

2020-2022, and the source of funding for treatment for almost all children was the CHI funds. Most of the children in the study period were admitted to level II facilities by transfer from another (58.6-63.5%), and to level III facilities by inpatient transfer (79.7-85.4%). In level II inpatient facilities, there were significantly more children who were referred by the outpatient clinic and delivered by ambulance, and fewer patients who were taken by their parents on their own than at level III. The characteristics of admitted patients in the first year of life in level II and level III children's inpatient clinics in 2020-2022 are shown in Table 5.4.

Table 5.4 - Characteristics of patients admitted in the first year of life in levelI II and III children's inpatient facilities in 2020-2022 (%)

Characteristic		Inpatient facility level	2020	2021	2022	Dynamics
Gender	male	Level II	55.6	57.1	56.5	+1.6
		Level III	49.3	50.5	52.6	+6.3
	female	Level II	44.4	42.9	43.5	-2.0
		Level III	50.7	49.5	47.4	-6.5
Source of financing	CHI (VHI)	Level II	100.0	100.0	100.0	-
		Level III	100.0	99.0	100.0	-
	VHI	Level II	-	-	-	
		Level III	-	1.0	-	-
	For a fee	Level II	-	-	-	
		Level III	-	-	-	-
Type of referral	Outpatient clinic	Level II	10.1	12.8	11.4	+11.4
		Level III	8.7	6.8	5.3	-39.1
	Self-examination	Level II	-	1.3	1.6	+100.0
		Level III	11.6	3.9	4.2	-63.8
	Transfer from another inpatient facility	Level II	63.5	58.6	60.4	-4.9
		Level III	-	1.9	2.1	+100.0
	First aid (emergency)	Level II	15.6	20.9	17.2	+9.3
		Level III	-	1.9	4.2	+100.0
	Intra-hospital transfer	Level II	10.8	6.4	9.4	-13.0
		Level III	79.7	85.4	84.2	+5.3
Type of inpatient admission	Emergency	Level II	88.9	98.5	96.3	+7.7
		Level III	66.7	30.1	32.6	-51.1
	Planned	Level II	11.1	1.5	3.7	-66.7
		Level III	33.3	69.9	67.4	+50.6

*Statistically significant difference between 2020 and 2022 indicators ($p<0.05$)

Evaluation of the structure of patients depending on the type of inpatient admission showed that in level II facilities in 2020-2022, the vast majority were admitted

urgently (88.9-98.5%) and the proportion of planned admissions was the lowest in 2021 (1.5%), and the highest in 2020 (11.1%). In 2020, two thirds of patients were admitted to level III inpatient facilities urgently, but starting from 2021, the ratio of patients changed to the predominance of planned admissions, and patients with emergency admission became slightly more than 30%.

An assessment of the distribution of patients by specialized departments in inpatient facilities of levels II and III showed (Figures 5.5 and 5.6) that during the study period, children of the first month of life were most often admitted to the neonatal and infant pathology department. However, pediatric departments came second in the number of inpatient admissions in level II facilities and anesthesiology and reanimation and intensive care departments in level III facilities. In addition, there were significantly more patients admitted with COVID-19 and in surgical departments in level III children's inpatient clinics.

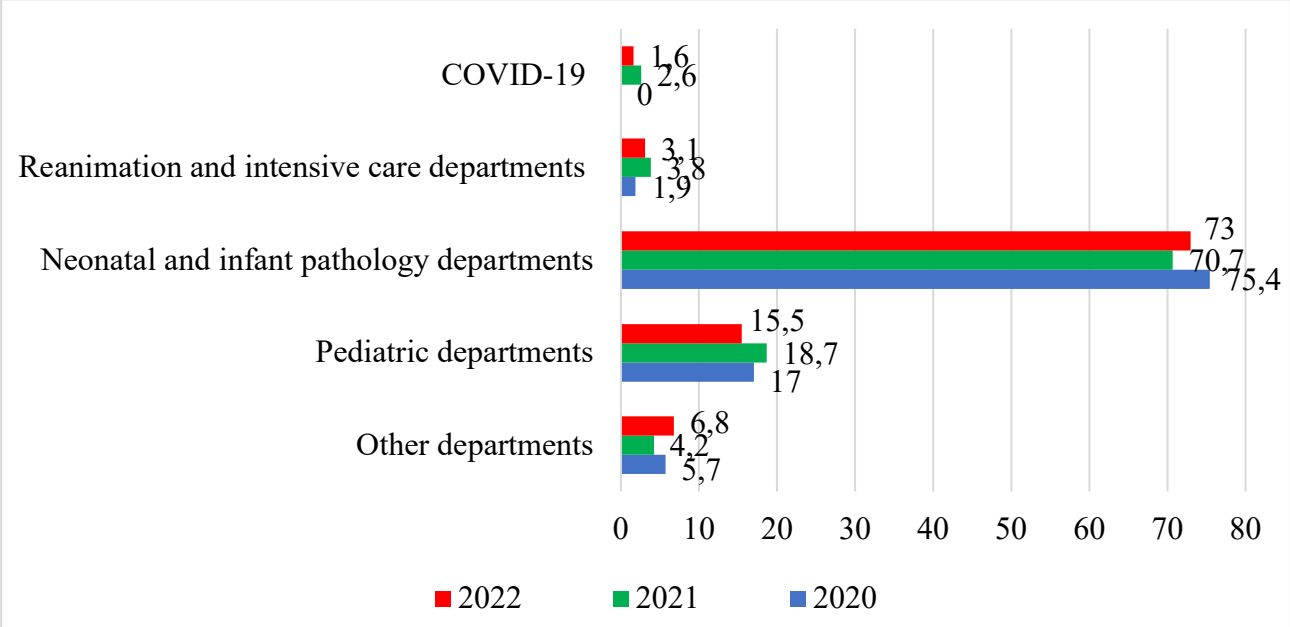

Figure 5.5 - Distribution of admitted patients of the first year of life by profile departments in level II children's inpatient clinics in 2020-2022 (% of total)

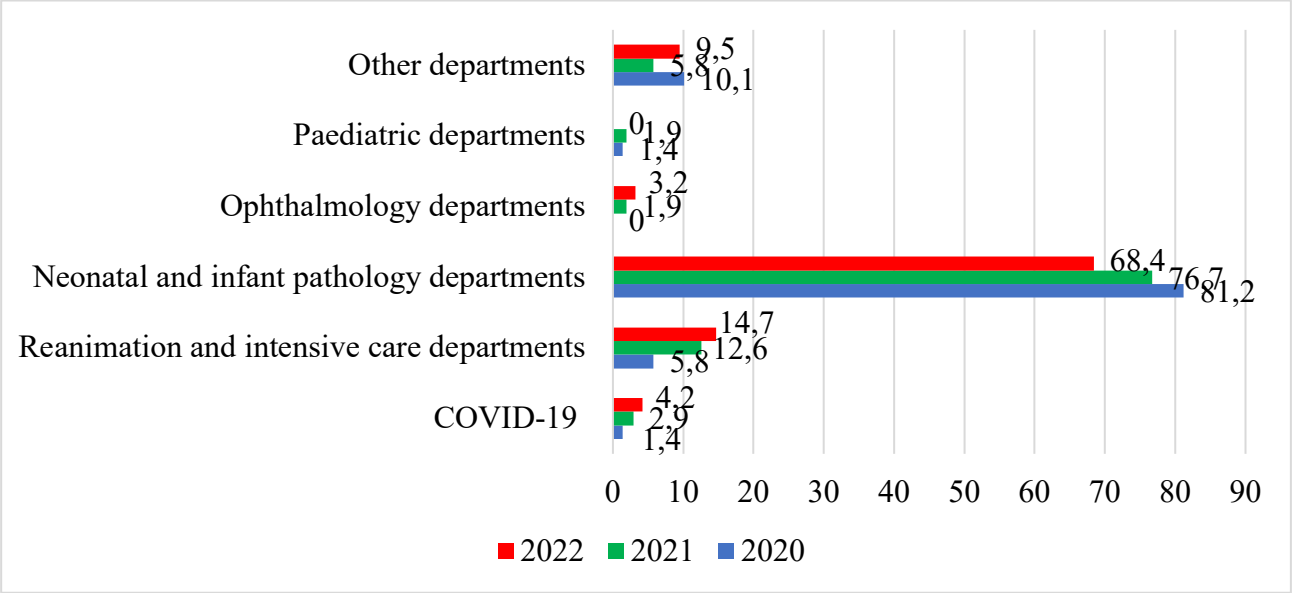

Figure 5.6 - Distribution of admitted patients in the first month of life by specialized departments in a level III children's inpatient clinics in 2020-2022 (% of total)

Evaluation of inpatient admission rates according to the ICD-10 disease class showed that, regardless of the level of admission in 2020-2022, the highest admission rates were for patients with certain conditions arising in PP and with CM. The third ranking in terms of frequency of admissions differed: at level II it was respiratory diseases and at level III it was endocrine diseases. The analysis of admission rates for three years allowed us to establish the presence of multi-directional dynamics for all classes of ICD-10 diseases, both in level II and level III inpatient facilities. However, if we evaluate the change in indicators in 2022 to the level of 2020, then at all levels of inpatient facilities there is a decrease in the most common classes of diseases: certain conditions that occur in PP and CM.

In addition, the rate of inpatient admission of children with respiratory diseases, some infectious and parasitic diseases, and digestive diseases has decreased in level II facilities, and the rate of admission of patients with diseases of the endocrine and genitourinary systems has increased (Table 5.5.).

Table 5.5 - Frequency of inpatient admission of children of the first month of life depending on the class of diseases according to the ICD-10 in 2020-2022 (in ‰)

ICD-10 disease class	2020		2021		2022		Average for 3 years / dynamics (in %)	
	Level II	Level III	Level II	Level III	Level II	Level III	Level II	Level III
Certain infectious and parasitic diseases (A00-B99)	18.51	-	14.29	-	17.04	-	19.92 / -7.9	-
Diseases of the blood, hematopoietic organs and certain disorders involving the immune mechanism (D50-D89)	-	14.49	-	38.83	-	42.11	0.00	17.77 / +65.6
Diseases of the endocrine system (E00-E90)	-	72.46	10.10	9.71	11.48	10.52	10.01 / +100.0	27.39 / -85.5
Respiratory diseases (J00-J99)	75.52	-	55.7	38.83	63.88	21.10	65.03 / -15.4	12.94 / +100.0
Diseases of the digestive system (K00-K93)	33.27	-	21.43	-	37.39	-	30.70 / -11.0	-
Genitourinary system diseases (N00-N99)	17.12	-	21.21	29.13	35.44	52.63	24.59 / +51.7	9.71 / +100.0
Certain conditions that occur in the perinatal period (P00-P96)	643.98	478.26	688.74	572.81	632.97	452.63	655.23 / -1.7	350.36 / -5.4
Congenital anomalies (malformations), deformities and chromosomal abnormalities (Q00-Q99)	88.33	333.33	71.75	233.10	63.12	242.11	74.40 / -28.5	188.81 /-27.7
Factors affecting health status and referrals to health care institutions (Z00-Z99)	-	14.49	-	29.13	-	21.06	-	14.54 / +31.2
Other	122.22	86.94	116.78	58.25	138.68	158.42	125.89 / +11.9	48.40 / +45.1

*Statistically significant difference between 2020 and 2022 indicators ($p<0.05$)

In level III inpatient facilities, there was an increase in the frequency of blood diseases, diseases of the genitourinary system, and the level of admission of children with factors affecting the health status of the population and referrals to health care facilities. At the same time, only admissions of children with diseases of the endocrine system

decreased in the level III inpatient facility. The frequency of inpatient admission of children in the first month of life, depending on the class of diseases according to the ICD-10 in 2020-2022, is shown in Table 5.5.

A comparative assessment of the frequency of inpatient admissions of children showed that in level II facilities, compared to level III, the frequency of admissions of patients with respiratory diseases was 5.0 times higher, diseases of the genitourinary system - 2.5 times higher and with certain conditions occurring in PP - 1.9 times higher (Figure 5.7.).

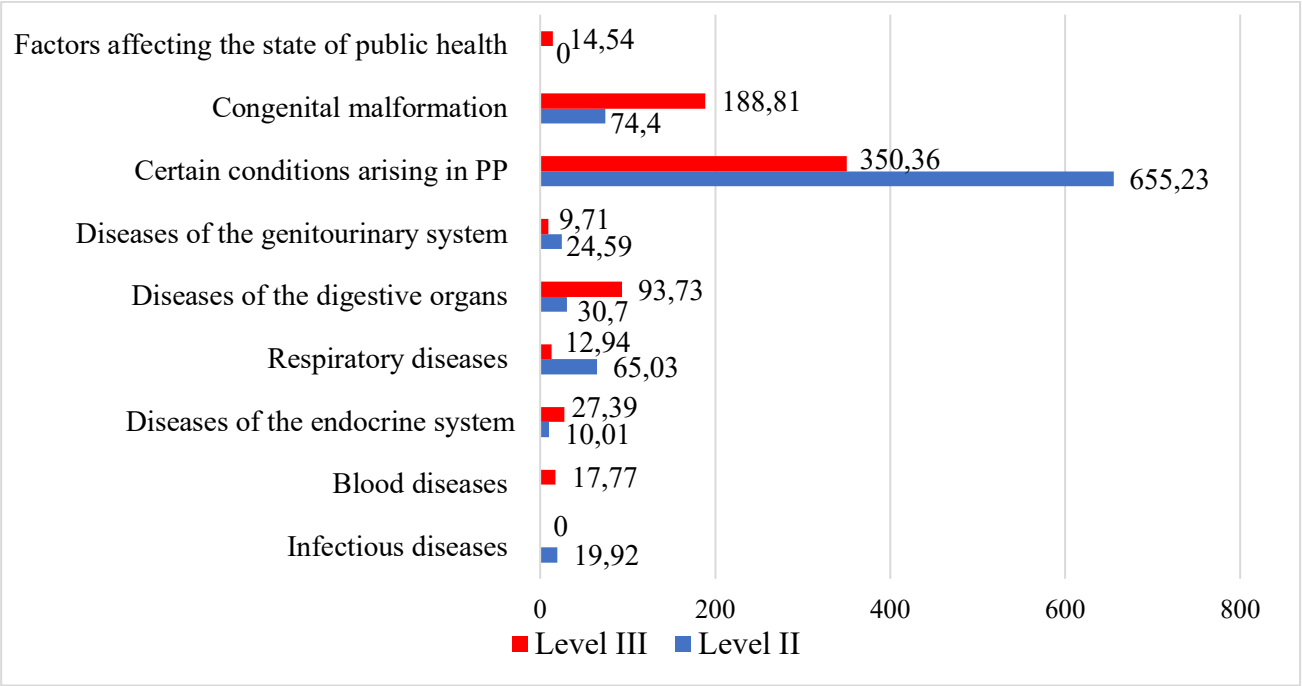

Figure 5.7 - The average frequency of admission of children in the first month of life in children's inpatient clinics of levels II and III depending on the class of diseases according to ICD-10 in 2020-2022 (‰)

In level III inpatient facilities, the frequency of admissions of children with endocrine diseases is 2.7 times higher and 2.5 times higher for children with CM. In addition, in level II inpatient facilities, unlike level III, there were no admitted patients of the first month of life with blood diseases and with factors affecting the health status and referrals to health care facilities (with the presence of colostomy or gastrostomy). No children admitted with certain infectious and parasitic diseases and digestive diseases were observed in level III children's inpatient clinics.

The highest average length of stay per bed in level II facilities was in patients admitted with CM, certain conditions arising in PP and endocrine system diseases (Table 5.6).

Table 5.6 - The average length of stay of first-month patients in a bed depending on ICD-10 disease class in 2020-2022 (M±m days)

ICD-10 disease class	2020		2021		2022		Average for 3 years / dynamics (in %)	
	Level II	Level III	Level II	Level III	Level II	Level III	Level II	Level III
1	2	3	4	5	6	7	8	9
Certain infectious and parasitic diseases (A00-B99)	7.00± 0.00	-	9.52± 5.15	-	8.00± 0.00	-	8.17± 1.72 / +12.5	-
Diseases of the blood, hematopoietic organs and certain disorders involving the immune mechanism (D50-D89)	-	7.00± 0.00	-	16.3± 5.31	-	9.50± 3.70	-	10.93 ±6.54 / +26.3
Diseases of the endocrine system (E00-E90)	-	14.2± 7.30	17.00± 0.00	23.0± 0.00	21.00 ± 0.00	15.0± 0.00	12.67± 2.43 / +100.0	17.40 ± 0.00 / +11.8
Respiratory diseases (J00-J99)	5.62± 2.11	-	8.34± 1.95	19.0± 4.62	12.41 ± 1.77	22.5± 21.50	8.79± 1.94 / +54.7	13.83 ± 8.71 / +100. 0
Diseases of the digestive system (K00-K93)	5.57± 3.35	-	4.89± 4.01	-	5.23± 3.89	-	5.23± 3.75 / -6.1	-
Genitourinary system diseases (N00-N99)	11.00± 0.00	-	12.52± 2.38	13.7± 4.10	11.77 ± 3.15	10.4± 1.69	11.76± 1.84 / +6.4	8.03± 1.93/ +100. 0
Certain conditions that occur in the perinatal period (P00-P96)	14.63± 1.12	15.50 ± 2.96	11.75± 1.31	12.43 ± 1.00	24.72 ± 1.42	19.30± 3.01	17.03± 1.28 / +48.0	15.74 ± 2.32 / +19.7

Continuation of Table 5.6

1	2	3	4	5	6	7	8	9
Congenital anomalies (malformations), deformities and chromosomal abnormalities (Q00-Q99)	16.88± 2.02	15.40 ± 3.83	15.11± 2.12	16.8± 3.65	19.20 ± 2.44	12.3± 1.59	17.06± 2.19 / +12.08	14.83 ± 3.02 /- 20.1
Factors affecting health status and referrals to health care institutions (Z00-Z99)	-	79.00 ± 0.00	-	22.7± 10.33	-	24.50± 7.50	-	42.07 ± 5.94 / -69.0
Other	8.44± 2.72	6.7± 2.89	8.82± 1.36	7.4± 1.66	9.63± 1.58	7.2± 3.41	8.96± 1.89 / +12.4	7.10± 2.65 /+7.5

Children with colostomy or gastrostomy, respiratory diseases, and certain conditions occurring in PP were in level III inpatient facilities for longer periods of time. In 2022, the average length of stay per bed for patients of all ICD-10 classes, except for patients admitted with digestive diseases, increased in level II facilities by the level of 2020. Level III inpatient facilities in 2022 also experienced an increase in the average length of stay for all classes of diseases, except for children admitted for the class "Factors affecting the health status of the population and referrals to health facilities" and in children with CM.

Comparison of the average length of stay of children of the first month of life in inpatient facilities depending on the level revealed (Figure 5.8) that in level II children's clinics patients stayed longer with CM, certain conditions arising in PP and diseases of the genitourinary system and less long with diseases of the respiratory and endocrine systems.

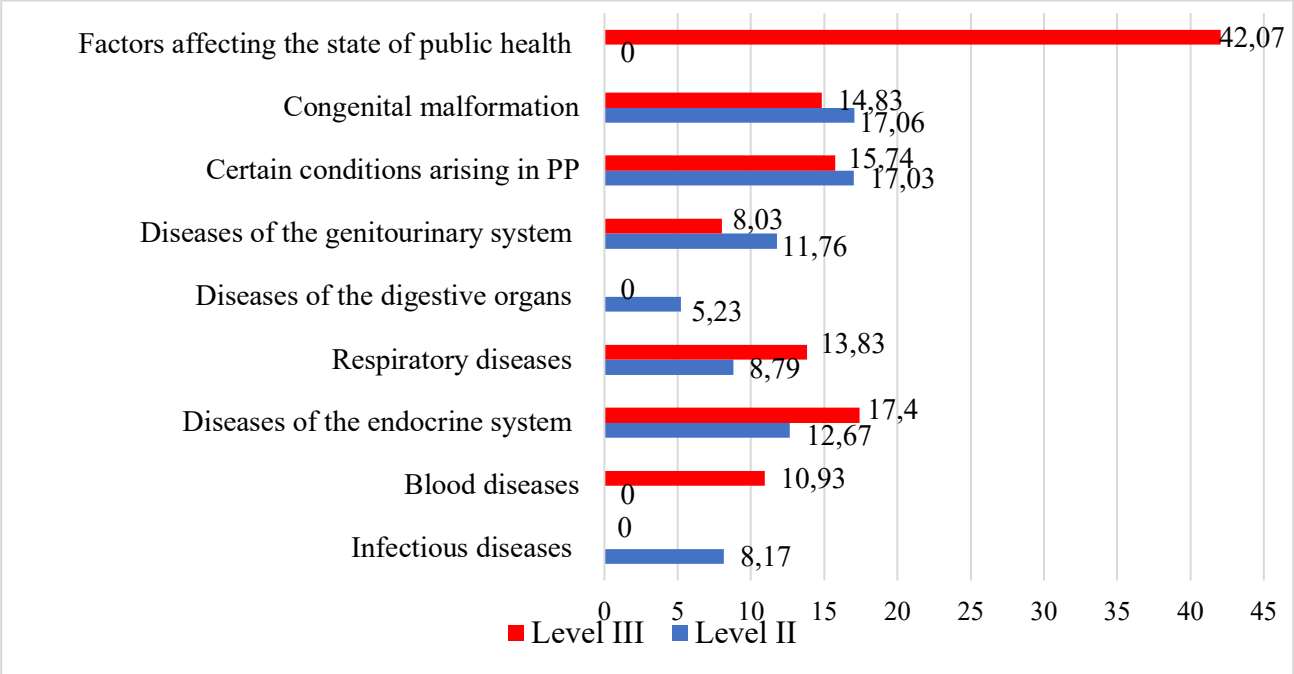

Figure 5.4 - The average length of stay of patients in the first month of life in pediatric inpatient clinics of levels II and III depending on the class of diseases according to ICD-10 in 2020-2022 (in days)

Thus, inpatient admissions of patients of the first month of life at different levels of inpatient facilities have both similarities and individual differences. Most of the patients were treated at the expense of the CHI. Most of the children were admitted to level II inpatient facilities by transfer from another clinic or were delivered by ambulance (emergency), in contrast to level III, where planned admission by clinical transfer prevailed. Children were most frequently admitted with certain conditions arising in PP and with CM in neonatal and infant pathology departments, but pediatric departments were the second most frequently admitted in level II inpatient facilities and anesthesiology and reanimation and intensive care departments in level III facilities. In level II children's inpatient clinic, patients with CM, certain conditions arising in PP and diseases of the genitourinary system stayed longer in level II, and in level III - with diseases of the respiratory and endocrine systems.

5.3. Assessment of the organization of specialized medical care for children of the first year of life in megalopolis inpatient facilities

On the assumption that the level of medical care quality should not depend on the

level of the inpatient facility, a subjective assessment of the provision of specialized medical care in the conditions of round-the-clock children's clinics for children of the first year of life in the megalopolis was carried out. It was found that for 98.9% of patients admitted in the first year of life, inpatient stay was paid for by CHI fund, and for 1.1% of children - from the parents' personal funds.

The average length of inpatient stay (days) used in the calculation for the provision of specialized medical care is 11.80 days, and according to the profile "Pediatrics" - 8.60 days. The average length of inpatient admission was 8.33±1.1 days and more than half of the children (62.3%) were admitted for 4-9 days. 15.1% stayed for less than 4 days, and 22.6% stayed for 10 days or more. The distribution of patients of the first year of life by length of inpatient stay is shown in Figure 5.9.

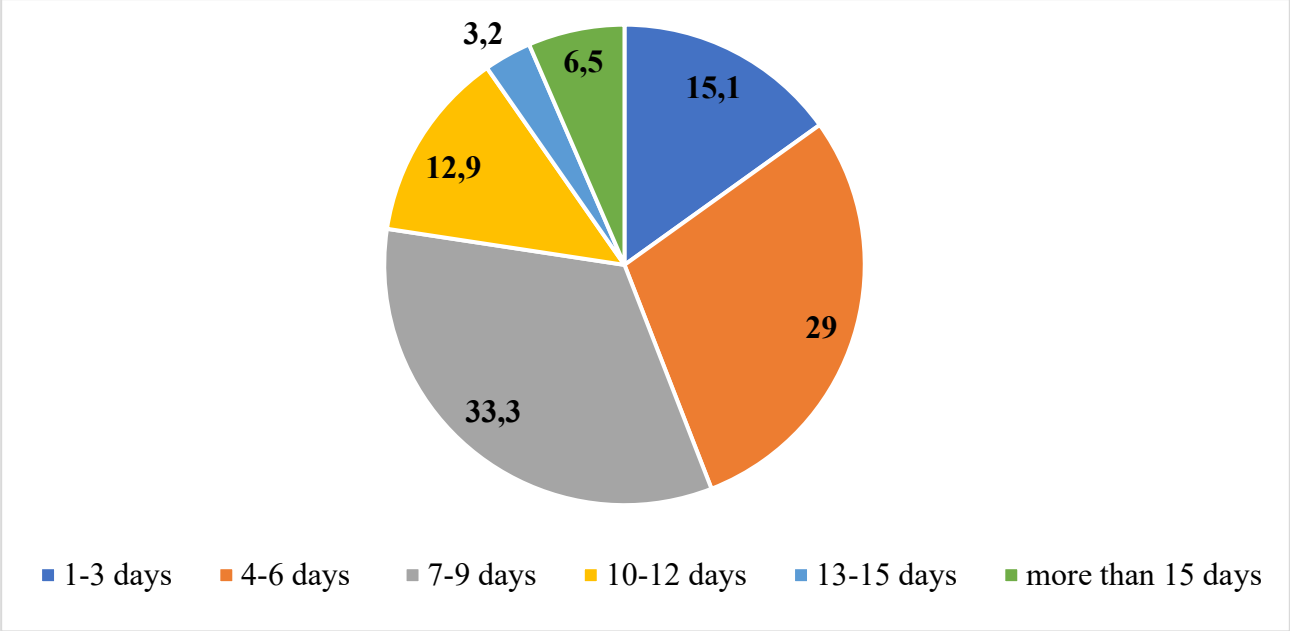

Figure 5.9 - Distribution of patients of the first year of life by length of inpatient stay (% of total)

The study showed that inpatient admission was emergency for 85.0% of children and planned for 15.0%. The waiting time for planned admission, in accordance with the Territorial Program of State Guarantees of St. Petersburg, is up to 14 days from the date the patient receives a referral from the outpatient clinic. In children who were admitted on a planned basis, it was most often due to the referral of a physician from a children's outpatient clinic (64.3%). In addition, 21.4% of children were transferred to a children's inpatient clinic from a maternity clinic (perinatal center), and 14.3% of parents chose this medical organization for planned admission guided by the recommendation of friends. It

was revealed that 21.4% of children had a waiting period of up to 7 days, and 60.0% of patients expected inpatient admission from 1 up to 2 weeks. 21.6% of children waited for planned admission for more than 14 days. The distribution of patients in the first year of life by waiting time for planned inpatient admission is shown in Figure 5.10.

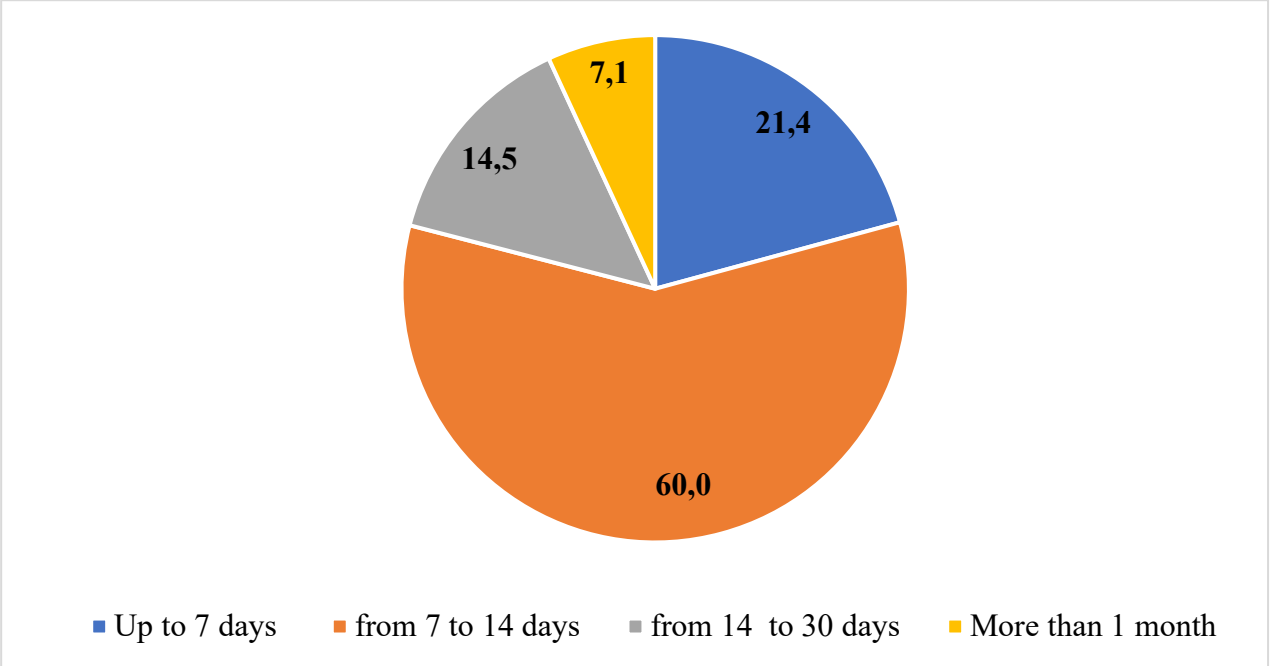

Figure 5.10 - Distribution of patients in the first year of life by waiting time for planned inpatient admission (% of total)

The study showed that 46.2% of children had duplicate examinations after his examination in the outpatient clinic before inpatient admission, and only 53.8% of patients did not. All 100.0% of patients admitted as planned, who indicated the presence of duplication, had blood and urine tests, 33.3% – examination of feces and 16.7% – ultrasound.

The majority of children of the first year of life who were urgently admitted were referred by the outpatient clinic (60.2%). 21.8% of parents took the child to the emergency department of the children's clinic on their own and called an ambulance themselves – 18.0%.

Emergency inpatient admission should be carried out immediately [146]. An assessment of the timeliness of the child's emergency inpatient admission revealed that almost half of the patients were admitted in the first 6 hours (48.5%), and 16.7% later than 24 hours. The distribution of patients of the first year of life by waiting time for emergency admission is shown in Figure 5.11.

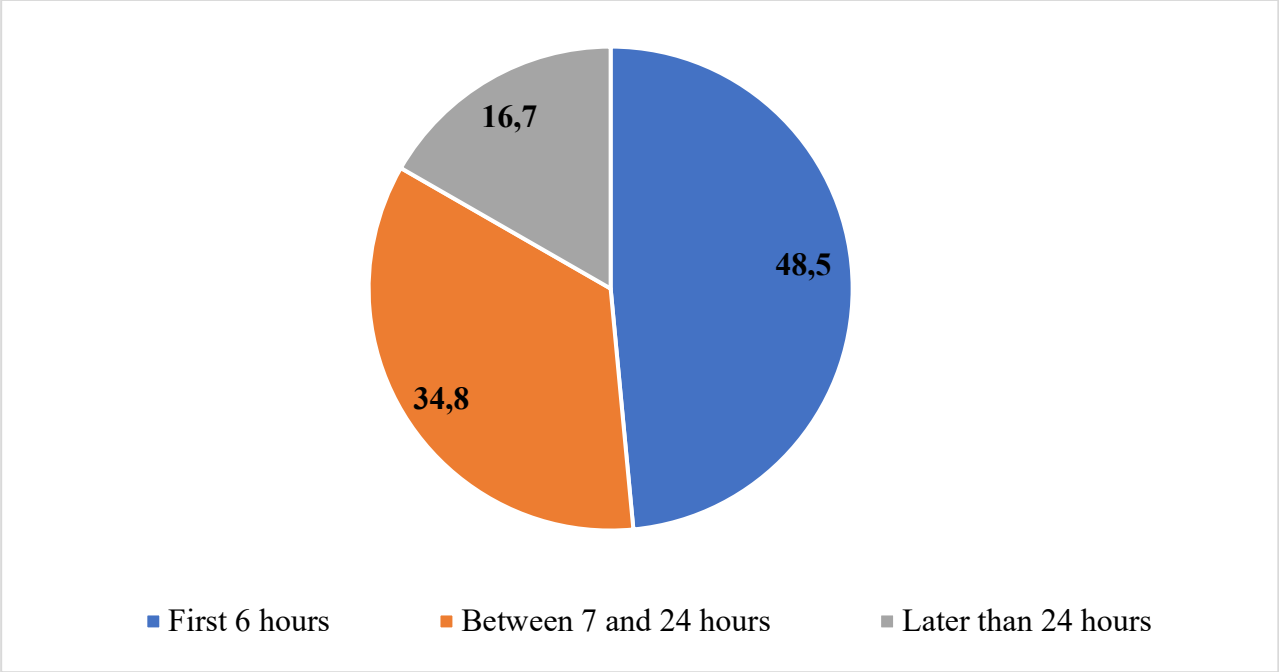

Figure 5.11 - Distribution of patients of the first year of life by waiting time for emergency inpatient admission (% of total)

An assessment of the frequency of refusal of inpatient admission revealed that none of all emergency and planned admitted children were refused and only 2.9% of parents of emergency admitted children refused treatment in the clinic themselves.

In general, 76.3% of patients admitted to children's inpatient clinic in the first year of life were referred by the children's outpatient department (COD). In 89.6% of patients, the diagnosis drawn in the children's outpatient department and the diagnosis made in the inpatient facility coincided. It did not match in 10.4% of children. It was revealed that 24.4% of children had repeated admissions for the same diseases during the year, and 75.6% did not.

The hallmark of any children's clinic is an admission department. Therefore, a lot of patients judge the activities of the facility as a whole by its work. In accordance with the Order of the Ministry of Health "On approval of criteria for assessing the quality of medical care" and other applicable regulatory documents, registration and examination of a patient referred to a medical organization as planned is carried out within two hours after admission, in an emergency - depending on the nosological form and severity of the disease. On average, they stayed in the admission department for 54.56±4.57 min. 14.9%

of children waited for admission up to 30 min., 50.0% - 30 to 60 min. and 35.1% - more than an hour.

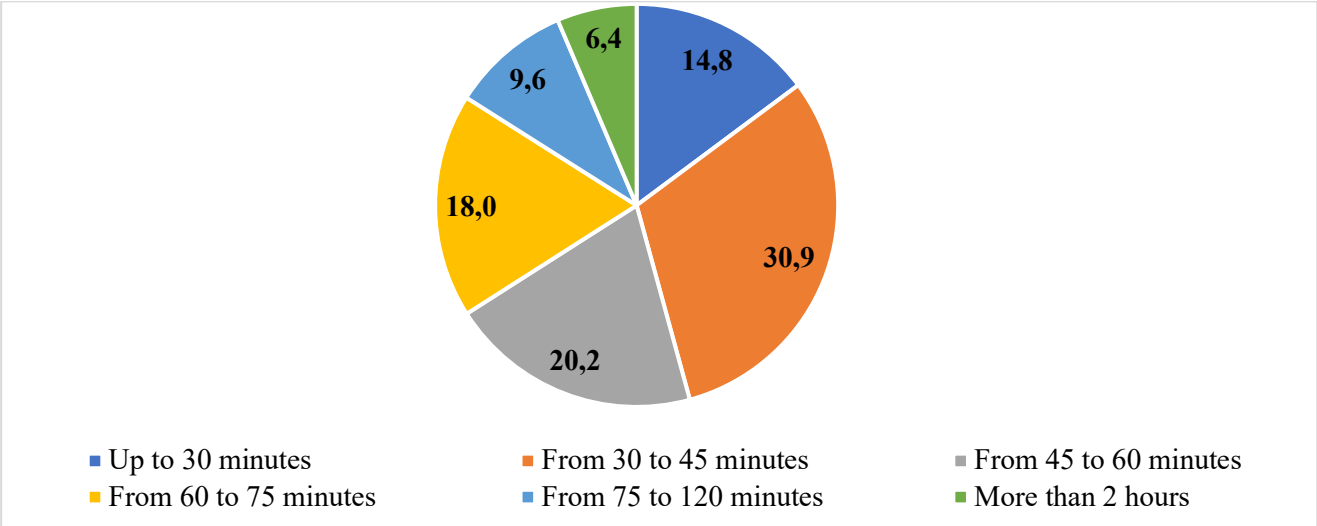

Figure 5.12 - Distribution of patients of the first year of life by waiting time in the admission department (% of total)

The assessment of satisfaction with the conditions of the child's stay in the admission department showed that 90.3% of parents were completely satisfied, 7.5% were partially dissatisfied, and 2.2% were completely dissatisfied. It was found that the main reasons for parents' dissatisfaction were the sanitary condition of the bathroom (42.9% and the lack of available waiting places (28.6%). In addition, among the main reasons for parents' dissatisfaction were: lack of drinking water (25.0%); uncomfortable conditions of stay in the admission department as a whole (21.4%) and lack of repair – 7.1%. The main reasons for parents' dissatisfaction with the conditions of the child's stay in the admission department are shown in Figure 5.13.

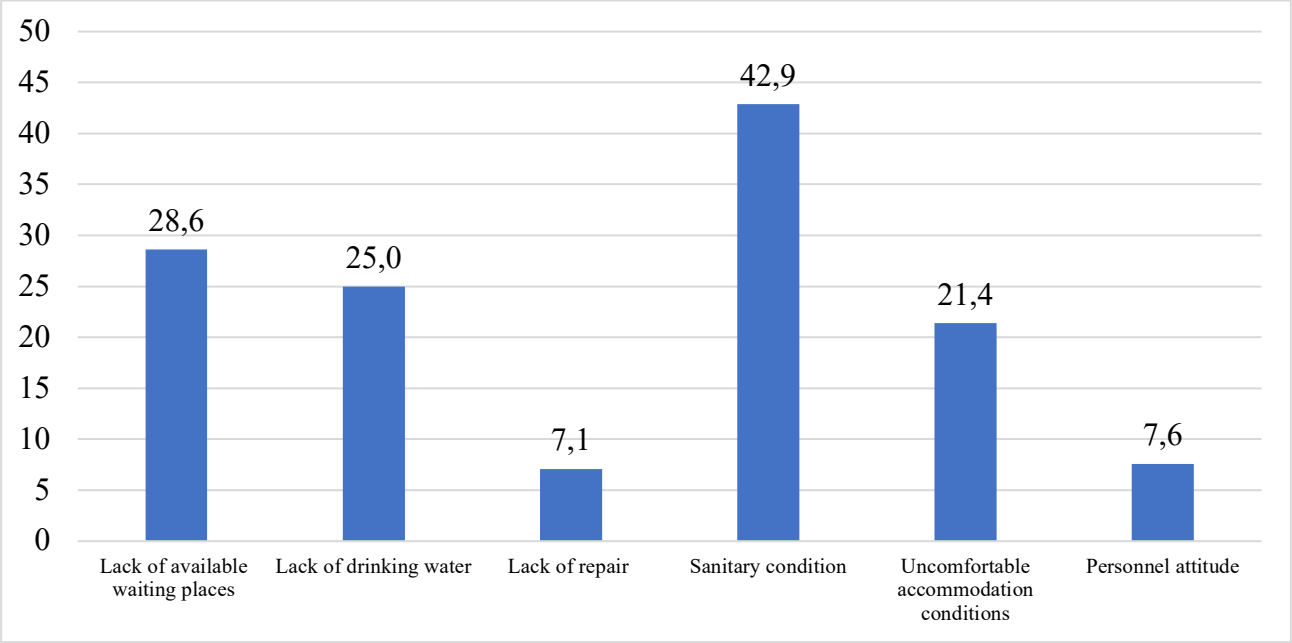

Figure 5.13 – The main reasons for parents' dissatisfaction with the conditions of the child's stay in the admission department (%)

The study showed that 92.4% of parents are satisfied with the attitude of the personnel (kindness, politeness) during their stay in the admission department and positively assess the work of the department.

The comfort of inpatient stay largely depends on the placement of patients in the wards. In accordance with the current Order of the Ministry of Health, the placement of patients in the provision of specialized care in inpatient settings should be carried out in 2 or more local wards. Single occupancy is provided only for medical and epidemiological reasons. Children of the first year of life are almost always with their parents, except for staying in the anesthesiology and reanimation and intensive care department. The study showed that, on average, there were 3.32±1.01 patients in the ward. At the same time, the most frequent accommodation was four-bed wards (41.4%). 49.2% of respondents stayed in wards with 2-3 beds, and 9.4% stayed in wards with 5 or more beds. The distribution of patients of the first year of life, depending on the placement in the wards of children's departments, is shown in Figure 5.14.

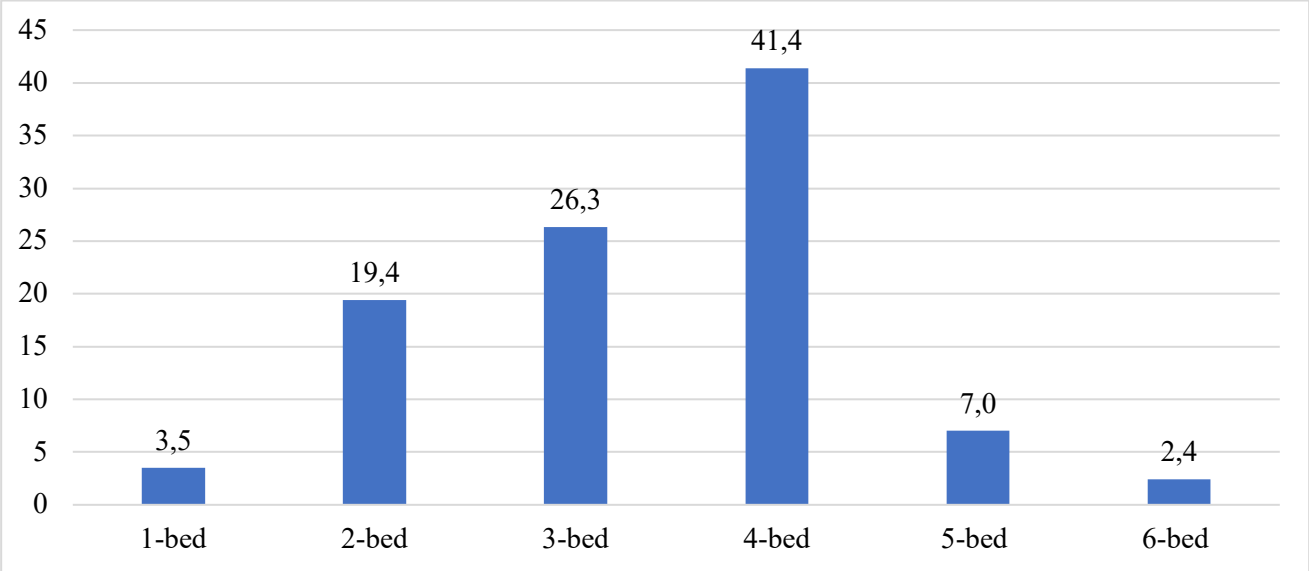

Figure 5.14 – Distribution of patients of the first year of life depending on placement in children's department wards (% of total)

The patient's contact with the attending physician is an important element of the medical care process. In the case of the treatment of children of the first year of life, this is primarily the physician's contact with the child's mother. 75.5% of the respondents had daily communication with their physician. 20.2% of women communicated every few days and 4.3% of mothers communicated only once during their stay at the department. At the same time, 93.5% of parents were satisfied with the kindness, tactfulness and politeness of the attending physician during their stay in the department, and 7.5% of mothers indicated that they were not satisfied with the attitude of the medical personnel towards patients.

According to the study, a smaller number of respondents were satisfied with the attitude of the nursing personnel during their stay in the department – 89.2%. Benevolence, tactfulness and politeness of nurses were not satisfactorily assessed by 10.8% of mothers.

It makes sense that the attitude of the medical personnel has an impact on the overall assessment of the department. In general, 77.8% of parents who participated in the sociological survey were satisfied with inpatient conditions of the child's stay in the clinic (Figure 5.15.). 12.5% of the respondents were partially satisfied, and 9.7% expressed complete dissatisfaction with the conditions of the child's inpatient stay. Considering that the share of fully and partially satisfied with the provision of medical

care in accordance with the territorial program of State Guarantees of St. Petersburg should be at least 80%, the satisfaction level of 90.3% can be considered high.

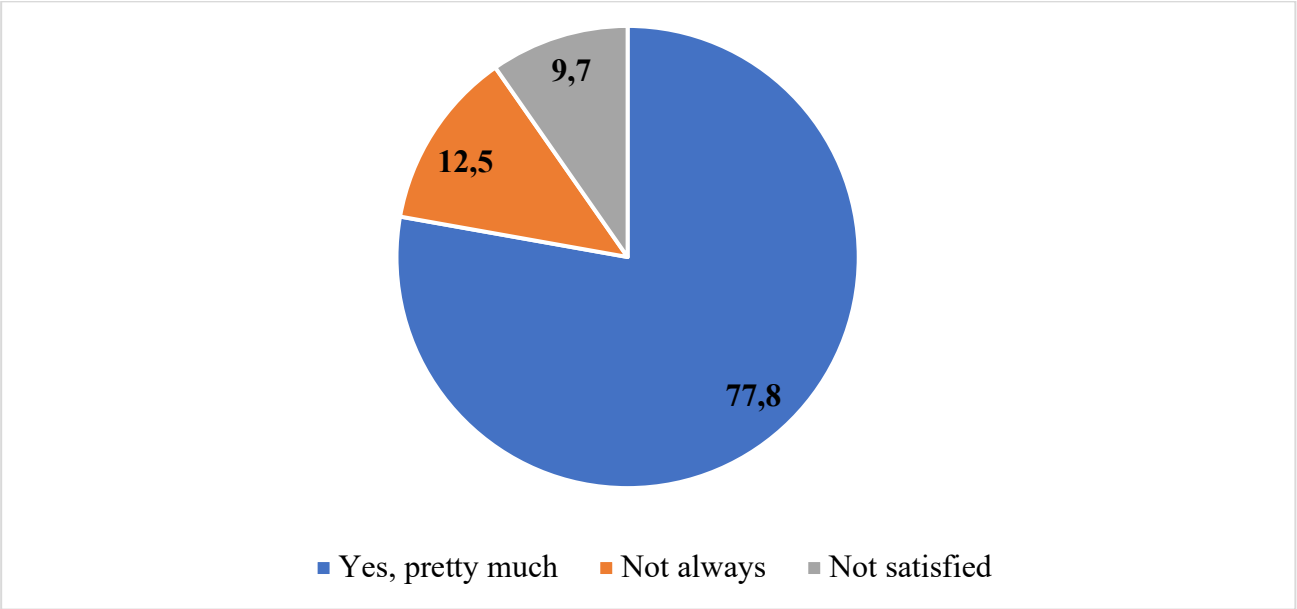

Figure 5.15 – Distribution of parents of first-year patients by level of satisfaction with the conditions of their child's inpatient stay (% of total)

It was found that mothers who were partially or completely dissatisfied with the inpatient conditions of their child's stay (Table 5.7) indicated nutrition (56.5%), the attitude of average medical personnel (30.4%) and lighting, temperature conditions (26.1%) among the main reasons for dissatisfaction.

Table 5.7 – The main reasons for parents' dissatisfaction with the conditions of the child's inpatient stay (%)

Reason for dissatisfaction	Specific weight	Abs.
Lighting, temperature control	26.1	30
Food	56.5	64
Bed linen condition	8.7	10
Attitude of physicians	17.4	25
Attitude of paramedical personnel	30.4	35
Sanitary condition of the bathroom	18.1	26
Sanitary condition of the ward in general	11.1	16
Medical organization needs repairs	12.5	18
Medical organization has old furniture	8.3	12

Parents were asked to give recommendations on improving the organization of specialized medical care for children in medical organizations providing medical care in inpatient settings, and 20.5% of mothers gave them (Table 5.8). Of all the women who proposed their improvement measures, 36.8% of the respondents indicated that it was

necessary to improve nutrition. According to 30.9% of mothers, it is necessary to increase the number of secondary medical personnel in medical organizations. 21.1% of mothers believed that playrooms (playgrounds) should be organized in children's clinics, and 19.1% of respondents believed that repairs should be made.

Table 5.8 - Selected measures to improve the organization of medical care for children in children's clinics (%)

Suggestions	Specific weight	Abs.
Organize game rooms (playgrounds)	21.1	20
Improve nutrition	36.8	35
Make repairs	19.1	18
Improve the quality of ward cleaning	10.5	10
Increase the number of nursing personnel	30.9	29
Improve the human qualities of personnel	5.3	5

For 98.9% of patients admitted in the first year of life, inpatient stay was paid for with CHI funds, only 1.1% of parents paid independently. A total of 76.3% of patients were admitted to children's inpatient facilities on referral from the COD, 10.4% of patients had mismatched diagnoses by outpatient clinic physicians, and 24.4% of children had repeated admissions for the same diseases during the year. 21.6% of children waited more than 14 days for planned admission and 46.2% of patients had duplication of inpatient studies.

Among those admitted to the inpatient facility urgently, 16.7% of children were admitted later than 24 hours. 2.2% of parents were not satisfied with the conditions of the child's stay in the admission department, and 9.7% in the inpatient clinic as a whole. Among the main reasons for dissatisfaction were nutrition (56.5%), lighting, temperature conditions (26.1%) and the attitude of doctors and secondary medical personnel (17.4% and 30.4%, respectively).

CONCLUSION

The demographic problems observed in modern conditions make it necessary to increase control over the health of the child population [4, 5]. Despite significant progress in the provision of medical care, the incidence rate among children of the first year of life remains quite high, which makes it necessary to further improve specialized medical care for children. The North West has traditionally been a region with a low birth rate, which has declined annually over the past five years. In the district, the largest contribution to the birth rate is made by its constituent megalopolis, which is home to 44.5% of all children of the first year of life in the Northwestern Federal District.

The incidence rate in St. Petersburg in 2018-2022 was above the Russian average (428.2‰ vs. 293.6‰) and, in contrast to the declining national average, increased (+6.5%). The incidence of children of the first year of life was also significantly higher than the national average (3750.1% versus 2341.8%) and, also unlike the national average, tended to increase (+24.0%). There has been an increase in incidence rates for all classes of diseases, except for diseases of blood, ear and mastoid, respiratory organs, as well as injuries, poisonings and some other consequences of external causes. In 2020, there was a decrease in both the overall indicator and in all classes of ICD-10 diseases, except for certain conditions that occur in PP and CM. The incidence rate of COVID-19 in 2021 increased 5.2 times compared to 2020 in first-year children, and 11.1 times in 2022.

Diseases of the respiratory system (39.6%), nervous system (12.2%) and digestive organs (7.8%) prevailed in the structure of incidence in children of the first year of life. A comparative assessment of the structure of child incidence showed that it has significant differences from the national average, as in the city the specific weight of respiratory diseases (39.6% vs. 47.8% in the RF) and individual conditions arising in PP (5.2% vs. 9.3% in the RF) is significantly lower, but higher in all other classes of diseases. The COVID-19 pandemic has made adjustments to the incidence structure of children of this age. In 2020, the proportion of all classes of diseases increased, except for infectious diseases and respiratory diseases, and in 2022, except for them, all others increased.

The incidence rate of newborns was also higher than the national average, and the care of low birth-weight babies is an indicator of the quality of medical care in high-tech conditions. In the megalopolis, the birth rate of children with a body weight of up to 2500 g and more than 4000 g exceeded the average values in the Russian Federation. During the study period, the rates of birth of children with deviations in body weight decreased and the rates of birth of children with average body weight increased. In St. Petersburg, the infant mortality rate was 1.3 times lower than the national average and its decrease over five years was 13.7% (from 3.8% to 3.5%).

The provision of pediatric physicians during all the studied years was higher than the average in the Russian Federation, and grew almost annually. The provision of pediatric endocrinologists, oncologists and cardiologists has increased most significantly (+36,7%; +27,3%, +26,4%), as well as neonatologists (+10.0%). Despite the fact that in the megalopolis, the provision of pediatric beds in general and specialized beds in particular tended to decrease, these indicators in St. Petersburg were higher than the national average for the entire studied period. Compared to Russia, St. Petersburg is more oriented towards highly specialized care for children, which can be explained by the fact that the city has only two levels of specialized inpatient care.

The first level of the outpatient stage of providing specialized care to children is the COD. Most often, children with diseases of the nervous system and digestive organs and certain conditions arising in PP were registered in children's outpatient departments for the regular medical check-up in the first year of life. An assessment of the dynamics of the indicators revealed that over the five years, the frequency of children with all diseases except respiratory diseases (-31.3%) and individual conditions occurring in PP (-5.8%) increased. Of all those taken on medical check-up, patients with diseases of the nervous system, digestive organs, eye and its appendages, as well as with CM, remained most often under further medical observation. Over the study period, there was a statistically significant increase in the frequency of continuing regular medical check-ups after the first year of life for certain classes of diseases in children with diseases of the eye and its appendage (1.9 times); diseases of the digestive organs (1.9 times); diseases

of the musculoskeletal system and connective tissue (2.1 times) and COVID-19 (7.0 times).

In the case of a disease or pathological condition requiring in-depth counselling or treatment, children are referred to the second level of the outpatient stage at the CDC (CDD). In the age structure of the CDC patients, more than 60% were children of 1-6 months (average 5.12 ±0.07 months). There were only 0.8-2.5% of patients of the first month of life and they most often visited neonatologists, surgeons, neurologists and ultrasound doctors. At the same time, the most common diagnosis of the ICD-10 among them were factors affecting the state of health and treatment in health care institutions, CM and diseases of the nervous system. In the first year of life, the highest attendance was to the following specialists: chiropractor, ultrasound diagnostics (ultrasound) and X-ray diagnostics, gastroenterologist and dermatovenerologist. Factors affecting health status and referrals to health care facilities were also ranked first (25.0-28.8%), followed by diseases of the nervous system (15.8-20.6%), skin and subcutaneous tissue diseases (10.1-10.6%) and CM (8.3-11.0%). Over the five years, the highest rates of increase were in diseases of the endocrine system (+56.8%), respiratory system (44.8%), CM (24.4%) and nervous system (23.4%).

The conducted subjective assessment revealed that 100.0% of children in the first year of life received primary specialized care within the framework of compulsory medical insurance, in the CDC – only 65.6%, while the share of parents' personal funds in the CDC was 26.2%. In COD, medical specialists were most often visited during preventive examinations of children (65.9%), at the direction of a pediatrician (50.0%), due to parents' suspicion of the presence of a child's disease (13.6%) or in connection with regular medical check-up (6.8%). Most of the children were admitted to the doctors of the CDC specialists at the direction of the city's children's outpatient clinics (39.1%), independently if they suspected the presence of a child's disease or for prevention (34.8% and 13.0%, respectively), and 4.3% turned to the CDC due to the lack of the right specialist in their clinic.

The most common use parents made of electronic doctor's appointments. In CDC, in comparison with COD, telephone recording significantly prevailed (15.6% vs. 60.6%).

In addition, 22.2% of parents in COD recorded their children directly at doctor's appointments. 52.9% of parents in COD and 45.5% in CDC had difficulties in making appointments for their children with specialists, while 13.6% of mothers in CDC and 11.1% in COD reported high difficulty in making appointments.

23.3% of parents in the COD and 4.5% in the CDC believed that the schedule of doctors' appointments was inconvenient. The average waiting time to see a neurologist in COD (9.3±1.5 min.) practically did not differ from that in CDC (9.4±1.23 min.). According to 48.8% of parents in COD and 31.3% of parents in CDC it is the most difficult to see a neurologist. Also in COD, parents had difficulties in getting appointments with ENT (39.0%), cardiologist (36.6%) and allergist (31.7%). Only 23.3% of parents believed that their children's outpatient clinics had all the specialists they needed, and 46.5% of mothers indicated the absence of necessary doctors, including an allergist-immunologist, cardiologist and infectious disease specialist.

It was revealed that 32.6% of parents paid for specialists' appointments in other medical organizations. The most frequent appointments were in private medical organizations and CDC (57.1% and 35.7%, respectively). The most frequently paid appointments were for ENT (42.9%), surgeon (28.7%), allergist (15.6%), neurologist (15.1%) and cardiologist (14.2%).

The rate of satisfaction with the specialized medical care provided was higher in CDC than in COD (87.0% vs 81.2%), but in COD there were no parents who were completely dissatisfied with their child's care.

An assessment of TMT use revealed that the most frequent need was for pediatric, surgical, cardiac and neurological care. Planned enquiries were the most frequent in child counselling, which increased annually along with urgent enquiries with an overnight decrease in the proportion of urgent enquiries (from 38.8% to 18.4%). A similar pattern was seen in TMC of children in the first month of life, but they had significantly more emergency and urgent requests than children in the first year of life in general.

After TMC, more than one-third of previously set diagnoses in first-year children were changed or clarified, in contrast to first-month children, in whom more often the diagnosis changed completely or remained unchanged. More than half of the children of

the first year of life after TMC were routed for specialized medical care to level III medical organizations and during the three years under study the assignment of inpatient admission to level III children's outpatient clinics increased by 16.3%. Infants of the first month of life were most often left for follow-up examinations and treatment in medical organizations at their place of residence, but there was also an annual increase in referrals to level III for specialized, including HTMC care.

In the event of a disease or pathological condition requiring in-depth consultation or treatment, children of the first year of life are referred to children's multi-specialized inpatient facilities. The average age of the admitted patients was just over 5 months, and more than half of the children were male. Among the sources of financing for treatment, CHI funds significantly prevailed, the share of which in level II inpatient facilities was higher (98.1% ± 1.27) than in level III facilities (-96.4% ± 1.52). The share of patients whose treatment was paid for from VHI and parents' personal funds was higher in level III inpatient facilities in all years studied. In level II inpatient facilities, emergency admissions were significantly predominant and the proportion of patients admitted routinely was much lower compared to level III. It was revealed that COVID-19 significantly affected the level of inpatient admissions of children. Level III inpatient facilities had the highest rate of emergency admissions in the year of COVID-19 pandemic (65.5%), but by 2022 there was a 29.1% decrease (46.5%). The majority of children were admitted to pediatric inpatient clinics by referral from pediatric outpatient clinics in St. Petersburg, but the proportion of such patients was significantly higher in level II inpatient facilities. And level III inpatient facilities had a significantly higher flow of patients admitted by external and internal transfer.

Assessment of the distribution of patients by profile departments showed that in level II children's inpatient facilities, the most frequent first-year children were admitted to pediatric (including neonatal and infant pathology department) and infectious diseases departments, and in level III children's facilities - to pediatric and surgical departments. In the three years studied, level II inpatient facilities over-went an increase in patient flow to pediatric and surgical departments and a decrease in infectious disease departments. The reverse pattern was observed in level III inpatient facilities.

A comparative assessment showed that there were significant differences between the rates of inpatient admissions of patients depending on the level of the facility. Level II inpatient facilities have significantly more patients admitted with certain conditions arising in the perinatal period (4.3 times), some infectious and parasitic diseases (4.0 times) and respiratory diseases (2.3 times). Children with CM (3.8 times), digestive diseases (1.5 times) and genitourinary diseases (1.2 times) are more frequently admitted to level III children's inpatient clinics. A comparison of the average length of stay of children in inpatient facilities in the first year of life, depending on the level, revealed that in level II children's inpatient clinics patients stayed longer in all the ICD-10 classes, except for diseases of the genitourinary system.

In almost all patients admitted in the first month of life, the source of financing for treatment was also CHI funds. Most of the children in the study period were admitted to level II facilities by transfer from another, and to level III facilities by inpatient transfer. In level II inpatient facilities, there were significantly more children who were referred by the COD and delivered by ambulance, and fewer patients were admitted routinely. The vast majority of patients were admitted to level II inpatient facilities urgently, and level III patients were admitted as planned. Regardless of level, children were most frequently admitted to neonatal and infant pathology department. In level II facilities, pediatric department admissions ranked second and anesthesiology and reanimation and intensive care department admissions ranked third. In addition, there were significantly more patients admitted to surgical departments in level III inpatient facilities.

Regardless of the level, the highest rate of inpatient admissions was in patients of the first month of life with certain conditions occurring in PP and with CM. The third place in terms of frequency of admissions differed: at level II it was respiratory diseases and at level III it was endocrine diseases. In level II facilities, compared to level III, the frequency of admissions of patients with respiratory diseases was 5.0 times higher, diseases of the genitourinary system - 2.5 times higher and with certain conditions occurring in PP - 1.9 times higher. In level III inpatient facilities, the frequency of admissions of children with endocrine diseases is 2.7 times higher and 2.5 times higher for children with CM. Comparison of the average duration of treatment depending on the

level of inpatient admission showed that level II children's inpatient facilities had longer stays for patients with CM, individual conditions arising in PP and diseases of the genitourinary system and shorter stays for patients with diseases of the respiratory and endocrine systems.

A subjective assessment of the organization of specialized care revealed that for 98.9% of patients admitted in the first year of life, their inpatient stay was paid for by CHI fund, only 1.1% of parents paid for it themselves. On average, the duration of inpatient admission did not exceed the guidelines for pediatrics (8.33±1.1 days vs. 8.60 days), but 22.6% of children stayed in for 10 days or more.

The majority of patients (85.0%) were admitted as part of routine admission by referral from the outpatient clinic (64.3%) or were transferred from the maternity clinic (21.4%), with 21.6% of children waiting more than 14 days for routine admission. In 46.2% of children, there was duplication of inpatient examinations after examination in the outpatient clinic before admission, most commonly blood, urine and examination of feces.

The majority of children admitted urgently to the inpatient facility were referred by the outpatient clinic (60.2%) or delivered without medical order (21.8%). 48.5% of children were admitted in the first 6 hours, 16.7% - later than 24 hours.

In 10.4% of admitted patients referred by the COD, the diagnosis made by outpatient and inpatient specialists did not coincide, and 24.4% of children had repeated admissions for the same cases during the year.

On average, 54.56±4.57 min patients stayed in the admission department and 35.1% of the respondents waited for admission for more than an hour. 9.7% of parents were not fully or partially satisfied with the conditions of the child's stay in the admission department, mainly due to the sanitary condition of the bathroom (42.9%), the lack of free waiting places (28.6%) and drinking water (25.0%). 7.6% of parents are not satisfied with the attitude of the personnel.

On average, there were 3.32±1.01 patients per ward and 9.4% of patients were accommodated in 5 or more local wards. 20.2% of women communicated with the attending physician every few days, and 4.3% - only once during their entire stay at the

department. 7.5% of mothers were not satisfied with the attitude of specialists, 10.8% - of nurses.

12.5% of parents were partially satisfied with the conditions of the child's stay in the children's inpatient department, and 9.7% expressed complete dissatisfaction. Among the main reasons for dissatisfaction were nutrition (56.5%), the attitude of secondary medical personnel (30.4%) and lighting, temperature conditions (26.1%). The level of satisfaction was higher than that established by the State Guarantees Program and amounted to 90.3%, but the proportion of those fully satisfied was significantly lower than in COD and CDC (77.8% vs. 87.0% and 81.2%, respectively). 36.8% of mothers believe that in order to improve the organization of specialized medical care for children in inpatient facilities it is necessary to improve nutrition, 30.9% - to increase the number of nursing personnel, 21.1% - to organize playrooms (playgrounds), and 19.1% - to make repairs.

Thus, the study showed significant differences in the organization of specialized medical care for children of the first year of life in the megalopolis in outpatient and inpatient settings, depending on the level. The epidemiological situation has an impact both on the health of children and on the organization of specialized medical care for them. Despite the fairly high level of primary specialized and specialized care, including HMT, there are some shortcomings in the work of medical organizations in the megalopolis, which have a significant impact on the availability and quality of medical care.

FINDINGS

1. Against the background of a decrease in the birth rate in the megalopolis, there is a consistently high level of the frequency of births of children with deviations in birth weight, which is an unfavorable risk factor for the health of the child population. The incidence of children of the first year of life, which exceeds the national average, both as a whole (from 3762.9 to 2373.3%; $p>0.05$), and for almost all classes of diseases, has structural features expressed in a lower proportion of individual conditions occurring in PP (1.8 times) and respiratory diseases (1.6 times). The high availability and quality of medical care for children is achieved due to the high provision of the pediatric population with specialists and pediatric beds, as evidenced by the consistently low infant mortality rate in St. Petersburg.

2. The state of health of the children's population of the first year of life has a significant impact on the structure of regular medical check-up registration and access to medical care in the first year of life on an outpatient basis. There is a high need for primary specialized care for children with diseases of the nervous system, the eye and its appendages, digestive organs, and CM. The need and duration of regular medical supervision in children's outpatient clinics for children with almost all classes of diseases is growing. There is a high incidence of children seeking medical and diagnostic help from neurologists, chiropractors, ultrasound and X-ray diagnostics specialists, as well as gastroenterologists.

3. Due to the lack of the right specialist, the presence of queues and an inconvenient schedule for the admission in children's outpatient clinics, or the suspicion that a child has a disease, about a third of parents pay for medical services in private medical organizations or contact the CDC. Despite the high prevalence of electronic appointments in primary specialized care, 11.1% of parents in COD and 13.6% in CDC have difficulty in making appointments with doctors. The high need for neurological care results in difficulty in obtaining a consultation with a neurologist for 48.8% of patients in COD and 31.1% in CDC. Parents' satisfaction with the medical care provided in CDC was higher than in COD (87.0% vs. 81.2%).

4. The increase in the use of TMC of children of the first year of life is taking place against the background of the transition from highly specialized to general pediatric medical care with a decrease in emergency requests towards an increase in planned and urgent requests. After TMC, more than one third of the diagnoses previously made for children were changed or clarified, and most patients were routed for specialized medical care at the inpatient and outpatient stages to third-level medical organizations.

5. Significant differences were found between the rates of inpatient admissions of patients of the first year of life depending on the level of admission. To the level II inpatient facilities were most often urgently admitted on referral from the outpatient clinic to pediatric and infectious diseases departments with respiratory diseases; certain conditions occurring in PP; some infectious and parasitic diseases and CM. In level III inpatient facilities, more than half of the patients are admitted on a planned basis for external and internal transfer to pediatric and surgical departments with CM, skin and subcutaneous tissue diseases, respiratory and digestive diseases. The length of stay of patients in level II inpatient facilities was higher than in level III for all the ICD-10 classes except for genitourinary diseases.

6. Despite the high level of satisfaction, there are significant shortcomings in the organization of specialized medical care in inpatient settings, including exceeding the waiting time for planned inpatient admission for more than 14 days (21.6%) and emergency admission later than 24 hours (16.7%); low continuity in the work of children's clinics and inpatient facilities associated with duplication of examinations (46.2%); high frequency of repeated admissions for the same cases during the year (24.4%); long waiting time in the admission department (more than an hour 35.1%); accommodation in 5 or more local wards (9.4%); not regular communication with the attending physician (24.5%). The main reasons for parents' dissatisfaction are: the attitude of medical personnel in the admission department (7.6%), the attitude of specialists and nurses in specialized departments (7.5% and 10.8%, respectively), nutrition (56.5%), lighting and temperature conditions (26.1%).

7. There are features of the organization of specialized medical care for children of the first month of life, both on an outpatient and inpatient basis. The most common

reasons for seeking primary specialized care are diseases of the nervous system, CM, and examination or observation of a child if a disorder, disease, or pathological condition is suspected for the purpose of treatment, including rehabilitation. Based on the results of TMC, in most cases they are prescribed additional examinations at their place of residence to avoid unjustified routing to higher-level medical organizations. Most of the children were admitted to level II inpatient facilities by transfer from another clinic or were delivered by ambulance (emergency), in contrast to level III, where planned admission by clinical transfer prevailed. Infants in the first month of life are most commonly admitted with certain conditions occurring in PP and with CM to neonatal and infant pathology department, pediatric departments (level II) and anesthesiology and reanimation, and intensive care department (level III). In level II children's inpatient clinic, patients with CM, certain conditions arising in PP and diseases of the genitourinary system stayed longer in level II, and in level III - with diseases of the respiratory and endocrine systems.

8. The new coronavirus infection has significantly affected the organization of specialized care for children of the first year of life. During the pandemic, lack of access to outpatient medical care in a planned manner led to a decrease in the incidence. As a result of TMC, there was an increase in the proportion of changed and clarified diagnoses, an increase in the number of routing of children for examination and treatment to level III health care organizations and an increase in the need for emergency requests due to a decrease in planned TMC. When providing inpatient care to children, the ratio of emergency and planned admissions has changed, there has been an increase in admissions of children with respiratory diseases at all levels, and the average length of inpatient stay has increased for most classes of diseases.

Thus, despite the presence of certain shortcomings, specialized care for children of the first year of life has a high level of organization. The provision of specialized care to children is influenced by the state of health of children in a megalopolis, the availability and quality of medical care, the pandemic of a new coronavirus infection, the age of the patient up to one month of life, the stage and level of medical care, etc.

PRACTICAL RECOMMENDATIONS

To the executive authorities in the field of healthcare of the city of St. Petersburg:

1. In order to reduce the frequency of birth of children with deviations in body weight, provide for increased control over the quality of work of medical organizations providing obstetric and gynecological care in outpatient settings.

2. To increase the availability of primary specialized care in children's city outpatient clinics, solve the issues of staffing in the most popular specialties.

3. Using sociological research methods, regularly monitor the quality of specialized care in medical organizations providing medical care in outpatient and inpatient settings.

4. In order to increase continuity in the work of children's city outpatient clinics and inpatient facilities, provide for the introduction of a unified medical electronic system in the city.

5. To increase control over the timing of inpatient admission and routing of patients in accordance with the severity and profile of the disease.

6. Provide for the possibility of obtaining TMC for doctors of all inpatient facilities in the city, regardless of the level.

7. Provide for an increase in the number of quotas for the free provision of primary specialized care in the CDC (CDD).

Chief physicians of pediatric inpatient facilities:

1. Strengthen control over the conditions and duration of patients' stay in the admission department;

2. Provide additional opportunities for more comfortable placement of mother and child in the inpatient facility;

3. The position descriptions should more clearly state the regularity of patient visits by the attending physician during his/her stay in the specialized departments of the inpatient facility;

4. Strengthen control over compliance by medical personnel with the principles of ethics and deontology.

5. If additional consultations are necessary, ensure that medical personnel can use TMT.

Chief physicians of COD and CDC:

1. To provide additional opportunities to simplify appointments with specialist doctors.

2. To solve the personnel issues of medical organizations in accordance with the growing need of the child population for primary specialized care in accordance with the level and structure of incidence of the attached child population.

Doctors of medical organizations:

1. Strengthen doctors' control over the work of subordinate nursing personnel.

2. To carry out sanitary and hygienic education more actively.

3. Regularly carry out activities to improve professional skills and communications, including using digital technologies in medicine.

PROSPECTS FOR FURTHER DEVELOPMENT OF THE SUBJECT

The prospect of further development of the topic of the thesis is to study the organization of specialized medical care for children of the first year of life and other age groups in other subjects that are part of the Northwestern region, to evaluate the organization of medical care for children of the first year in specialized hospitals, as well as to compare the results of the study with the indicators of the organization of specialized medical care for children of the first year of life in Moscow.

LIST OF ABBREVIATIONS

COVID-19 - "Corona Virus Disease 2019", or "disease caused by coronavirus 2019"

HTMC - high-tech medical care

CM - congenital anomalies (malformations), deformities and chromosomal abnormalities

VHI – voluntary health insurance

CHD – children's outpatient department

CDC – consultative diagnostic centers

ENT – otorhinolaryngologist

MOH – Ministry of Health

MIS – medical information system

ICD – International classification of diseases

ARICD - anesthesiology and reanimation, and intensive care department

CHI – compulsory health insurance

VLBW - very low birth weight

NIPD - neonatal and infant pathology departments

PP - certain conditions occurring in the perinatal period

RF – Russian Federation

NWFD - North-Western Federal District

SPb - St. Petersburg

TMC – telemedicine consultations

TMT – telemedicine technologies

USD - ultrasound diagnostics

FZ - federal law

CRIHCOI - "Central Research Institute of Health Care Organization and Informatization" of the Ministry of Health of the Russian Federation

ELBW - extremely low body weight

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APPENDICES

Appendix 1

QUESTIONNAIRE FOR MOTHERS OF CHILDREN OF THEIR FIRST YEAR OF LIFE

Please read and fill out the questionnaire carefully. Truthful answers will help to objectively assess the organization of medical care for children under one year old and promptly eliminate the shortcomings of its provision. You do not need to specify the last name, since the questionnaire is anonymous.

General part

1. Your age *(full years):* _____;
2. Your permanent place of residence: *St. Petersburg -1; Leningrad region -2; other region of the Russian Federation -3; I do not have a permanent place of residence -4; we are emigrants and came from* _____*-5.*
3. Number of children in the family, including this child _____
4. Your social status: *worker -1; employee -2; entrepreneur -3; housewife -4; student -5; pensioner -6, disabled -7; other* _____*-8.*
5. Your education: *primary -1; secondary -2; specialized secondary -3; incomplete higher -4; higher -5.*
6. Your financial situation: *I live poorly (there is not enough money even for minimal expenses) -1; I live below average (there is only enough money for minimal expenses) -2; I live average (there is enough money for a normal life) -3; there are no problems with money -4; I consider myself a rich man -5.*
7. Your marital status: *I live in a registered marriage -1; I live in a civil marriage -2; divorced -3; widow -4; I am not married and have not been -5.*

2 Assessment of the organization of medical care by specialists at the children's polyclinic (all specialties, except district pediatrician)

8. What form of appointment with specialist doctors do you use: *issuance of a coupon at the reception -1; electronic record -2; via the Internet -3; by phone -4; at a doctor's appointment -5; other*_____*- 6*
9. Is it difficult to make an appointment with specialist doctors: *easy -1; sometimes it is difficult -2; it is always difficult -3; almost impossible -4; I do not know -5.*
10. Is it convenient, in your opinion, to have a work schedule for narrow specialist doctors in a children's polyclinic: *yes -1; no -2;*
11. How much time do you usually spend waiting for an appointment at your children's clinic to see a specialist doctor: *there is no queue -1; up to 15 min. -2; from 15 to 30 min. -3; from 30 min. to 1 hour -4; 1 hour or more -5; I do not know -6.*

12. Most often, you get to a narrow specialist doctor if:
- your child was issued a referral -1; visited a doctor during medical examinations of children in the first year of life -2; decided to see a doctor yourself because you suspect the presence of a disease in your child -3; decided to see a doctor yourself for prevention -4; have a regular medical check-up registration -5; other_____- 6.
13. Which specialties are the most difficult to get an appointment with in your children's clinic: *neurologist -1, ENT -2, ophthalmologist -3, surgeon -4; cardiologist -5; orthopedist -6; allergist -7; endocrinologist -8; other_____-9.*
14. Do you think that in your polyclinic there are no doctors-specialists of the profile you need? *there are all -1; I find it difficult to answer, because we have not applied for a long time -2; missing (please, underline): neurologist, ENT, ophthalmologist, surgeon, cardiologist, orthopedist, allergist, endocrinologist -3; other _____-4.*
15. Did you have to pay for medical care provided by specialist doctors OUTSIDE your clinic: did *not have to -1; did not pay because there are no funds -2; paid for admission -3.*

    15.1 If you had to pay, then in which medical organization (several possible answers): *in another children's polyclinic -1; in a consultative and diagnostic center (department) -2; in a private medical organization -3; other_____- 4.*

    15.2 If you had to, it was an appointment (specify all those you paid for): *neurologist -1; ENT -2; ophthalmologist -3; surgeon -4; cardiologist -5; orthopedist -6; - allergist -7; endocrinologist -8; other _____-9.*
16. What was the main reason for your seeking medical services from specialist doctors outside the clinic (there are several possible answers): *we did not apply anywhere -1; absence of this specialist in my clinic -2; lack of queues -3; near the house -4; convenient reception schedule -5; individual approach, friendly medical personnel -6; modern equipment and a large number of types of research -7; availability of all doctors of narrow specialties and their high qualifications -8; service and conditions of increased comfort -9; confidence in the results of examination and treatment -10; other_____- 11.*

Thank you for your help!

Appendix 2

QUESTIONNAIRE FOR MOTHERS OF CHILDREN OF THE FIRST YEAR OF LIFE WHO RECEIVED INPATIENT

Please read and fill out the questionnaire carefully. Truthful answers will help to objectively assess the organization of medical care for children under one year old and promptly eliminate the shortcomings of its provision. You do not need to specify the last name, since the questionnaire is anonymous.

1. General part

1. Your age *(full years):* _____
2. Number of children in the family, including this child _____
3. Your social status: *worker -1; employee -2; entrepreneur -3; housewife -4; student -5; pensioner -6, disabled -7; other* _____*-8.*
4. Your education: *primary -1; secondary -2; specialized secondary -3; incomplete higher -4; higher -5.*
5. Your financial situation: *I live poorly (there is not enough money even for minimal expenses) -1; I live below average (there is only enough money for minimal expenses) -2; I live average (there is enough money for a normal life) -3; there are no problems with money -4; I consider myself a rich man -5.*
6. Your marital status: *I live in a registered marriage -1; I live in a civil marriage -2; divorced -3; widow -4; I am not married and have not been -5.*

2 Assessment of the organization of medical care for a child of the first year in hospital

7. Duration of inpatient admission *(in days)* _____
8. To which medical organizations: *children's city hospital -1; children's infectious diseases hospital -2; children's hospital at the university -3; children's hospital at the Research Institute -4.*
9. Inpatient admission was: *emergency -1; planned -2, there was both emergency and planned -3.*
10. If planned inpatient admission, it was due to: *referral from a doctor of a children's polyclinic -1; transfer from another hospital -2, transfer from a maternity clinic (perinatal centre) -3; referral (selection for admission) by a doctor from a university clinic -4; recommendation of friends, acquaintances -5; reviews on the Internet -6.*
11. If there is a planned admission, then how many days did you wait for *(specify the number of days)*: _____

Continuation of Appendix 2

12. If there is a planned admission, then was there a refusal to admit to a hospital when sending a child for treatment by a children's polyclinic: *no -1; yes, due to lack of beds in the hospital -2; yes, because admission is not indicated -3; yes, because they are not directed according to the profile -4; yes, because of our refusal -5; yes, there was an unjustified refusal from the hospital -6.*

13. Was there any duplication of the child's inpatient examinations after his/her examination at the outpatient clinic before admission: *no -1; yes -2.*

14. If yes, what examinations: *blood test -1; urinalysis -2; examination of feces -3; ultrasound -4.*

15. In case of emergency admission, how quickly was the child referred to hospital by the outpatient clinic from the onset of the disease: *in the first 6 hours -1; from 7 hours to one day -2; later than 24 hours -3; we called an ambulance themselves -4; we took the child to the hospital ourselves -5.*

16. If the polyclinic referred the child to the hospital, did the diagnosis made by the doctors of the children's polyclinic coincide with the diagnosis made to the child in the hospital: *yes -1; no -2.*

17. Have there been repeated inpatient admissions for the same diseases: *yes -1; no -2.*

18. Your service at the inpatient department: *CHI -1; VHI -2; personal funds -3.*

19. Are you satisfied with the conditions of your stay in the admissions department? *yes -1; no -2.*

20. What are the main reasons for your dissatisfaction *(specify)* _____.

21. How long did you wait in the admission department? *up to 30 min. -1; up to 45 min. -2; up to 60 min. -3; up to 75 min. -4; up to 120 min. -5; more than 120 min. -6.*

22. Are you satisfied with the attitude of the personnel during your stay in the admission department (benevolence, politeness)? *Yes -1; no -2.*

23. How many people were in your ward: _____

24. Your communication with the attending physician: *daily -1; every few days -2; once during the entire stay at the department -3.*

25. Are you satisfied with the attitude of your child's attending physician during your stay at the department (benevolence, tactfulness, politeness)? *Yes -1; no -2.*

26. Are you satisfied with the attitude of the nursing personnel during your stay in the department (benevolence, tactfulness, politeness)? *Yes -1; no -2.*

27. Are you satisfied with the conditions of the child's stay in the hospital? *yes, pretty much -1; not always -2; not satisfied -3.*

28. If you are not satisfied, then the main reasons for dissatisfaction are *(specify):* _____.

29. What do you think needs to be done to improve the organization of medical care for children in a medical organization *(specify)*_____

Thank you for your help!

Appendix 3

QUESTIONNAIRE FOR MOTHER OF A CHILD WHO RECEIVED PRIMERY SPECIALIZED CARE AT THE CONSULTATIVE DIAGNOSTIC CENTER

Please read and fill out the questionnaire carefully. Truthful answers will help to objectively assess the organization of medical care for children under one year old and promptly eliminate the shortcomings of its provision. You do not need to specify the last name, since the questionnaire is anonymous.

General part

1. Your age *(full years):* _____*;*
2. Your permanent place of residence: *St. Petersburg -1; Leningrad region -2; other region of the Russian Federation -3; I do not have a permanent place of residence -4; we are emigrants and from* _____*-5.*
3. Number of children in the family, including this child _____
4. Your social status: *worker -1; employee -2; entrepreneur -3; housewife -4; student -5; pensioner -6, disabled -7; other* _____*-8.*
5. Your education: *primary -1; secondary -2; specialized secondary -3; incomplete higher -4; higher -5.*
6. Your financial situation: *I live poorly (there is not enough money even for minimal expenses) -1; I live below average (there is only enough money for minimal expenses) -2; I live average (there is enough money for a normal life) -3; there are no problems with money -4; I consider myself a rich man -5.*
7. Your marital status: *I live in a registered marriage -1; I live in a civil marriage -2; divorced -3; widow -4; I am not married and have not been -5.*

2. Assessment of the organization of medical care by CDC specialists

8. Your service at the CDC: *CHI -1; VHI -2; personal funds -3.*
9. How did you get an appointment with a narrow specialist in CDCC *(please, specify all the necessary answers): referral from the polyclinic -1; referral during selection by doctors of the Pediatric University in the regions -2; there is no such doctor in our polyclinic -3; we applied after receiving telemedicine consultation -4; after visiting a doctor at the polyclinic during medical examinations of children in the first year of life, the child needed a consultation -5; decided to see a doctor independently, because we suspect the presence of a disease in the child -6.*
10. What form of appointment with CDC specialists did you use: *issuing a coupon at the CDC registry -1; electronic record -2; by phone -3; other* _____*- 4;*
11. Is it difficult to make an appointment with CDC specialist doctors: *easy -1; sometimes it is difficult -2; it is always difficult -3; almost impossible -4; I do not know -5.*
12. Is it convenient, in your opinion, to have a work schedule for narrow specialist doctors in CDC: *yes -1; no -2;*

Continuation of Appendix 3

13. How much time did you spend waiting for an appointment with a specialist: *there is no queue -1; up to 15 min. -2; from 15 to 30 min. -3; from 30 min. to 1 hour -4; 1 hour or more -5; I do not know -6.*

14. Which specialties are the most difficult to get an appointment with in CDC: *neurologist -1, ENT -2, ophthalmologist -3, surgeon -4; cardiologist -5; orthopedist -6; allergist -7; endocrinologist -8; other* _____*-9.*

15. Do you think that CDC has all the specialist doctors of the profile you need? *yes -1;* I find it *difficult to answer -2; missing (please, underline): neurologist, ENT, ophthalmologist, surgeon, cardiologist, orthopedist, allergist, endocrinologist -3; other* _____*-4.*

16. Diagnosis of the child with whom you came to CDC *(specify)*_____

17. The diagnosis of the child, which was made by the doctor at CDC *(specify)*_____

18. Are you satisfied with the child's care by doctors and specialists at CDC? *yes, pretty much -1; not always -2; not satisfied -3.*

Thank you for your help!

Appendix 4

Extract from the "Child's record" F. 112u"

Gender male -1; female – 2.

No.	Characteristic	Fill in (write in)
1	Medical organisation where admission took place in year 1 (write in)	
2	Number of days of admission	
3	Planned -1 / emergency - 2	
	If it is an emergency, then in what way	ambulance – 1; independently -2; other -3
	If it's an emergency, then from where	from the children's clinic – 1; from the house – 2; from the street - 3; from another hospital 4; independently – 5.
4	If it is planned, then in what way	ambulance – 1; independently -2; other -3
	If it is planned, then from where	from a children's clinic – 1; from another hospital - 2; independently – 5.
5	Diagnosis upon admission	
6	Diagnosis at discharge	