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CURRENT STATUS AND MAIN ORGANIZATIONAL PROBLEMS OF MEDICAL CARE FOR NEWBORN

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ABSTRACT. The most important trend of national policy, both in the Russian Federation and in most countries of the world, is to stimulate healthy pregnancy and maintain the health of newborns, especially in the first month of life. The health care of Russia has improved the obstetric service, following the example of the obstetric and neonatological medical care system existing in the world developed countries, which has made a positive effect on reducing perinatal mortality and neonatal morbidity. The system of organizing medical care for pregnant women, women in childbirth, puerperas and newborns in Russia has a number of features, which are primarily due to the specifics of particular regions. Among the main problems in the organization of medical care for newborns are difference in economic development, the availability of medical care and staff of the neonatological service of obstetric organizations in the constituent entities of the Russian Federation, as well as the violation of the routing of pregnant women, women in childbirth, puerperas and newborns. The studied literature data allowed us to conclude that improving organization and quality of neonatological care in current demographic, economic and social conditions in Russia is of vital importance, and this fact caused the scientific interest of this study.

KEY WORDS: newborns; obstetric organizations; organization of medical care for newborns; infant mortality; perinatal mortality; neonatal morbidity.

СОВРЕМЕННОЕ СОСТОЯНИЕ И ОСНОВНЫЕ ОРГАНИЗАЦИОННЫЕ ПРОБЛЕМЫ МЕДИЦИНСКОЙ ПОМОЩИ НОВОРОЖДЕННЫМ

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РЕЗЮМЕ. Наиважнейшим направлением национальной политики как Российской Федерации, так и большинства стран мира, является стимулирование здоровой беременности и сохранение здоровья новорожденных, особенно в первый месяц жизни. Здравоохранение России усовершенствовало службу родовспоможения по примеру системы оказания акушерской и неонатологической медицинской помощи, используемой в развитых странах мира, что положительно отразилось на уменьшении показателей перинатальной летальности и неонатальной заболеваемости. Система организации медицинской помощи беременным, роженицам, родильницам и новорожденным в России имеет ряд особенностей, которые в первую очередь обусловлены спецификой отдельных регионов. Среди основных проблем организации медицинской помощи новорожденным можно назвать различный уровень экономического развития, доступности медицинской помощи и кадрового обеспечения неонатологической службы организаций родовспоможения субъектов Российской Федерации, а также нарушение маршрутизации беременных, рожениц, родильниц и новорожденных. Изученные литературные данные позволили сделать заключение о важности улучшения организации и повышения качества неонатологической помощи, так как в сложившихся в России демографических, экономических и социальных условиях это приобретает жизненно важное значение, что и предопределило научный интерес к данному исследованию.

КЛЮЧЕВЫЕ СЛОВА: новорожденные; организации родовспоможения; организация медицинской помощи новорожденным; младенческая смертность; перинатальная смертность; заболеваемость новорожденных.

The main objectives of neonatology are to find the best diagnostic and therapeutic methods for diseases in children during a newborn period, to develop rehabilitation measures for sick children and to create in the neonatal period a foundation for the health of their entire subsequent life. It has been noted that both primary and secondary prevention mesures of many chronic diseases are most effective in the perinatal period (from the 22nd week of pregnancy to the first week of life incl.).

Thus, neonatology is a young science of nursing children of the first four weeks of life, which is one of the parts of pediatrics. Neonatology as a special science was formed in the XX century, i.e. in the recent past in contrast to pediatrics. The demographic significance of the perinatal period of newborn life is invaluable for the birth of healthy children, who are the health reserve of any country [4, 25, 42]. It should be noted that family health and quality of life in the community have a great impact on the intrauterine and early neonatal development of each child, which is especially relevant for Russia, where is a low birth rate [47].

Important areas of national policy both in the Russian Federation and in many countries of the European Community are the promotion of healthy pregnancy and preservation of newborn health, especially in the first month of life. The main indicators of this policy are perinatal and infant mortality rates. A decrease in the level of the indicators not only provides an assessment of the degree of reproductive health

of population, but also indicates the quality of both obstetric and neonatal care, which proves the dependence of health of pregnant women and newborns on the organization of these types of medical care [2, 10, 48].

Poor management of pregnancy and obstetrics can lead to serious consequences for health of a woman and child, lead to morbidity and disability of children. In the literature, it is noted that perinatal causes are almost 80% of causes in childhood disability. Many authors note that the health status of children is in direct correlation with the morbidity of their mothers during pregnancy. It is noted that the frequency of intrauterine developmental delays, neuropsychiatric disorders, and hypoxic damage to the central nervous system increases in newborns [5, 25, 51].

Insufficient weight gain of a pregnant woman is also one of the risk factors for the development of perinatal pathology, because insufficient trophic function of a maternal body leads to placental insufficiency and delayed fetal development [17].

Diseases of all organ systems and obstetric pathological conditions in pregnant women have a serious impact on the increase in neonatal morbidity [7, 40]. The presence of anaemia and pre-eclampsia in these women contribute to the development of perinatal fetal pathology due to the formation of placental insufficiency.

Many literature sources indicate the negative impact of birth trauma on health of newborns. The breech presentation of the fetus is the most common cause of birth trauma. Birth trauma is also caused by anomalies of labor, the use of obstetric forceps and uterotonic agents [1, 14, 40].

It is pointed out that the reason for decrease in the quality of obstetric care is the factor of obstetric aggression, which leads not only to complications of labor, but also perinatal pathology. It is noted that the use of uterotonic agents in labor to reduce its duration reaches 60%. The negative effect of a number of drugs used during labor, especially anesthetics with cardiodepressive effect, effect on respiratory function and postnatal adaptation of newborns has been established [34, 38].

Congenital anomalies have significant impact on the morbidity and especially child mortality. According to many authors, the population specific part of this pathology varies from 3 to 7%. At the same time, it increases to 11–18% among stillborns [26, 27].

Number of authors has opinion that children born using assisted reproductive technologies are more likely than those conceived naturally to have such disorders as neonatal asphyxia (more than 90%), half of them have neurological abnormalities, and almost third of them have delayed intrauterine development [23].

A large number of studies conducted and currently ongoing are devoted to the influence of social risk factors on children's health, which include socio-hygienic (household and material conditions, etc.), medical and demographic (age of parents, single-parent family, etc.) and socio-psychological (poor moral and psychological environment of family, unwanted pregnancy, etc.) factors [3, 14, 50].

Chronic arterial hypertension and pre-eclampsia/eclampsia in a pregnant woman, her low level of education and lack of employment, alcohol abuse, smoking, low body weight, and first labor increase the risk of giving birth to a low birth weight premature baby [1, 43]. The most informative indicators of the health of born children are the level and structure of perinatal and infant mortality.

According to WHO, 2.6 million live-born children die in the first month of life worldwide, and an equal number are stillborn. Up to half of deaths cases in live-borns occur in the first 24 hours of life and up to 75% in the first week. WHO notes that the most critical period for the survival of a newborns is the first 48 hours of life [11]. It is noted that the causes of death in children under 5 years of age, 50% of which are newborns, are complications of premature birth, neonatal asphyxia, pneumonia, diarrhea and malaria [12].

Adverse factors that increase the number of preterm births (in combination with poor reproductive history, diseases of other organ systems (not reproductive system) and pregnancy complications) are pregnancy in unmarried women, insufficient education of a mother, lack of employment, smoking and alcohol abuse, and the age of a woman (less than 18 years and over 35 years) [25, 39].

Despite the significant successes of Russian health care in combating infant mortality, there are significant reserves for further reduction of this indicator [43]. As noted by number of authors, reducing losses from respiratory diseases, infectious diseases and other conditions potentially under the control of medical wor-

kers, which account for up to 30% of the causes of infant mortality, will significantly reduce the infant mortality rate [20, 26].

A number of scientists cite data that different efficiency in the provision of medical care to both pregnant, women in childbirth and newborns, social and economic, climatic situation in different regions can lead to regional discrepancies in the perinatal mortality rate [16].

Decompensated chronic placental insufficiency with severe fetal growth retardation, severe prematurity and intrauterine infection contribute most to perinatal mortality. The issue of reducing the number of preventable perinatal deaths is currently one of the main issues in the international work of health authorities [15, 16]. At present, improving ante- and intrapartum diagnosis of fetal condition and implementing the risk strategy is considered a promising direction in perinatology to address the encountered problems. An important point affecting the newborn morbidity and mortality is the incidence of preterm labor, which, according to number of scientists, is a "big obstetric syndrome" [37].

Premature birth is the most significant risk factor for neonatal mortality worldwide. The baby is born immature, resulting in respiratory disorders, central nervous system lesions and intraventricular hemorrhage. In addition, congenital developmental anomalies and perinatal infections are common in such newborns [18].

An increasing number of authors identify respiratory distress syndrome of the newborn among the main causes of mortality of children in the first month of life, which is more often characteristic of premature infants and children born with extremely low body weight and caused by immaturity of the lungs and primary surfactant deficiency [15, 19, 26].

There is an evidence that the leading place in the structure of early neonatal mortality in preterm infants is occupied by intrauterine infection, followed by asphyxia and congenital malformations with associated respiratory distress syndrome. In premature infants, early neonatal mortality is primarily due to respiratory distress syndrome and asphyxia with concomitant intrauterine infection [20].

A study of neonatal health conducted in 2001–2013 showed a high prevalence of pathology among newborns: every third premature newborn is born sick or becomes ill in his first days of life [1].

It should be noted, that increasing time of stay in an inpatient clinic (maternity hospital) more than the minimum time contributes to the reduction of neonatal deaths and saves financial resources in nursing [29]. Increasing the average length of stay of a newborn in hospital (maternity hospital) by 15 hours was accompanied by a 36% drop in the average probability of child death, i.e. the risk of death decreased with each additional hour spent in the hospital (maternity hospital). In a short time, it is impossible to diagnose a number of diseases and timely start effective treatment, so increasing the length of stay in the hospital (maternity hospital) increases the chance of survival of children of the first month of life [13, 44].

The age of mothers, especially young mothers and women from 40 years and older, according to British specialists, is a risk factor for neonatal mortality. In England, children born to mothers over 40 years of age have 1.3 times higher neonatal mortality than children born to women aged 25–29 years [55].

The incidence of stillbirths and neonatal mortality doubles when children are born to obese women with a body mass index of more than 30 [40, 49, 54].

Smoking by women during pregnancy may increase a risk of preterm birth and, consequently, increase a risk of neonatal mortality. A study of the effect of maternal smoking showed that more than 1/3 of preterm infants born to women who smoked had intrauterine developmental delays [3, 17, 45].

The presence in a woman of such chronic diseases as chronic renal failure, arterial hypertension, diabetes mellites, antiphospholipid syndrome, haemoglobinopathy, thrombophilia significantly increases the risk of an unfavorable outcome for her child. Alcohol abuse, drug abuse, and infectious diseases have an extremely negative impact on pregnancy outcome. The risk of neonatal death in multiple pregnancies increases from 2 to 5 times in comparison with singleton pregnancies [8, 15, 40].

As noted above, the risk factor for perinatal and early neonatal mortality is premature birth, which leads to prematurity. Among children who died in the first week of life premature babies account for up to 70%, and among those who died before the age of 1 year — 65–75% [57].

The main fraction of neonatal deaths in preterm births (up to 70%) is accounted for by

babies born with a body weight of 500 to 1000 grams, and perinatal mortality is 10‰. In preterm births, stillbirth rate is significantly higher (8–13 times) than in term births. At the same time, congenital anomalies account for almost a quarter of the causes in the structure of perinatal mortality [18].

The transition of our country in 2012 to the WHO-recommended live birth criteria and deteriorating health of women, especially those of fertile age, provoked an increase in the number of premature births and increase in the number of children born with extremely low birth weight [11, 12, 14].

There is a negative impact of the mortality of children born with extremely low body weight on the medical and demographic situation in the country (region) [53, 54]. The authors indicate that the predominant causes of mortality are intrauterine infections, congenital pneumonia and respiratory distress syndrome [49].

These children have a high incidence of congenital malformations and asphyxia. The prognosis for the future life of surviving children born with extremely low body weight is quite varied: from the absence of pathology to severe disability. For this reason, caring for such children often requires the use of respiratory support and use of modern therapeutic and rehabilitation technologies, constant close monitoring [22, 46].

However, according to N.V. Bashmakova [6], only 10–25% of these children grow up healthy, and the decrease in infant mortality due to nursing of such newborns provokes an increase in child morbidity and disability.

According to the data of the Belgorod State National Research University, the chances of survival of children born with a body weight of up to 500 g are only 11.6%, and with a body weight of 750 g — 83.9%, i.e. the chances of survival in this case increase more than 7 times [10].

The data of authors from foreign economically developed countries show that in the USA about 67% of child mortality up to 1 year of life are premature, more than half of them were born with extremely low body weight. The mortality of children born with a body weight of 500–749 g was 85%, and in newborns with a body weight of 750–1000 g — 49% [53, 55, 57].

In Japan, about 90% of children born with a birth weight of 1500 g or more survive. However, 19% of them have subsequent neurological complications [54].

According to Swedish scientists, 70% of children born between 22–26 weeks of gestation survived (9.8% among those born at 22 weeks and 85% at 26 weeks). It is noted that 45% of the survivors do not have significant somatic and neurological abnormalities [51, 55].

In the last five years, survival rate of children born with extremely low birth weight in Italy has increased to 76% [57]. According to the data of foreign scientists, about 85% of children born with extremely low birth weight who received high-quality medical care in perinatal centers survive and were discharged home. However, depending on the gestational age and body weight of a newborn, this indicator varies [52].

Children born before 25 weeks of gestation and weighing up to 700 g are the most difficult patients. The viability limit zone is considered to be 22–24 weeks of gestation and body weight of 500–600 g. The mortality rate of these newborns remains very high [6, 10, 39]. The survival rate to hospital discharge for infants with a gestational age of 22–24 weeks in the United States was 13%, and for those with a gestational age of 26 weeks or more, it was 70%. At the same time, they subsequently experience severe pathology of the nervous system, 70 and 30%, respectively. About half of the surviving children in the UK at 22–25 weeks' gestation who survived to 6 years of age had moderate or severe neurological pathology [55].

The most promising group of children for reducing perinatal, neonatal and infant mortality are infants born with a gestational age of 24 weeks or more and with weight of 700 g or more. However, the survival rate of these infants is not an adequate criterion for the effectiveness of medical care for these children if they have severe somatic and neurological abnormalities. Survival with severe health consequences should be recognized as an unfavorable outcome; therefore, the search for and implementation of productive prognostic, diagnostic, and organizational methods that allow survivors to have good health and quality of life indicators as they grow up are at the forefront [4, 6].

In the Russian Federation, according to the order of the Ministry of Health care and Social Development of October 2, 2009, No. 808n "On Approval of the Procedure for Providing Ob-

stetric and Gynecological Care", a three-level model of perinatal care was introduced [33].

In order to improve the quality and accessibility of medical care for pregnant women, women in childbirth, puerperas and women in postpartum period , due to the order of the Ministry of Healthcare of the Russian Federation No. 572n of November 1, 2012, the provision of medical care to these women is based on routing sheets, taking into account the degree of risk of complications, structure and bed capacity, level of equipment of each medical organization, and availability of qualified medical staff [35]. In this regard, medical organizations that provide medical care to women during childbirth and postpartum period were divided into three groups. The new order of the Ministry of Healthcare of the Russian Federation of October 20, 2020, No. 1130n "On Approval of the Procedure for the Provision of Medical Care in the Profile of Obstetrics and Gynecology" retains the three-level model of medical care, but regulates its provision with the use of telemedicine technologies [36].

The improvement of obstetrics service was based on the experience of obstetric and neonatal medical care used in developed countries of the world [28]. However, unlike the countries of the European Community (the United Kingdom, the United States and Japan) the organization of such three-level system of medical care for pregnant women, women in childbirth, puerperas and newborns in our country has its own peculiarities, primarily related to the territorial location of obstetric institutions and ethnic traditions. In the European Community, the majority of population (up to 95%) lives within 15–20 minutes' accessibility to third-level medical organizations providing obstetric care [53].

In the USA, up to 82% of women of reproductive age live within 30–60 minutes' drive of a perinatal center. About 80% of UK women live within 30 minutes by car of obstetric unit and 99% within 60 minutes. Accessibility to perinatal centers for women in the Netherlands averages less than 15 minutes in urban settings and more than 20 minutes in rural areas. A study of nine regions in Germany, the United Kingdom, France, Italy, Belgium, Denmark, Portugal and Poland found that the average distance to tertiary care hospitals for half of the women was about 10 km, for a quarter of women — 4.1 km and for 25% of women — almost 80 km [48].

The time for transporting Japanese women to a tertiary obstetric hospital of the third level ranges from 90 to 180 minutes, while air transport takes 15 to 29 minutes [52]. Air transport of pregnant women is used when they are far from an obstetric unit or hospital (more than 3 hours by road) or when ground transportation is not possible. For example, the distance from a obstetric hospital (unit) in rural areas of Northern Australia can be 560–965 km [55].

The restructuring of medical care for pregnant women and newborns in the European Community and North America has led to a reduction in the number of obstetric units [48, 49]. Despite the increased distance from the place of residence to the obstetric facility, the elimination of low-capacity obstetric hospitals (units) did not affect the accessibility of timely obstetric care, which was facilitated by strict adherence to the rules of regionalization of medical care, the use of modern telecommunication technologies and developed transport system of these countries.

In the Russian Federation (in a large number of its constituent entities), unlike in economically developed countries of Europe, the distance from second and especially third level obstetric institutions is on average 70–100 km. Long distances, lack of the developed transportation network, difficulty (and often impossibility) with air transportation, and insufficiently developed telecommunication technologies can negatively affect the health of pregnant women, women in childbirth and newborns. This is extremely important, as it has been proven that transportation for more than 20 minutes increases the risk of perinatal outcomes even in physiological pregnancy and labor, especially in the intrapartum period, and can lead to the development of complications in the woman in childbirth and newborn [8, 12, 31].

According to official statistics, up to 20% of pregnant women belong to the group of high perinatal risk. These women are indicated for medical care in perinatal centers and obstetric hospitals of the third level. Women with low and moderate perinatal risk are referred for delivery to obstetric hospitals of the first and second levels. According to the authors, increasing the availability of timely diagnostics (laboratory, instrumental and ultrasound), strengthening the material and technical base of district obstetric medical organizations is a reserve for reducing the perinatal mortality rate [21, 35].

Studies by large number of authors have confirmed that correct routing to obstetric hospitals at the appropriate level improves outcomes and reduces reproductive losses among pregnant women with high risks [56].

However, there are cases of irrational routing of this contingent of patients due to insufficient functional coordination or lack of special transport, which hinders timely transportation of a woman or newborn [23].

The increase in the newborn mortality (for them who up to 7 days of life) in urban obstetric facilities and, especially, in tertiary health care facilities, as well as its decrease in rural health care organizations is a natural result of proper routing of pregnant women and high-risk women in labor and delivery [8].

The main role in the structure of organizations providing obstetric-gynecological and neonatal care is played by third-level obstetric organizations. Perinatal centers are located at this level, to which high-risk pregnant women and their children are mainly referred. These centers are provided with highly qualified staff and modern equipment. The establishment of perinatal centers began according to Order No. 881 of the Ministry of Healthcare of the USSR in 1989 [32].

Provision of emergency and urgent care to newborns has a constant development and improvement [46]. It should be noted that, in addition to neonatal intensive care units, a city has large number of pediatric hospitals with beds for premature newborns and preterm infants with pathology [24].

One of the important problems not only in Russia, but also in all countries of the world, is the problem of medical evacuation of newborns. Improving the transportation of infants in need of emergency and urgent medical care will have a positive impact on both the quality of perinatal care and the reduction of neonatal losses. If it is necessary to transfer a newborn requiring treatment (nursing) to higher-level medical organizations, obstetric hospital physicians should provide the necessary therapeutic care until the neonatal resuscitation team arrives [35]. This is argued by the fact that the child (under the pretext of non-transportability) may not be transferred to another medical organization to provide more highly qualified care [38]. Early transfer to medical organizations with a higher level of diagnosis and treatment is the most effective point of treatment and evacuation tactics of emergency neonatology [23].

Another extremely important problem of our health care is its staffing. It is noted that the availability of physicians in the Russian Federation is very uneven. The share of neonatologists in the country is just over 60% [9].

There is a deficiency of neonatologists in almost all regions of Russia. Many authors note that the share of senior citizens among doctors is high and share of young specialists is low. In addition, there is a low retention rate of young specialists in the field [36, 41]. One of the qualitative characteristics of the availability of medical workers is the level of their qualification. 34.4% of doctors have the highest category, first category — 21.5%, second category — 7.3%. 1/3 of doctors has no qualification category at all [30]. A negative aspect of staffing is the low level of provision of our health care with middle medical staff [26].

Thus, the domestic system of maternal and child health care has undergone a number of significant changes in recent decades. Based on the positive experience of obstetric and neonatal medical care in developed countries, the obstetrics service was modernized. This improvement has had a positive impact on the reduction of perinatal mortality and neonatal morbidity. However, the system of organization of medical care for pregnant women, women in childbirth and newborns in Russia has a number of peculiarities, which are primarily due to the specific features of the regions. The main problems in organization of medical care for newborns include different levels of economic development, accessibility of medical care and staffing of neonatology services of obstetrics organizations of the Russian Federation, as well as violations of the routing of pregnant women, women in childbirth and delivery, puerperas and newborns.

ADDITIONAL INFORMATION

Author contribution. Thereby, all authors made a substantial contribution to the conception of the study, acquisition, analysis, interpretation of data for the work, drafting and revising the article, final approval of the version to be published and agree to be accountable for all aspects of the study.

Competing interests. The authors declare that they have no competing interests.

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Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

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