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PREVENTIVE MEDICINE FUND

ЕВРО-АЗИЯ АЛДЫН АЛУУ ЖАНА ДЕН СООЛУК ЖУРНАЛЫ

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КЫРГЫЗ МАМЛЕКЕТИНИН БИРИНЧИ МЕДИЦИНАЛЫК ИЛИМИЙ ИНСТИТУТУНУН АЛДЫН АЛУУЧУ МЕДИЦИНАНЫ ӨНҮКТҮРҮҮДӨГҮ САЛЫМЫ

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Корутунду. Эпидемиология жана микробиология медициналык тармагындагы биринчи илимий институтту (азыр Коомдук саламаттык сактоо Улуттук институту) уюштуруу жана түзүү Кыргыз мамлекетинин саламаттык сактоо системасын өнүктүрүүдө принципиалдуу тарыхый мааниге ээ. Өткөн окуяларды илимий - практикалык түшүнүү жана жугуштуу жана жугуштуу эмес оорулар чөйрөсүндөгү алдын алыуучу медицинанын учурдагы системасынын укуктуу улантуучусу өлкөнүн калкынын ден соолугун башкаруунун инновациялык стратегиясын иштеп чыгууга мүмкүндүк берет. Жалпысынан келтирилген тарыхый-графикалык фактылар Кыргыз Республикасында саламаттык сактоонун алдын алуучу технологияларын трансферлөөнүн негизинде калкка сапаттуу жана натыйжалуу медициналык кызмат көрсөтүүнү камсыз кылууга өбөлгө түзөт.
Негизги сөздөр: тарых, саламаттык сактоо, инновация, алдын алуу, илим жана билим берүү

ВКЛАД ПЕРВОГО МЕДИЦИНСКОГО НАУЧНОГО ИНСТИТУТА КЫРГЫЗСКОГО ГОСУДАРСТВА В РАЗВИТИЕ ПРОФИЛАКТИЧЕСКОЙ МЕДИЦИНЫ

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Резюме. Организация и становление первого научного института медицинского профиля эпидемиологии и микробиологии (ныне Национальный институт общественного здоровья) имеет основополагающее историческое значение в развитии системы здравоохранения кыргызского государства. Научно-практическое осмысление прошлых событий и преемственность современной системы профилактической медицины в области инфекционных и неинфекционных болезней позволит выработать инновационную стратегию управления здоровьем населения страны. В целом приводимые историко-графические факты способствуют обеспечению качественного и эффективного оказания медицинских услуг населению на основе трансфера технологий профилактики для здравоохранения Кыргызской Республики.
Ключевые слова: история, здравоохранение, инновации, профилактика, наука и образование

CONTRIBUTION OF THE FIRST MEDICAL SCIENTIFIC INSTITUTE OF THE KYRGYZ STATE TO THE DEVELOPMENT OF PREVENTIVE MEDICINE

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Abstract. The establishment and formation of the first scientific institution of a medical profile, the Institute of Epidemiology and Microbiology (now the National Institute of Public Health) has a fundamental historical significance in the development of the healthcare system of the Kyrgyz state. Scientific and practical understanding of past events and the continuity of the modern system of preventive medicine in the field of communicable and non-communicable diseases will allow us to develop an innovative strategy for managing the health of the country's population. In general, the presented historiographical facts contribute to ensuring high-quality and effective provision of medical services to the population based on the transfer of prevention technologies for the health care of the Kyrgyz Republic.
Keywords: history, healthcare, innovation, prevention, science and education

The start was made by the adoption of the historic Resolution of the Central Committee of the CPSU (b) and the Council of People's Commissars of the USSR dated 23.06.1936 "On the work of higher educational institutions and on the management of higher education" and the organization of a network of sanitary and bacteriological institutes in national republics" [1], which was supported by the Central Committee of the CP(b) and the Council of People's Commissars of the Kyrgyz SSR (F316, op 12.5, L.62-63). And on the basis of which the Order of the People's Commissariat of Health of the Kyrgyz SSR No. 761 dated 09.12.1937 "On the organization of the Institute of Epidemiology and Microbiology of the People's Commissariat of Health of the Kyrgyz SSR" was issued with the direction of opening it on January 01, 1938, thus creating the first scientific institution of a medical profile in the Kyrgyz state [2, 3].

The beginning of the formation and development of the Kyrgyz scientific institute is associated with the name of its first director B.Ya. Elbert [4], the traditions laid down by him are unshakable on professionalism, broad erudition, diligence and responsibility throughout the 85-years history of the institution – now the National Institute of Public Health of the Ministry of Health of the Kyrgyz Republic. It should be noted that by the Decree of the President of the Kyrgyz Republic S.N. Zhaparov (No. 386 dated 07.12.2022) for the first time the status "national" was conferred on a scientific institution in our country for recognition of the merits and achievements of many generations of Soviet and Kyrgyz scientists of the country in the field of preventive medicine.

In the distant pre-war (1938-1940) and war (1941-1945) years, the Institute went through a difficult path of searching for optimal and effective forms of work, strengthening human resources and material and technical basis (Figure 1). The fundamental scientific developments at this stage are aimed at:

- production of biological preparations (vaccines and serums) for specific prevention and treatment of infections, including wound infections (smallpox, tuberculosis, measles, diphtheria, rabies, meningococcus, typhoid fever and dysentery, etc.) up to 22 items with a volume of more than a million doses, which met the needs of the civilian population of Kyrgyzstan and the Soviet Army;

- the study of regional problems of epidemiology of the spread of infectious diseases, with the improvement of methods of laboratory diagnostics of infectious diseases in order to organize effective treatment, elimination and prevention;

- comprehensive studies were conducted to determine the quality of food products, water supply sources, municipal, industrial, school hygiene and sanitation facilities.

- organization of special 5-month courses for the training of bacteriologists and hygienists of higher and medium qualifications.

Приказ № 761
По Народному Комиссариату
Здравоохранения Кирг. ССР
от 9 декабря 1937 г.

ОБ ОРГАНИЗАЦИИ ИНСТИТУТА ЭПИДЕМИОЛОГИИ И МИКРОБИОЛОГИИ НК ЗДРАВА КИРГИЗСКОЙ ССР

I. ***В целях планомерной борьбы с эпидемическими заболеваниями в Республике, является необходимым создание центрального Научно-исследовательского и производственного института.***

II. ***Организовать в 1938 году Институт Эпидемиологии, микробиологии в составе следующих отделов и отделений:***

1. ***Эпидемиологический отдел с отделениями:***

   а) кишечных инфекций
   б) капельных или детских инфекций
   в) остро-заразной лаборатории
   г) коревой станции
   д) эпидемиологического бюро с разъездными врачами эпидемиологами

2. ***Пастеровская станция***

3. ***Оспенно-вакцинный отдел с отделениями:***

   а) оспенного
   б) вакцинного
   в) лаборатории по вакцинации против туберкулеза

4. ***Сывороточный отдел***

5. ***Санитарно-гигиенический отдел с отделениями:***

   а) водная лаборатория
   б) пищевая лаборатория

6. ***Учебный отдел***

7. ***Судебно-химический отдел***

В дальнейшем предусмотреть по мере организации и развертывания вышеперечисленных отделов, также организацию протозоологического отдела на базе существующей малярийной станции.

Основание: ф316, оп1д.5, л.62-63.

НАРКОМ ЗДРАВООХРАНЕНИЯ КИРГИЗСКОЙ ССР ***С.К.ЛОБЫНЦЕВ***

Figure 1. Order of the People's Commissariat of Health "On the organization of the Institute of Epidemiology and Microbiology of the People's Commissariat of Health" No.761 dated 09.12.1937

The obtained scientific and practical materials and their results were formed into reports at meetings of the Frunze Scientific Society and republican-level councils, as well as published in the journal "Soviet Healthcare of Kyrgyzstan", created in 1938 [5]. Naturally, along with the founder of the preventive medicine of Kyrgyzstan – the largest domestic microbiologist, professor Elbert Boris Yakovlevich, contributions were also made by doctors of medical sciences Vasiliev, Ryabtseva, Mumedzhanova and others in carrying out various tasks for the diagnosis and prevention of infections, improving the work and life of working people of the republic. The opening of the Kyrgyz State Medical Institute in 1939 – B.Ya. Elbert was appointed the first director (he organized and headed the Department of Microbiology and Epidemiology), as well as the evacuation in 1941 of a large group of medical scientists from Kharkov and Leningrad contributed to the creation of an effective scientific and methodological basis for preventive medicine aimed at preserving the health of the population and Red Army soldiers during the Great Patriotic War (1941-1945).

In 1945, the Ministry of Health of the USSR recalled B.Ya. Elbert from Kyrgyzstan to work at the Rostov Research Institute of Epidemiology and Microbiology. After that, in the period 1945-1946, there were acting directors of the Institute: S.I. Gelberg, P.V. Komarov, Yu.A. Abdullaev, K.M. Weizman. At the end of 1946 candidate of medical sciences T.L. Proreshnaya (later doctor of medical sciences, professor, head of the Department of Epidemiology of the Kyrgyz State Medical Institute) was appointed a director. In the post-war period, according to the established tradition, work continued on the problems of regional medicine aimed at improving the health and ensuring the sanitary and epidemiological well-being of the population (especially rural) living in various climate-geographic conditions. There appeared the need to study the relationship between morbidity and the state of the environment: environmental media (water, soil, air, nutrition, etc.) and occupational environment in various sectors of the national economy, which required the training of scientific and practical personnel in various areas of preventive medicine.

The high importance of the emerging needs in the field of hygienic prevention predetermined the addition of "hygiene" and the change of the name of the institute by Resolution of the Council of Ministers of the Kyrgyz SSR No. 534 dated 23.05.1952 - Kyrgyz Research Institute of Epidemiology, Microbiology and Hygiene, which in 1953 was headed by candidate of medical sciences V.M. Perelygin. During his work, large-scale studies of decisive importance for healthcare were launched:

- search for a mechanism for managing various infections of diphtheria, whooping cough, measles, scarlet fever with the determination of antibiotic resistance, as well as socially determined diseases of tuberculosis, syphilis, etc.;

- hygienic research at enterprises of various industries using vegetative raw materials cotton, bast, grain, including industrial and professional activities of agricultural workers;

- development of new technologies for the preparation of baby food products based on lactic acid bacteria (acidophilic) - "Biolact", approved for introduction by the Ministry of Health of the USSR (1971).

In general, the period 1952-1972 is characterized by great achievements in solving regional problems of preventive medicine and training a scientific personnel of more than 20 candidates and doctors of sciences. In 1972, V.M. Perelygin, doctor of medical scientists, professor, hygiene scientist, WHO expert on soil problems was invited to work in Moscow.

In 1972, Dzhumaliev Namyrbek, an experienced health organizer, deputy Minister of Health of the Kyrgyz SSR was appointed as the director of the Institute. Under his leadership, the material and technical base and scientific potential of the Institute is seriously strengthened [4, 9]:

- a new 5-storey building with a clinical department for 50 beds is built;

- microbiology and hygiene laboratories are equipped with modern equipment - an electron microscope (Japan), an atomic adsorption spectrophotometer, liquid chromatographs, immunoenzymatic and biochemical analyzers, etc.;

- the training of scientific personnel is carried out through target postgraduate and doctoral studies at institutes and universities of Union level;

- the research results on the prevention of children's droplet and intestinal infections, influenza and flu-like diseases, hepatitis, polio, salmonellosis, acute intestinal infections, etc. are being introduced into practice, which made it possible to reduce the incidence of certain diseases by several times by the end of the 80s compared to the 60s;

- the circulation of arboviruses is discovered and their nosogeography is determined on the territory of the Kyrgyz SSR, they are included in the International Taxonomic Classification: Bhandta, Sokuluk, Burana, Batken, Tamchi, Issyk-Kul;

- priority hygienic studies of environmental media, various industrial, agricultural and livestock facilities allowed to develop a system of health recommendations and a system for monitoring the negative impact on the health of workers.

Thus, the scientific and practical directions of the Institute formed in 1972-1988 solved topical issues of preventive medicine aimed at ensuring sanitary and epidemiological well-being and strengthening the health of the population. And this is also the merit of a whole galaxy of scientists: M.G. Aminova, T.A. Tynalieva, F.E. Karas, V.G. Evdoshenko, E.A. Sogomonyan, M.B. Shpirt, Yu.P. Popov, Yu.I. Manuylenko and many others [10].

During the perestroika period, research institutes in the healthcare system of the Union republics began to be integrated in order to improve the efficiency of their work with an increase in the categorical status of scientific institutions. Accordingly, the Resolution of the Council of Ministers of the Kyrgyz SSR No. 41 dated 06.01.1988 "On the reorganization of the Research Institute of Tuberculosis, Research

Institute of Epidemiology, Microbiology and Hygiene, Research Institute of Rehabilitative Treatment and Balneology into the Research Institute of Ecology and Prevention of Infectious Diseases of the Ministry of Health of the Kyrgyz SSR" was issued. For the first time, a new scientific institution of the Research Institute of Ecology and Prevention of Infectious Diseases was headed by an elected director, Doctor of Medical Sciences, Professor G.A. Komarov. Traditionally, research continued on problems of regional medicine, therapeutic and preventive measures, social diseases and rehabilitation measures for both children and adults. The total number of medical workers amounted to 1000 people, including 240 full-time researchers. However, in general, the expected qualitative result in terms of improving scientific and organizational methodology for solving communicable and non-communicable problems had not been reached [4, 6].

In this regard, in 1991, another reorganization took place by the Resolution of the Cabinet of Ministers of the Kyrgyz SSR No. 322 dated 01.07.1991 "On the organization of the Research Institute of Tuberculosis, the Research Institute of Balneology and Rehabilitative Treatment of the Ministry of Health of the Kyrgyz SSR", with the Research Institute of Ecology and Prevention of Infectious Diseases being transformed into an independent institution, the Research Institute of Prevention and Medical Ecology, which was headed by an experienced health organizer, Minister, candidate of medical sciences, Oirot Turgunbayev. However, after the well-known August events, the Union ceased to exist and the results of the country's first medical scientific institution of the Soviet period - are determined [6, 7] by the following indicators:

- more than 3,0 thousand scientific papers, including 25 monographs are published;
- more than 125 dissertations are defended, including 20 by practitioners;
- more than 200 scientific proposals and instructional-methodological recommendations are given and introduced into practice;
- 5 patents, 24 copyright certificates, 28 certificates of invention are obtained and more than 250 innovation proposals are implemented.

The sovereignization of the country had led to an extremely difficult financial and economic situation, which required O.T. Turgunbayev to make great professional and organizational efforts to ensure scientific and practical research and preserve human resources. After his sudden death, the Institute was headed from 1995 by doctor of medical sciences, professor R.O. Khamzamulin. It is known that this period was under reform processes, when the national economy was moving to market conditions, and science and medicine were funded on a residual basis. Moreover, by the end of the 90s, 76% of the population of the Kyrgyz Republic began to live in poverty [8]. Due to health reasons in 1998, R.O. Khamzamulin leaves the post of director and T.T. Abdyldaev is elected to the vacant position as a director.

In these 1991-2000 years, there are certain achievements of the scientific and practical activities of the Institute, when the management and research staff, in conditions of extremely insufficient funding, were striving for 10 years to maintain scientific potential and meet the needs of healthcare. However, despite the measures taken, the effectiveness of scientific research decreased, structural units and personnel were reduced.

To improve the situation, the Government of the Kyrgyz Republic issued Resolution No. 491 of August 14, 2000 on renaming the Research Institute for Prevention and Medical Ecology into the Scientific and Production Association for Preventive Medicine of the Ministry of Health of the Kyrgyz Republic. Appointed as the director was doctor of medical sciences, professor, Laureate of the State Prize of the Kyrgyz Republic in the field of science and technology Kasymov O.T. For more than 23 years (2000-2023), he had to raise the potential of this scientific institution in difficult socio-economic, financial, material and technical conditions, with shortage of personnel, trying to be in accordance with the new requirements of the changing paradigm of the public health system. And, too, despite that there was going on the implementation of national health reform programs "Manas" (1996-2006), "Manas Taalimi" (2006-2010), "Den Sooluk" (2012-2016), the program of the Government of the Kyrgyz Republic for the protection of public health and the development of the health system for 2019-2030 "A healthy Person - a Prosperous Country", these programs for their realization did not point out the importance of the foundations of preventive medicine so necessary for the protection and promotion of public health, being mostly declarative in nature. At the same time, the priorities of epidemiological, microbiological and hygienic research were scientifically formulated with the development of measures for the prevention of communicable and non-communicable diseases with the following results:

- the sources of funding were determined on a budgetary and on a competitive basis for scientific research together with the attraction of grants from international organizations and foundations;

- the planned training of scientific personnel in postgraduate and doctoral studies were resumed;

- for the first time since 2005, there is a dissertation council for the defense for the degrees of doctor and candidate of sciences in: epidemiology, hygiene, infectious diseases, public health;

- research by scientists of the Institute on polio and malaria contributed to their elimination in the territory of the Kyrgyz Republic confirmed by the WHO/Europe certificates that the country is free of polio (2002) and malaria (2016);

- for the needs of the health care system, Republican Scientific and Practical Centers were established for: viral hepatitis control with a reference laboratory (23.12.2003), quality control of laboratory diagnostics of infectious diseases (30.05.2005), which has accreditation according to

international standards ISO 17043:2010 "Conformity Assessment–General Requirements for Proficiency Testing - A2LA, USA (until 31.10.2023); infection control and management of medical wastes (06.11.2003) with a role for coordinating the activities of healthcare organizations. In general, this made it possible to develop a unified scientific concept that allows integrating epidemiological surveillance of infections and their risk management with microbiological diagnostics;

- development and implementation of viral hepatitis programs: "Viral Hepatitis in The Kyrgyz Republic, 1999-2010" (Order of the Ministry of Health of the Kyrgyz Republic No. 183 dated 11.06.1999); "Target Program for the Management of Medical Waste and Control of Nosocomial Infections in the Kyrgyz Republic for 2002-2006" (Order of the Ministry of Health of the Kyrgyz Republic No. 393, dated 18.09.2002); The second phase of the "Target Program for the Management of Medical Waste and Control of Nosocomial Infections in the Kyrgyz Republic for 2007-2011 (Order of the Ministry of Health of the Kyrgyz Republic No. 87 dated 28.02.2007); Five-year target program "Prevention and Treatment of Viral Hepatitis in the Kyrgyz Republic for 2011-2015" (Order of the Ministry of Health of the Kyrgyz Republic No. 11 dated 12.01.2011); Target program "Strategy for Fighting Viral Hepatitis in the Kyrgyz Republic for 2017-2022" (Order of the Ministry of Health of the Kyrgyz Republic No. 431 dated 22.05.2017); order of the Ministry of Health of the Kyrgyz Republic No. 472 of 27.12.2001 "On the Implementation of the Decree of the Government of the Kyrgyz Republic No. 517 dated 04.09.20.01 "On the National Program of Immunoprophylaxis 2001-2005" and "On the Implementation of the Law of the Kyrgyz Republic “On the Immunoprophylaxis of Infectious Diseases” dated 21.12.2001. No. 800, where mandatory vaccination of newborns against viral hepatitis B was included in the National Vaccination Calendar [21].

The implementation of these programs with the organization of sentinel epidemiological surveillance in collaboration with the CDC (USA) allowed to reduce the incidence of acute viral hepatitis (2000-2022). The introduction of hepatitis B vaccination (2000) reduced the incidence in children under 14 years old to isolated cases [22].

- within the framework of the CIS Inter-State Innovative Scientific Project (2015-2021) - "Creation of test systems for the serological diagnosis of hepatitis E and the testing of their diagnostic value" in collaboration with Russia - Mechnikov Research Institute of Vaccines and Serums, Kyrgyzstan – Scientific and Production Association for Preventive Medicine, and Belarus - Institute of Experimental Large-scale Seroepidemiological and Molecular Epidemiology Studies have been carried out in the regions of the participating countries, a line of diagnostic test systems that have no world analogues has been developed;

- within the framework of scientific cooperation with WHO and the Pasteur St. Petersburg Research Institute of Epidemiology and Microbiology "Assessment of population immunity to the

SARS CoV-2 virus in the population of the Kyrgyz Republic in the context of the COVID-19 pandemic" was conducted (2020-2022);

- in the forming of hygienic directions on the problems of environmental medicine, research was carried out on: adaptation to climate change-2011-2017 [11, 12, 13, 14, 15]; proper handling of mercury-containing medical devices [18, 19]; development of technical regulations (2008-2019) [16, 17]; the EAEU Technical Regulation "On the Safety of Packaged Drinking Water, including Natural Mineral Water", harmonized with European Directives and international standards for the EAEU member States, which was approved by the decision of the EEC Council No. 45 dated June 23, 2017 (https://docs.eaeunion.org/docs/ru-ru/01414757/cncd_05092017_45). Definitely, the study of the health impact of environmental and occupational factors was of the utmost importance for the entire hygienic direction and was carried out within the framework of international cooperation programs, based on interdisciplinary approach and integrating a variety of modern problems related to environmental factors: natural, social, industrial, domestic, etc. [4];

- in the period 2000-2023, the potential of the scientific institution improved in personnel training – more than 20 doctoral and more than 43 candidate's dissertations were defended. More than 500 scientific papers were published in publications indexed in the Web of Science, Scopus and RSCI, as well as more than 30 monographs and 10 collections of works. Scientific developments in the form of instructional and methodological recommendations have been introduced into the practice of healthcare. Government resolutions, orders of the Ministry of Health (more than 80). More than 5 patents for inventions and copyright certificates have been obtained. A number of scientific and practical achievements of the Institute were marked by the award of the Government of the Kyrgyz Republic for Quality – Resolution of the Government of the Kyrgyz Republic No. 515 dated 22.07.2015 (quality control of laboratory diagnostics) and No. 500 dated 25.12.2019 (infection control).

On the whole, the 85th anniversary is symbolic in recognition of the merits and achievements in the field of preventive medicine of many generations of Soviet and Kyrgyz scientists of the country, the Decree of the President of the Kyrgyz Republic S.N. Zhaparov No. 386 dated December 07, 2022) was issued on awarding the status of "national" to the Scientific and Production Association for Preventive Medicine and to be called "National Institute of Public Health" of the Ministry of Health of the Kyrgyz Republic, which was further approved by Resolution No. 340 of the Cabinet of Ministers of the Kyrgyz Republic dated July 7, 2023.

In the XXI century, the state sets before the scientific community a strategy for the development of scientific, practical and educational technologies to motivate health saving in the field of preventive medicine aimed at ensuring sanitary and epidemiological safety of the territory, protecting and strengthening the health of the country's population - ultimately contributing to improving the quality of life of people.

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КЫРГЫЗ РЕСПУБЛИКАСЫНДА RT-qPCR ЫКМАСЫН КОЛДОНУУ МЕНЕН SARS-CoV-2 КОРОНАВИРУСУНУН РНКсын АНЫКТОО БОЮНЧА КВАЛИФИКАЦИЯНЫ ТЕКШЕРҮҮ ПРОГРАММАСЫН ИШТЕП ЧЫГУУ ЖАНА ИШКЕ АШЫРУУ

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Корутунду. Изилдөөнүн максаты ОТ-ПЦР ыкмасы менен SARS-CoV-2 диагностикасы боюнча Кыргызстандын саламаттык сактоо лабораторияларынын квалификациясын текшерүү программасын иштеп чыгуу жана ишке ашыруу болгон. Диагностикалык лабораториялардын көрсөткөн кызматтарынын квалификациясын текшерүү сапат системасынын маанилүү компоненттеринин бири болуп саналат жана лабораториялык диагностиканы жакшыртууга жана изилдөөнүн достовердүү жыйынтыктарын алууга багытталган. Лабораториялардын квалификациясын текшерүү үчүн үлгүлөрдүн контролдук панели даярдалган. Панелде 4 үлгү камтылган: 1 терс, SARS-CoV-2 РНКсынын 3 жогорку оң, орто жана төмөнкү деңгээлдери. Түзүлгөн контролдук үлгүлөр панели ISO 13528, ISO Guide 35 стандарттарынын талаптарына жооп берет жана SARS-CoV-2 RNA үчүн тестирлөөнүн сапатын көз карандысыз баалоо куралы болуп калды. 2022-2023-жыл мезгилдеринде өткөрүлгөн, 3 раунд ичинде квалификацияны текшерүү программасына 18, 21 жана 21 мамлекеттик жана жеке медициналык лабораториялар катышты. Лабораториялардын катасыз иштеген үлүшү КТП биринчи раундда 83,3%ды (15/18) жана экинчи жана үчүнчү раундда 80,9%ды (17/21) түздү. Тийиштүү биринчи, экинчи жана үчүнчү раундда мамлекеттик лабораториялардын туура иштеген үлүшү 100% (13/13), 78,5% (11/14), 81,3% (13/16) түзгөн. Катасыз иштеген жеке лабораториялардын үлүшү биринчи, экинчи жана үчүнчү раундда 40% (2/5), 85,7% (6/7) жана 80% (4/5) түздү. Квалификацияны текшерүү ыкмасы аркылуу Улуттук сапатты тышкы баалоо программасын жүзөгө ашыруу аккредитацияланган провайдердин жеткиликтүү болушу, программанын үзгүлтүксүз раунддарын жүргүзүү жана бардык катышуучуларга өз жыйынтыктарын көрүүгө жана ОТ-ПЦР ыкмасы аркылуу SARS-CoV-2 RNA тестирлөөнүн сапатынын жалпы түзүлүшүн көрүүгө мүмкүндүк берген аналитикалык отчеттун болушу лабораториялардын мүмкүнчүлүктөрүн кеңейтти. Квалификацияны текшерүү программасы айырм лабораториялар үчүн да, ошондой эле өлкөнүн саламаттыкты сактоо системасынын деңгээлинде дагы SARS-CoV-2 диагнозун жакшыртуу мүмкүнчүлүктөрүн сунуш кылат.
Негизги сөздөр: пандемия, SARS-CoV-2 лабораториялык диагностикасы, сапатты көзөмөлдөө, лабораториялык квалификацияны текшерүү программасы.

РАЗРАБОТКА И ВНЕДРЕНИЕ ПРОГРАММЫ ПРОВЕРКИ КВАЛИФИКАЦИИ ПО ВЫЯВЛЕНИЮ РНК КОРОНАВИРУСА SARS-CoV-2 МЕТОДОМ ОТ-ПЦР-РВ В КЫРГЫЗСКОЙ РЕСПУБЛИКЕ

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Резюме. Целью исследования было разработка и внедрение программы проверки квалификации лабораторий здравоохранения Кыргызстана по диагностике SARS-CoV-2 методом ОТ-ПЦР. Проверка квалификации является важной составляющей системы качества предоставляемых услуг диагностических лабораторий и направлена на совершенствование лабораторной диагностики и получение достоверных результатов исследований. Была

приготовлена контрольная панель образцов для проверки квалификации лабораторий. Панель содержала 4 образца: 1отрицательный, 3 положительных с высоким, среднем и низким уровнем содержания РНК SARS-CoV-2. Созданная панель контрольных образцов отвечала требованиям стандартов ISO 13528, ISO Guide 35 и стала инструментом независимой оценки качества тестирования на RNA SARS-CoV-2. В течение 3 раундов, проведенных в период 2022-2023гг. в программе проверки квалификации участвовали 18, 21 и 21 государственные и частные медицинские лаборатории. Доля лабораторий, сработавших без ошибок, составила 83,3% (15/18) в первом раунде и по 80,9% (17/21) во втором и третьем раундах ППК. Доля правильно сработавших государственных лабораторий составила 100% (13/13), 78,5% (11/14), 81,3% (13/16) в первом, втором и третьем раундах соответственно. Удельный вес безошибочно сработавших частнопрактикующих лабораторий составил 40% (2/5), 85,7% (6/7) и 80% (4/5) в первом, втором и третьем раундах. Внедрение Национальной программы внешней оценки качества методом проверки квалификации расширило возможности лабораторий благодаря доступности аккредитованного провайдера, регулярному проведению раундов программы и наличию аналитического отчета, позволяющему всем участникам увидеть собственные результаты и общую картину качества тестирования на RNA SARS-CoV-2 методом ОТ-ПЦР. Программа проверки квалификации предлагает возможности для последующего улучшения диагностики SARS-CoV-2 как для отдельной лаборатории, так и на уровне системы здравоохранения страны.
Ключевые слова: пандемия, лабораторная диагностика SARS-CoV-2, контроль качества, программа проверки квалификации лабораторий.

DEVELOPMENT AND IMPLEMENTATION OF THE PROFICIENCY TESTING PROGRAM FOR THE DETECTION OF SARS-CoV-2 Coronavirus RNA USING RT-qPCR METHODS IN THE KYRGYZ REPUBLIC

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Abstract. The aim of the study was to develop and implement a proficiency testing program for healthcare laboratories in Kyrgyzstan for the diagnosis of SARS-CoV-2 by RT-PCR. Proficiency testing is an important component of the quality system for the services provided by diagnostic laboratories and is aimed at improving laboratory diagnostics and obtaining reliable research results. A control panel of samples was prepared for laboratory proficiency testing. The panel contained 4 samples: 1 negative, 3 positives with high, medium and low levels of SARS-CoV-2 RNA. The created panel of control samples met the requirements of ISO 13528, ISO Guide 35 and became a tool for independent assessment of the quality of SARS-CoV-2 RNA testing. During 3 rounds conducted in the period 2022-2023. 18, 21 and 21 public and private medical laboratories participated in the proficiency testing program. The proportion of laboratories that performed without errors was 83.3% (15/18) in the first round and 80.9% (17/21) each in the second and third rounds of the PQP. The proportion of government laboratories that performed correctly was 100% (13/13), 78.5% (11/14), 81.3% (13/16) in the first, second and third rounds, respectively. The proportion of private laboratories that worked flawlessly was 40% (2/5), 85.7% (6/7) and 80% (4/5) in the first, second and third rounds. The introduction of the National Proficiency Testing External Quality Assurance Program has expanded the capabilities of laboratories through the availability of an accredited provider, regular rounds of the program and the availability of an analytical report that allows all participants to see their own results and an overall picture of the quality of SARS-CoV-2 RNA testing by RT-PCR. The proficiency testing program offers opportunities to further improve the diagnosis of SARS-CoV-2 both for the individual laboratory and at the country health system level.
Key words: pandemic, SARS-CoV-2 laboratory diagnostics, quality control, laboratory proficiency testing program.

Introduction

Despite the measures taken by the world community to contain the spread of the new coronavirus, the infection spread to vast territories. On March 11, 2020, WHO officially announced the start of the COVID-19 pandemic [1, 2]. In May 2023, the World Health Organization announced that the COVID-19 pandemic was on a declining trend and rescinded its status as a "Public Health Emergency of International Concern". At the same time, the SARS-CoV-2 virus remained in the population, moving into the category of seasonal diseases, and has not ceased to pose a threat to humanity.

A lot of organizational work has been carried out in Kyrgyzstan aimed at strengthening measures to improve the diagnosis and epidemiological monitoring of SARS-CoV-2. In addition to the existing ones, 10 new PCR laboratories were created and equipped, the task of which was to timely diagnose new cases and monitor the incidence of COVID-19 in all regions of the republic.

Conducting a program to assess the quality of SARS-CoV-2 testing is a necessary part of the laboratory process that allows you to give an objective assessment to laboratories. Take adequate measures to improve the quality of testing and, thereby, guarantee the reliability of the results [3].

The purpose of this work was to develop and implement a proficiency testing program (PTP) for health laboratories in Kyrgyzstan for the diagnosis of SARS-CoV-2 by RT-PCR.

Materials and methods

The work was carried out on the basis of the Republican Scientific and Practical Center for Quality Control of Laboratory Diagnostics of Infectious Diseases (RSPCQCLDID) accredited by the American Association for Laboratory Accreditation (A2LA, USA) according to ISO 17043. The development and implementation of the PTP was carried out in accordance with the biological safety requirements applicable to laboratories testing biomaterial for the detection of SARS-CoV-2 RNA (BSL 2) and included two stages. At the first stage, an assessment tool was developed - a panel of control samples. At the second stage, the quality of laboratory diagnostics of SARS-CoV-2 RNA of participants in the proficiency testing program was assessed using the developed control panel.

The preparation of the panel of control samples was carried out in accordance with the requirements of ISO 17034 "General requirements for the competence of manufacturers of reference materials", ISO Guide 35 "Reference materials - General and statistical principles for certification".

Materials. 400 samples of positive and negative nasopharyngeal swabs in the transport medium, obtained by us from the diagnostic laboratory, served as the initial material for creating the control panel. These samples had a previously positive or negative status in the PCR test system "TIB MOLBIOL ModularDx kit SarbecoV E-gene EAV" (Germany). Further testing of samples at RSPCQCLDID was carried out in PCR test systems from two manufacturers: AmpliPrime SARS-CoV-2 DUO PCR (Russia); Bio-Rad Reliance SARS-CoV-2 RT-PCR IVD Assay Kit (CE, FDA, USA).

The proficiency testing program was carried out in accordance with the requirements of the international standard ISO 17043 “Conformity assessment. General requirements for professional testing” and the corresponding 2022-2023. The PTP consists of three rounds with a period of once every six months. 18, 21, 21 laboratories participated in the program in the first, second and third rounds, respectively.

Methods. All sample-candidates for panel and the prepared panel of control samples were tested by RT-PCR. Statistical evaluation of the measurement uncertainty of the values of control samples, their homogeneity and stability was carried out using the computer program Excel.

Determination of the value of the control sample and its standard uncertainty was calculated by the formula:

$u = \sqrt{\frac{(\sum (x_1 - \mu)\, 2)}{n \cdot (n-1)}}$, where

u – measurement uncertainty

$\sum$ - sum

x - received value

n is the number of measurements

μ - mean value

Expanded uncertainty (U) - measurement at 95% confidence level = μ ± 2 * u

The Cochran G-test was used to assess the homogeneity and stability of control samples according to the formula:

$G = \frac{S_i^2}{\sum_{i=1}^{N} S_i^2}$, where

S - is the largest value of the line-by-line dispersion

N - is the number of repetitions.

The found value (G) of the control sample was recognized as homogeneous if it was below the critical value (G cr.), which was determined according to the table of values of the Cochran criterion and equaled 1.01 at p = 0.95.

The stability of the control samples was assessed before and at the end of each round of PTP. The overall arithmetic mean of the measurement results from the homogeneity test was compared with the arithmetic overall mean of the results from subsequent stability evaluations. Samples were considered stable if the difference between the average values between homogeneity and stability did not exceed 3SD.

Proficiency testing included: distribution of a panel with encoded controls to participating laboratories; subsequent statistical processing of the results obtained in accordance with the requirements of the international standard ISO 13528 "Statistical methods for the use of professional testing in interlaboratory comparisons"; notification of participants about the results obtained with the preparation of individual and generalized reports on the results of the program round.

The effectiveness of testing for SARS-CoV-2 by RT-PCR was assessed by solving the task by the participants to correctly identify the control samples of the panel in percent (%):

− correct identification of 4 samples out of 4 – 100%

− correct identification of 3 samples out of 4 – 75%

− correct identification of 2 samples out of 4 – 50%

− correct identification of the 1st sample out of 4 – 25%

− lack of correctly identified samples – 0%

The significance of differences was determined using Chi-square with a p-value of 0.05 (assessment of the correctness of testing the PCR tests used, etc.)

Results and discussion

The panel design included 4 controls, of which one was negative, i.e. did not contain SARS-CoV-2 RNA, and three positive nasopharyngeal swab samples with high, medium, low SARS-CoV-2 RNA. To select samples with different contents of SARS-CoV-2 RNA, a series of serial dilutions of the initial positive pool of samples was carried out. According to the results of assessment of prepared control samples of the panel in PCR tests from two manufacturers, the following values were obtained: for the first sample, characterized as containing a high concentration of SARS-CoV-2 RNA, the CT values varied within 23.2 (±0.44) - 25.0 (±0.37); for the second sample, characterized as containing an average concentration of SARS-CoV-2 RNA, the CT values ranged from 28.82 (±0.37) to 29.84 (±0.45); and for the third sample, characterized as containing a low concentration of SARS-CoV-2 RNA from CT 32.54 (±0.47) to CT 32.96 (±0.41) (Table 1). When assessment a negative sample, the CT value was absent.

Table 1. Results of assessment of a panel of control samples for professional testing of laboratories for the diagnosis of SARS-CoV-2

No	Sample characteristic	AmpliPrime SARS-CoV-2 DUO PCR, mean CT±U*	BioRAD Relieance SARS-CoV-2 RT-PCR Assay kit, mean CT±U
1	Positive (high level of SARS-CoV-2 RNA)	23.2±0.44	25.0±0.37
2	Positive (average level of SARS-CoV-2 RNA)	28.82±0.37	29.84±0.45
3	Positive (low SARS-CoV-2 RNA)	32.54±0.47	32.96±0.41
4	Negative	CT absent	CT absent

Note: * U is the expanded uncertainty of measurements with a coverage of k = 2, which provides a confidence level of 95%

The results of evaluating the homogeneity of the samples of the control panel with the Cochran G-test were equal to 0.6, which is below the critical value of 1.01 (p = 0.95). The results obtained allowed to assume a homogeneous composition of the evaluated control samples, and to guarantee similar results, provided that the control testing was carried out qualitatively by the participants in the PTP. The results of the evaluation of stability of panel of control samples before start of PTP and at its completion in each round did not exceed 3SD from the initial values calculated during the evaluation of homogeneity. Thus, panel of control samples created by us and used by the laboratories met the requirements of international standards ISO CODE 35, ISO 13528, ISO 17043 for biological

reference materials and became a tool for independent external quality assessment of SARS-CoV-2 RNA testing by RT-PCR.

The results of testing the negative control panel samples (Figure 1) show 100% correct answers in the first round of the PTP, 88% in the second and 86% in the third round of the program. When identifying positive control samples with a high level of SARS-CoV-2 RNA, 100% correct answers were obtained in first and second rounds of PTP, in the third round there were 95% correct answers. Samples with an average level of SARS-CoV-2 RNA in 100% of cases were identified correctly in first and third rounds of PEP, in the second round 91% of correct answers were received. Samples with low levels of SARS-CoV-2 RNA were identified with errors in all three rounds of PTP, with largest number in third round of the PT program.

The percentage of correct results obtained by participating laboratories ranged from 75% to 100% in first round, from 50% to 100% in second, and from 33% to 100% in third round of the PT program. Of the 24 participants, 14 laboratories (58.3%) made no control testing errors during three rounds (Table 2).

The proportion of laboratories that performed without errors was 83.3% (15/18) in first round and 80.9% (17/21) each in the second and third rounds of the PTP. The proportion of government laboratories that performed correctly was 100% (13/13), 78.5% (11/14), 81.3% (13/16) in first, second and third rounds, respectively. The proportion of private laboratories that completed perfectly was 40% (2/5), 85.7% (6/7) and 80% (4/5) in the first, second and third rounds (Table 3). There were no significant differences in the correctness of control testing in public and private laboratories ($p>0.05$).

In PTP participants used a total of 12 combinations (kits for DNA/RNA isolation and amplification, PCR product detection) of PCR tests from different manufacturers (Table 4). Laboratories that used following five types of PCR tests in all rounds worked without errors: "Art Test COVID-19" (manufacturer ArtbioTech), "Sarbecov E gene EUA" (TIB MOLBIOL), "Xpert Xpress SARS-CoV-2" (GeneXpert), "Cov-Bat-FL" (Amlisens), "SARS-CoV-2 Nuclea acid detection kit" (Tialong). When using tests from other manufacturers, errors ranged from 4 to 66%. We did not find a significant difference in the correctness of control testing when using PCR tests from different manufacturers ($p>0.05$).

Proficiency testing programs for testing for SARS-CoV-2 RNA have been carried out in Kyrgyzstan since the end of 2020, when, with the support of WHO, coded control samples from a foreign provider were transferred to leading laboratories. This program made it possible to assess the level of testing quality in each laboratory, but was not carried out regularly and did not allow a comparative assessment of their own results with the results of other participants in the PPT. The development and implementation of the National EQA by the PTP method has expanded the capabilities of laboratories due to the proximity and accessibility of an accredited provider.

Table 2. Participating laboratories and their results on the detection of SARS-CoV-2 RNA coronavirus

No	Laboratory identification number	Correctness of performance of control testing for detection of SARS-CoV-2, %		
		1 round 1st half of 2022	2nd round II half of 2022	3rd round 1st half of 2023
1	1-240	100%	100%	100%
2	1-241	100%	100%	100%
3	2-242	100%	100%	100%
4	2-245	100%	100%	50%
5	2-247	100%	100%	100%
6	2-204	75%	50%	N/A
7	3-248	100%	100%	100%
8	4-185	100%	100%	100%
9	4-185/1	N/A*	100%	N/A
10	4-180	100%	75%	100%
11	4-155	100%	100%	100%
12	4-139	100%	100%	100%
13	4-203	75%	100%	75%
14	4-013	100%	100%	100%
15	4-014	75%	100%	100%
16	4-029	N/A	100%	100%
17	4-038	N/A	100%	N/A
18	4-255	N/A	N/A	100%
19	5-249	100%	50%	75%
20	6-250	100%	100%	100%
21	7-251	100%	100%	100%
22	7-254	N/A	N/A	100%
23	8-252	100%	50%	100%
24	8-253	N/A	N/A	33%

Note: *N/A - did not participate in the proficiency testing program

Table 3. Proportion of laboratories achieving 100% accuracy in the proficiency testing scheme for 2022 (Rounds 1 and 2) and 2023 (Round 3) in public and private laboratories for the detection of SARS-CoV-2 coronavirus RNA

Laboratories in the healthcare system	Percentage of labs that performed correctly from the number of participating in PTP		
	1st round 2022	2nd round 2022	3rd round 2023
Public	100% (13/13)	78.5% (11/14)	81.3% (13/16)
Private	40% (2/5)	85.7% (6/7)	80% (4/5)
Total	83.3% (15/18)	80.9% (17/21)	80.9% (17/21)

Table 4. Results obtained using PCR test systems for the detection of SARS-CoV-2 coronavirus RNA from different manufacturers

Name of diagnostic kit		Number of kits used			Number of false positive to true negative panel samples			Number of false negative to true positive panel samples			chi square, p = 0.05
Isolation of nucleic acids	Amplification and detection of PCR product	rounds			rounds			rounds			
		*I	II	III	I	II	III	I	II	III	
ALPREP, Algimed Techno	ALSENSE, Algimed Techno	1	1	1	0/1 (0%)	0/1 (0%)	0/1 (0%)	1/3 (33%)	0/3 (0%)	0/3 (0%)	0.74
ArtRNA Magnit, ArtbioTech	Art Test COVID-19, ArtbioTech	1	1	1	0/1 (0%)	0/1 (0%)	0/1 (0%)	0/3 (0%)	0/3 (0%)	0/3 (0%)	1
M-Sorb-NA, Synthol	RT-PCR-q-SARS-CoV-2-L, Synthol	1	1	1	0/1 (0%)	0/1 (0%)	0/1 (0%)	1/3 (33%)	0/3 (0%)	1/3 (33%)	0.5
A+CheQ COVID-19 RT-qPCR Detection kit, AMSBIO	A+CheQ COVID-19 RT-qPCR Detection kit, AMSBIO	1	1	N/A **	0/1 (0%)	0/1 (0%)	N/A	1/3 (33%)	2/3 (66%)	N/A	0.2
Proba-NK-S, DNA-Technology	SARS-CoV-2/SARS-CoV, DNA Technology	12	10	5	0/12 (0%)	1/10 (10%)	0/5 (0%)	0/36 (0%)	1/28 (4%)	0/14 (0%)	0.91
Ribo-prep, Amlisens	Cov-Bat-FL, Amlisens	3	1	N/A	0/3	0/1 (0%)	N/A	0/8 (0%)	1/3 (33%)	N/A	0.76
Ribo-prep, Amlisens	Sarbecov E gene EUA, TIB MOLBIOL	1	N/A	N/A	0/1 (0%)	N/A	N/A	0/3 (0%)	N/A	N/A	1
Xpert Xpress SARS-CoV-2, GeneXpert	Xpert Xpress SARS-CoV-2, GeneXpert	N/A	1	1	N/A	0/1 (0%)	0/1 (0%)	N/A	0/3 (0%)	0/3 (0%)	1
Proba-NK-S, DNA-Technology	Cov-Bat-FL, Amlisens	N/A	2	N/A	N/A	0/2 (0%)	N/A	N/A	0/2 (0%)	N/A	1
Proba-NK-S, DNA-Technology	AmpliSense COVID-19-FL, Amlisens	N/A	1	N/A	N/A	1/1 (100%)	N/A	N/A	1/3 (33%)	N/A	0.25
Ribo-prep, Amlisens	AmpliSense COVID-19-FL, Amlisens	N/A	4	12	N/A	1/4 (25%)	3/12 (25%)	N/A	1/12 (8%)	1/32 (3,1%)	0.3
Ribo-prep, Amlisens	SARS-CoV-2 Nuclea Acid detection kit, Tialong	N/A	1	1	N/A	0/1 (0%)	0/1 (0%)	N/A	0/3 (0%)	0/3 (0%)	1
Total		20	23	22	0/20 (0%)	3/23 (13%)	3/22 (13,6%)	3/59 (5%)	6/66 (9%)	2/61 (3,3%)	

Note: *I - Round-1 2022; II - Round-2 2022; III - Round-3 2023; ** N/A - not used

Regular conduct of PTP rounds (at least once every 6 months) and the availability of an analytical report that allows all participants to see their own results and an overall representation of the quality of testing for RNA SARS-CoV-2 by RT-PCR. The PT program offers opportunities to further improve diagnosis of SARS-CoV-2 both for the individual laboratory and at the level of the country's health care system.

Conclusions

1. Organized by an accredited provider and conducted on a regular basis National Program for External Quality Assurance by proficiency testing for the diagnosis of SARS-CoV-2 RNA by RT-PCR.

2. The proportion of laboratories that achieved 100% test accuracy in the three rounds of SARS-CoV-2 RNA varied from 81.3% to 83.3% ($p>0.05$).

3. The results of the PTP showed a relatively low level and lack of growth in the quality of control testing over three rounds in general for all laboratories, which prescribes the need for quality improvement measures both at the level of an individual laboratory and at the level of the healthcare system.

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БИРИНЧИ МЕДИЦИНАЛЫК-САНИТАРДЫК ЖАРДАМ КӨРСӨТҮҮЧҮ УЮМДАРГА КАРАТА ИННОВАЦИЯЛЫК ЫКМАЛАР: УЮШТУРУУ ЧЕЧИМДЕРИНИН ВАРИАНТТАРЫ

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Корутунду. Макала Россия Федерациясынын калкына биринчи медициналык-санитардык жардамды уюштурууга карата амбулаториялык шарттарда медициналык жардам көрсөтүүнүн жеткиликтүүлүгүн жана сапатын жогорулатууга багытталган инновациялык ыкмаларды баяндоого арналган. Авторлор тарабынан медициналык уюмга кайрылуу максатына жараша пациенттердин агымын бөлүштүрүүсу да кирген уюштуруучулук чечимдердин варианттары, шашылыш формасындагы медициналык жардам көрсөтүү боюнча бөлүмдөрдүн ишин уюштуруу, медициналык алдын алуу бөлүмдөрдүн ишин уюштуруу жана медициналык жана медициналык эмес персоналдын айрым категорияларынын ортосундагы функцияларды кайра бөлүштүрүү баяндалган. Бул чечимдерди колдонуу медициналык уюмдардын ресурстарын натыйжалуу пайдаланууга жана пациент үчүн оптималдуу күтүү убактысын камсыз кылууга мүмкүндүк берет. Авторлор тарабынан Россия Федерациясынын Саламаттык сактоо министрлигинин жана "ЦНИИОИЗ" Федералдык мамлекеттик бюджеттик мекемесинин пилоттук долбоорунун чегинде Россия Федерациясынын 50 субъектисинде ишке ашырылган уюштуруу чечимдерин жүзөгө ашыруу алгоритми келтирилген. Сунушталган уюштуруу чечимдеринин натыйжалуулугун баалоо иштелип чыккан критерийлердин негизинде жума сайын мониторинг режиминде ишке ашырылат. Биринчи медициналык-санитардык жардам көрсөтүүнү уюштурууга карата инновациялык ыкмалардын чегинде бизнес-процесстерди оптималдаштыруудагы негизги натыйжалары оорулууларды 35%га чейин жергиликтүү врач-терапевге каттоо үчүн бекер орундарды бошотуу болду, бул жеткиликтүүлүктү жогорулатууга жана кабыл алуу үчүн күтүү убактысын кыскарттууга; врачтардын кабыл алуусундагы медициналык кызматкерлердин профилдик эмес иш оордугун төмөндөтүүгө, медициналык кызматкерлердин кесиптик күйүп кетүү тобокелдигин азайтуу жана медициналык жардамга кайрылганда пациенттин канааттануусун жогорулатууга мүмкүнчүлүлүк берди.

Негизги сөздөр: биринчи медициналык-санитардык жардам, уюштуруу чечимдери, натыйжалуулукту баалоо, биринчи медициналык-санитардык жардамдын жеткиликтүүлүгү

ИННОВАЦИОННЫЕ ПОДХОДЫ К ОРГАНИЗАЦИИ ОКАЗАНИЯ ПЕРВИЧНОЙ МЕДИКО-САНИТАРНОЙ ПОМОЩИ: ВАРИАНТЫ ОРГАНИЗАЦИОННЫХ РЕШЕНИЙ

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Резюме. Статья посвящена описанию инновационных подходов к организации первичной медико-санитарной помощи населению Российской Федерации, направленных на повышение доступности и качества оказания медицинской помощи в амбулаторных условиях. Авторами описаны варианты организационных решений, включающие выделение потоков пациентов по цели их обращения в медицинскую организацию, организацию работы отделений по оказанию медицинской помощи в неотложной форме, организацию работы отделений медицинской профилактики и перераспределение функций между отдельными категориями медицинского и немедицинского персонала. Применение данных решений позволяет более рационально использовать ресурсы медицинских организаций и обеспечить оптимальные сроки ожидания для пациента. Авторами представлен алгоритм внедрения организационных решений, который реализован в 50 субъектах Российской Федерации в рамках пилотного проекта Министерства здравоохранения Российской Федерации и ФГБУ «ЦНИИОИЗ» Минздрава России. Оценка эффективности предложенных организационных решений осуществляется в режиме еженедельного мониторинга на основании разработанных критериев. Основными эффектами от оптимизации бизнес-процессов в рамках инновационных подходов к организации оказания ПМСП стало высвобождение свободных слотов для записи пациентов к врачу-терапевту участковому до 35%, что позволило увеличить

доступность и сократить время ожидания приема; снижение непрофильной нагрузки на медицинский персонала на врачебном приеме, снижение риска профессионального выгорания медицинских работников и повышение удовлетворенности пациентов при обращении за медицинской помощью.
Ключевые слова: первичная медико-санитарная помощь, организационные решения, оценка эффективности, доступность первичной медико-санитарной помощи

INNOVATIVE APPROACHES TO THE ORGANIZATION OF PRIMARY HEALTH CARE: ORGANIZATIONAL SOLUTIONS

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Abstract. The article describes innovative approaches to the organization and management of primary health care for the population of the Russian Federation, aimed at increasing the accessibility and quality of medical care in outpatient settings. The authors propose organizational solutions including the allocation of patient flows according to the purpose of their visit to a health organization, the organization of emergency medical care departments, the organization of preventive medicine departments and the redistribution of functions among certain categories of medical and non-medical personnel. Implementation of these solutions allows for a more rational use of the resources and ensures optimal waiting times for the patient. The authors present an algorithm which is implemented in 50 subjects of the Russian Federation as part of a pilot project of the Ministry of Health of the Russian Federation and Federal Research Institute for Healthcare Management and Informatization under the Ministry of Health of Russia. Performance evaluation of the proposed organizational solutions is carried out as weekly monitoring based on the developed criteria. The main effects of optimizing business processes as part of innovative approaches to PHC organization and management were the release of up to 35% free slots for registering patients with a district general practitioner which made it possible to increase accessibility and reduce waiting time for an appointment; reduction of the non-core workload on medical personnel at an appointment, risk reduction of professional burnout of health workers and increase in patient satisfaction when seeking medical care.
Keywords: primary health care, organizational solutions, performance evaluation, primary health care accessibility

Organization and management of primary health care (hereinafter referred to as PHC) as the most widespread type of medical care, including measures to identify risk factors, prevention, diagnosis, treatment, rehabilitation, and the formation of healthy lifestyle motivation, is of utmost importance for achieving the national development goal of the Russian Federation which is "Maintaining population, health and well-being of people"(defined by the Decree of the President of the Russian Federation) with the key performance indicator of life expectancy increase to 78 years by 2030.

Ensuring the accessibility of PHC is one of the priority tasks of the state healthcare system of the Russian Federation. The condition for its implementation is the rational use of all available resources and, first of all, human resources.

In recent years, within the framework of the state policy of the Russian Federation, unprecedented measures have been taken aimed at increasing the level of health personnel provision in primary care. These measures include the activities within the federal project "Providing health organizations in the healthcare system with qualified personnel" of the national project "Healthcare", targeted federal programs "Zemsky doctor" and "Zemsky feldsher", which made it possible to ensure a positive trend in the provision of both medical and paramedical personnel. At the same time, it should be noted that the problem of personnel shortage in healthcare has not been solved in any

country of the world. Taking into account the fact that health personnel is a resource with a fairly long renewal period, the effect of the measures taken today in the field of state personnel policy will be tangible only a few years later.

One of the options for organizational solutions within the framework of innovative approaches to organizing PHC aimed at increasing its accessibility and quality, is to change the processes within health organizations. This may include implementing approach of differentiated functional duties of doctors, organizing multidisciplinary medical teams, and expanding areas of responsibility of the paramedical personnel, as well as introducing jobs for non-medical personnel, such as administrators of doctor's appointments [2, 3].

To free up the doctor's working time which is not directly related to the provision of care to patients at the appointment, organizational models can be introduced to ensure the transfer of functions from the doctor to the nursing staff and workers with non-medical education [3].

To inform proposals regarding changes in organizational approaches in the provision of PHC, including expanding the role of paramedical personnel and involving non-medical personnel, in order to free up the working time of a doctor who is not directly related to the provision of medical care during a face-to-face appointment, the Federal Research Institute for Healthcare Management and Informatization under the Ministry of Health of the Russian Federation has carried out the analysis of regulatory legal acts that define the qualification requirements for health workers, the distribution of functional responsibilities in organizing medical appointments in a polyclinic, has defined the main processes in relation to the categories of medical personnel, conditions necessary for the redistribution of functions between medical and non-medical personnel, as well as possible risks when changing the organizational principles of PHC provision [5-9].

The key organizational solutions within the framework of the proposed model were:

- selecting patient flows according to the purpose of contacting a health organization and further routing of patients;

- organizing work of departments to provide emergency medical care;

- organizing work of prevention departments;

- redistributing functions between certain categories of medical and non-medical personnel in the organization of medical appointments in order to free up the doctor's time which is not directly related to the provision of medical care to patients during the appointment.

These organizational solutions are currently implemented in health organizations of 50 subjects of the Russian Federation which took part in a pilot project of the Ministry of Health of the Russian Federation and Federal Research Institute for Healthcare Management and Informatization to implement the developed methodological recommendations [4].

The algorithm for implementing organizational solutions includes six stages:

Stage 1. Assessment of readiness of regional health systems to participate in a pilot project.

Stage 2. Setting up criteria to include territorially allocated structural units of health organizations in the pilot project.

Stage 3. Development of criteria for assessing the implementation and dynamics of the implementation of organizational solutions at the level of a medical area and territorially allocated structural divisions.

Stage 4. Analysis of quantitative data in the monitoring format. Identification of non-optimal processes in the context of the subjects of the Russian Federation - participants of the project.

Stage 5. Setting up model of organizational solutions to optimize the flow of patients with different aims of visit.

Stage 6. Summing up the results of the project based on the outcomes of the redistribution of functions between the categories of health workers and the implementation of organizational solutions.

The interventions necessary for the implementation of the developed organizational solutions at the level of regional health care systems and individual medical organizations were as follows: analysis of the staffing table of health organizations and assessment of the need to introduce positions of personnel without medical education; development of job descriptions for personnel without medical education and amendments to the current job descriptions of medical personnel in compliance with labor laws; development and approval of local regulatory legal acts on the procedure for implementing organizational decisions to increase the amount of doctors' working time for patient reception and monitoring the implementation of organizational measures.

The developed criteria for evaluating the implementation of organizational solutions in the allocation of patient flows with a particular purpose of visit make it possible to assess the proportion of actually implemented interventions in the context of territorially allocated structural divisions of health organizations from their total number in the healthcare system of a subject of the Russian Federation.

The assessment of the implementation of organizational solutions on the redistribution of functions between certain categories of medical and non-medical personnel in order to free up doctor's time at an appointment not related to the provision of medical care is carried out in accordance with the target model for the redistribution of functions presented in the guidelines based on the proportion of health organizations ensuring the implementation of these activities from the total number of health organizations in the subject of the Russian Federation.

Thus, the optimal organizational model for the implementation of organizational solutions in the subject of the Russian Federation is the one in which the share of achieving the target indicators in accordance with the developed criteria is at least 75% for each of the organizational solutions

indicating an increase in the accessibility of PHC based on changing processes at the health organization level.

During the period of the pilot project the subjects of the Russian Federation have demonstrated a high potential for increasing the accessibility of PHC based on changing the use of available resources of health organizations, introducing the routing of patient flows according to the purposes of visit, reducing the waiting time for an appointment, and providing emergency care (including at home) within no more than two hours from the moment the patient applied, introducing employees without medical education into the staff of health organizations.

The main effects of optimizing business processes as part of innovative approaches to PHC organization and management were the release of free slots up to 35% for registering patients' appointments to a district general practitioner which made it possible to increase availability and reduce the waiting time for an appointment; reduction of non-core workload on medical staff at a medical appointment and leveling the risk of professional burnout of health workers.

The key indicator of the effectiveness of organizational solutions is the increase in the level of satisfaction of the population when applying for medical care, which is assessed in accordance with the methodology approved by the Ministry of Health of the Russian Federation. Thus, the subjects of the Russian Federation which ensured the formation of an optimal model in the implementation of organizational solutions demonstrate a pronounced positive trend in the population satisfaction indicator, which reveals the contingency of these parameters.

In general, the search and the scientific justification of new organizational solutions in the settings of limited resources of the healthcare system make it possible to increase the availability and quality of medical care and ensure the implementation of the state national policy aimed at achieving the national goals of the Russian Federation.

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РОССИЯ АРКТИКАСЫНДАГЫ ИШКАНАЛАРДЫН ЖУМУШЧУЛАРЫНДАГЫ ФИБРОГЕНДУУ АЭРОЗОЛДОРДУН ТАСИРИНЕН БОЛГОН ПРОФЕССИОНАЛДЫК ПАТОЛОГИЯСЫ

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Корутунду. Киришүү. Фиброгендик таасирде басымдуу болгон аэрозолдор (ФТБА) Арктикадагы ишканаларда эң маанилүү зыяндуу өндүрүш факторлорунун бири бойдон калууда. *Изилдөөнүн максаты*: Россия Арктикасында ФТБА пайда болуучу профессионалдык оорулардын өнүгүүсүнүн, структурасынын жана таралышынын өзгөчөлүктөрү. *Материалдар жана ыкмалар.* «Эмгек шарттары жана профессионалдык оорунун» социалдык-гигиеналык мониторингинин маалыматтары жана профессионалдык оорулардын учеттук картасынан алынган каттоо үзүндүлөрү (Россия Саламаттык сактоо министрлигинин 2001-жылдын 28-майындагы № 176 буйругу) изилденген. *Жыйынтыктар.* 2007-2021-жылдары ФТБА бардык зыяндуу өндүрүштүк факторлордун структурасында тогузунчу орунду (4,8%) жана профессионалдык ооруларды пайда кылуучу факторлордун ичинен бешинчи орунду (9,1%) ээлеген, алардын структурасында өнөкөт бронхит (87,7%) басымдуулук кылган. Кенчилердин арасында ФТБАдун таасиринен болгон профессионалдык оорулардын пайда болуу тобокелдиги металлургиялык (ОР=12,9; 95%сы 9,63-17,26; p<0,001), курулуш (ОР=11,7; 95%сы 10,78-19,11 p<0,0001) жана транспорт (ОР=31,3; 95%сы 10,11-77,19; p<0,001) ишканаларынын жумушчуларына караганда жогору болгон. 2007-2021-жылдары ФТБАдун таасиринен болгон оорулардын санынын азайышы байкалган жана 2019-2021-жылдары алардын өсүү тобокелдиги 2007-2009-жылга караганда төмөн болгон: ОР=2,10; 95%сы 1.19-3.71; p=0,009. *Тыянак.* Жетишилген оң натыйжаларга карабастан, Россиянын Арктикасындагы көмүр казып алуу ишканаларындагы проходчиктердин, шахтадагы тоо-кен жумушчулары, тоо-кен машиналарынын машинистери жана башка жумушчулары үчүн чаңды басуунун ыкмаларын жана дем алуу органдарын коргоону жакшыртуу артыкчылыгы сакталып калууда.
Негизги сөздөр: фиброгендик аэрозолдор, эмгек шарттары, профессионалдык патология, тоо-кен өнөр жайы, Арктика

ПРОФЕССИОНАЛЬНАЯ ПАТОЛОГИЯ ОТ ВОЗДЕЙСТВИЯ ФИБРОГЕННЫХ АЭРОЗОЛЕЙ У РАБОТНИКОВ ПРЕДПРИЯТИЙ В РОССИЙСКОЙ АРКТИКЕ

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Резюме. *Введение.* Аэрозоли преимущественно фиброгенного действия (АПФД) продолжают быть одним из важнейших вредных производственных факторов на предприятиях в Арктике. *Цель исследования:* особенности развития, структуры и распространенности в российской Арктике профессиональных заболеваний, вызванных АПФД. *Материалы и методы.* Изучены данные социально-гигиенического мониторинга «Условия труда и профессиональная заболеваемость» и регистра выписок из карт учета профессионального заболевания (Приказ Министерства здравоохранения России от 28.05.2001 г. № 176). *Результаты***.** В 2007-2021 годах АПДФ занимали девятое место (4,8%) в структуре всех вредных производственных факторов и пятое место (9,1%) - среди факторов, вызывавших профессиональные заболевания, в структуре которых доминировал хронический бронхит (87,7%). Риск развития профессиональных заболеваний от воздействия АПФД у горняков был выше, чем у работников металлургических (ОР=12,9; 95%ДИ 9,63-17,26; p<0,001), строительных (ОР=11,7; 95%ДИ 10,78-19,11 p<0,0001) и транспортных (ОР=31,3; 95%ДИ 10,11-77,19; p<0,001) предприятий. В 2007-2021 годах

отмечалось снижение числа заболеваний от воздействия АПФД, а риск их развития в 2019-2021 годах был ниже, чем в 2007-2009 годах: ОР=2,10; 95%ДИ 1,19-3,71; p=0,009. *Заключение*. Несмотря на достигнутые положительные результаты, сохраняется приоритет совершенствования методов пылеподавления и средств защиты органов дыхания у проходчиков, горнорабочих очистного забоя, машинистов горных выемочных машин и других работников угледобывающих предприятий в российской Арктике.
Ключевые слова: фиброгенные аэрозоли, условия труда, профессиональная патология, горнодобывающая промышленность, Арктика

FIBROGENIC AEROSOL-CAUSED OCCUPATIONAL DISEASES AMONG INDUSTRIAL WORKERS IN THE RUSSIAN ARCTIC

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Abstract. *Introduction*. Aerosols of predominantly fibrogenic action (APFE) are among the most important harmful production factors. *The aim of the study*: features of the development, structure and prevalence of occupational diseases caused by APFD in the Russian Arctic. Materials and methods. We studied the data of socio-hygienic monitoring "Working conditions and occupational morbidity" and the register of extracts from occupational disease records (Order of the Ministry of Health of Russia dated May 28, 2001 No. 176). *Results*. In 2007-2021, APDE ranked ninth (4.8%) in the structure of all harmful production factors and fifth (9.1%) among the factors that caused occupational diseases, in the structure of which chronic bronchitis dominated (87.7%). The risk of developing occupational diseases from exposure to APFE at mining was higher than at metallurgical (RR=12.9; 95% CI 9.63-17.26; p<0.001), construction (RR=11.7; 95% CI 10.78-19.11 p<0.0001) and transport (RR=31.3; 95% CI 10.11-77.19; p<0.001) enterprises. In 2007-2021, there was a decrease in the number of diseases from exposure to APFE, and the risk of their development in 2019-2021 was lower than in 2007-2009: RR=2.10; 95% CI 1.19-3.71; p=0.009. *Conclusion.* Despite the positive results, the priority remains to improve dust suppression methods and respiratory protection for drifters, longwall miners, mining machine operators and other workers of coal mining enterprises in the Russian Arctic.
Keywords: fibrogenic aerosols, working conditions, occupational pathology, mining industry, Arctic

Introduction

Aerosols with a predominantly fibrogenic effect (APFE) are among the most common health hazards for the working population in Russia [1], even though the degree of exposure of workers to industrial dust has been significantly reduced recently [2]. Thus, in Russia, from 2012 to 2021, the proportion of air samples exceeding the maximum permissible concentration (MAC) for dust decreased from 2.60% to 1.75%. Against the background of a decrease in dust load at workplaces, the importance of APFE among the risk factors for the development of occupational diseases is decreasing also, giving way to physical and biological factors, increased severity of work, and harmful chemicals. However, in 2021, 28.35% of newly diagnosed cases of pneumoconiosis, 23.45% of chronic obstructive pulmonary disease, 15.4% of chronic bronchitis and 10.36% of bronchial asthma had dust etiology[1].

The aim of the study was to analyze features of the development, structure and prevalence of occupational diseases caused by APFE in the Russian Arctic.

[1] On the state of sanitary and epidemiological well-being of the population in the Russian Federation in 2021: State report. – M.: Federal Service for Supervision of Consumer Rights Protection and Human Welfare, 2022.

Materials and methods

We studied the data of the socio-hygienic monitoring program "Working conditions and occupational morbidity" and the register of extracts from occupational disease records (Order of the Ministry of Health of Russia of May 28, 2001 No. 176 “On Improving the System for Investigating and Recording Occupational Diseases in the Russian Federation”, Annex No. 5) for the period 2007-2021 within the boundaries of the Arctic zone of the Russian Federation[2].

When processing the obtained results, the relative risk (RR), 95% confidence interval (95% CI), $\chi 2$ test were determined. The significance level of the null hypothesis was considered critical at $p<0.05$.

Results

In 2007-2021, APFE ranked ninth (4.8%) in the structure of harmful production factors to which workers were exposed at enterprises in the Russian Arctic The largest share of people exposed to APDE was noted in metallurgy, which was higher than in the mining industry ($\chi 2 = 259.2$; $p<0.001$), construction industry ($\chi 2 = 632.6$; $p<0.001$) and transport ($\chi 2 = 4242 .9$; $p<0.001$).

In 2007-2021, 941 new occupational diseases caused by APFE were identified in the Russian Arctic. In the structure of harmful production factors that led to the formation of occupational pathology, APFE occupied the fifth place (9.1%) after the increased labor severity, noise, hand-arm and whole-body vibration.

Among persons with occupational pathology predominated men of retirement age who were employed at mining enterprises. Of the miners, 783 (83.2%) employees carried out coal mining and coal beneficiation, and 83 (8.8%) employees were engaged in the extraction and dressing of metal and non-metal ore raw materials, as well as precious metal sands. The risk of developing occupational diseases from exposure to APFE in miners was higher than in metallurgical (RR=12.9; 95% CI 9.63-17.26; $p<0.001$), construction (RR=11.7; 95% CI 10.78-19.11 $p<0.0001$) and transport (RR=31.3; 95% CI 10.11-77.19; $p<0.001$) workers. Chronic bronchitis dominated in the structure of occupational diseases (87.7%). Pneumoconiosis (8.1%), bronchial asthma (1.8%), neoplasms of the respiratory organs (1.1%) were detected much less frequently.

Occupational diseases of dust etiology were distributed extremely unevenly across the subjects of the Russian Arctic. Thus, 727 (77.3%) diseases were detected in the Arctic part of the Komi Republic, 96 (10.2%) in the Chukotka Autonomous Okrug, 76 (8.1%) in the Murmansk Region, 24 (2. 6%), Arctic regions of the Republic of Yakutia - 12 (1.3%). 2 cases of diseases were diagnosed in each of the following subjects: in the Arctic parts of the Arkhangelsk region and the Republic of Karelia, as well as in the Yamalo-Nenets Autonomous Okrug.

[2] Decree of the President of the Russian Federation of May 2, 2014 No. 296 “On land territories of the Arctic zone of the Russian Federation”

In 2007-2021, the annual number of occupational diseases also differed significantly in the Russian Arctic. In 2008-2009, an increase in their number was noted. In 2010-2013, stabilization at a new higher level followed. In 2014-2016, the first decrease, and since 2017 the second decrease took place. As the trend lines show, in 2007-2021, the number of all occupational diseases tended to increase, while diseases caused by dust exposure, on the contrary, to decrease (Figure). As a result, the risk of developing diseases of dust etiology in 2019-2021 became lower than in 2007-2009: RR=2.10; 95% CI 1.19-3.71; p=0.009.

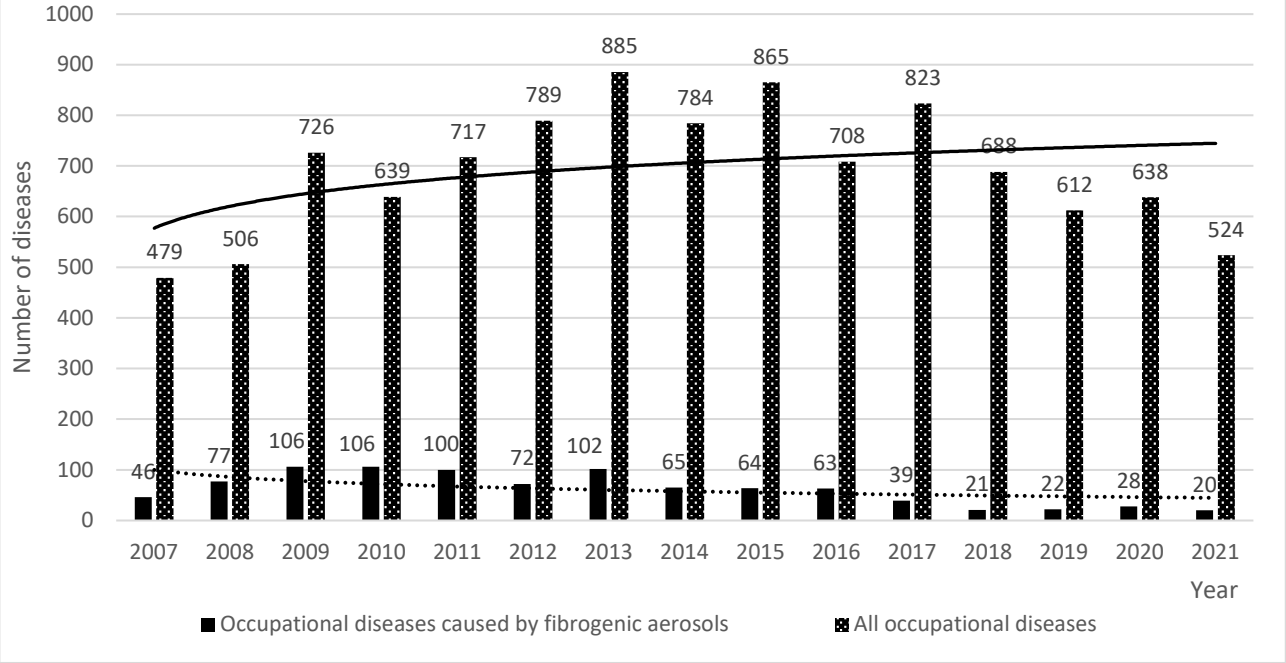

Figure. Annual number of newly diagnosed occupational diseases in the Russian Arctic in 2007-2021

Discussion

The presented study revealed a number of data that deserve attention and discussion. First of all, in the Russian Arctic in 2007-2021, as in Russia as a whole, there was no tendency to reducing the share of APFE in the structure of harmful production factors to which workers of industrial enterprises were exposed.

For 15 years, the risk of developing occupational diseases of dust etiology in mining workers was higher than in all other types of economic activity. However, it is important to note the downward trend in the number of newly diagnosed occupational diseases caused by APFE. This fact can be explained by an increase in the effectiveness of personal respiratory protective equipment and medical recreational activities [3, 4], since there was no decrease in the exposure of workers to APDE.

In the Russian Arctic, chronic bronchitis was the most frequently detected occupational disease from exposure to aerosols of varying degrees of fibrogenicity (almost 90% of cases). Probably, this is a consequence of the predominance of weakly fibrogenic aerosols among harmful production factors. The detection of almost 80% of APFE-caused occupational diseases in the Arctic

part of the Komi Republic confirms the fact that at present the main cause of their development is coal dust during the extraction and dressing of coal [5, 6].

Conclusion. In 2007-2021, fibrogenic aerosols ranked fifth (9.1%) among the harmful factors that caused occupational diseases and ninth (4.8%) in the structure of harmful production factors at enterprises in the Arctic. Diseases of dust etiology developed mainly in workers of coal enterprises (83.2%) with the dominance of chronic bronchitis in their structure (87.7%). In general, over the course of 15 years, there was a downward trend in the number of occupational diseases from exposure to fibrogenic aerosols, and the risk of their development in 2019-2021 was lower than in 2007-2009: RR=2.10; 95% CI 1.19-3.71; p=0.009. Despite the positive results, there remains a priority need to improve dust suppression methods and respiratory protection for coal mining workers in the Russian Arctic.

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КАЛКТЫН САНИТАРДЫК-ЭПИДЕМИОЛОГИЯЛЫК ИЙГИЛИКТҮҮЛҮГҮН КАМСЫЗ КЫЛУУДАГЫ АЗЫРКЫ УЧУРДУН МААЛЫМАТТЫК ТЕХНОЛОГИЯЛАРЫ

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Корутунду. Калктын санитардык-эпидемиологиялык ийгиликтүүлүгүн камсыз кылуу маселеси улуттук коопсуздуктун милдети. Бул тармактагы маанилүү көйгөйлөрдүн бири маалыматтык камсыздоонун алсыздыгы болуп саналат, бул санитардык-эпидемиологиялык ийгиликтүүлүктү жакшыртуу боюнча кабыл алынган башкаруу чечимдеринин жетишсиз натыйжалуулугуна алып келет. Бул маселени чечүү үчүн картографиялык интерфейси менен болгон азыркы учурдагы санариптик маалыматтык-аналитикалык системаларды түзүү зарыл. Ата мекендик жана чет элдик тажрыйбанын анализи азыркы учурда калктын санитардык-эпидемиологиялык ийгиликтүүлүк маселеси боюнча толук кандуу картографиялык онлайн ресурстары жок экендигин көрсөттү. Бул медициналык-демографиялык, социалдык-экономикалык жана санитардык-эпидемиологиялык маалыматтарды чогултуу, системалаштыруу жана анализдөө үчүн бирдиктүү санариптик платформаны түзүүгө шарт түзөт. Изилдөөнүн максаты - калктын санитардык-эпидемиологиялык ийгиликтүүлүгүнүн абалы жөнүндө маалыматты чогултуу, иштетүү, анализдөө жана визуализациялоо үчүн замандын эң алдыңкы ыкмаларын иштеп чыгуу жана Роспотребнадзордун иш-аракетине киргизүү. 2007-2020-жылдардагы Россия Арктикасынын калкынын санитардык-эпидемиологиялык ийгиликтүүлүгүнүн абалы жөнүндө маалыматтар, 2018-2021-жылдарга борборлоштурулган ичүүчү суу менен камсыздоо системаларындагы суунун сапатынын лабораториялык изилдөөлөрүнө анализ жүргүзүлдү. Санариптик системаны түзүү үчүн геомаалыматтык ArcGIS Server Advanced Enterprise 10.7 платформасы колдонулган. Жыйынтыктарды визуализациялоо үчүн маалыматтарды чогултуу, сактоо жана анализдөө картографиялык тиркемеси менен болгон көп деңгээлдеги системадагы геомаалыматтык порталынын концепциясы иштелип чыгып, «Россия Арктикасынын калкынын санитардык-эпидемиологиялык ийгиликтүүлүгү» базалык версиясы түзүлгөн. Геопортал Россиядагы жана дүйнөдөгү калктын санитардык-эпидемиологиялык ийгиликтүүлүгүнүн абалына арналган биринчи маалыматтык картографиялык интернет-ресурс болуп саналат. Геопортал муниципалдык райондордун, субъектилердин же Россиянын Арктика зонасынын жалпы территориялык түстүү индикациясынын кезилишинде мейкиндикке байланышкан маалыматтарды визуализациялоого мүмкүндүк берет. Өтө көйгөйлүү территорияларды идентификациялоого жардам берет. Маалыматтарды таблица түрүндө жана гистограмма түрүндө берүү функциясы ишке ашырылган. «Таза суу» федералдык долбоорунун чегинде калкка жана бийлик органдарына конкреттүү дарек боюнча ичүүчү суунун сапаты жөнүндө маалымат берүү максатында «Россия Федерациясындагы ичүүчү суунун сапатын көзөмөлдөөнүн интерактивдүү картасы» маалыматтык системасы түзүлүүдө. 2018-2021-жылдары борборлоштурулган ичүүчү жана үй тиричилик-чарбалык суу менен камсыздоо системасындагы суунун сапатынын лабораториялык изилдөөлөрүнүн жыйынтыктарын, контролдук точкалар жөнүндөгү маалыматтарды киргизүүнүн техникалык талаптары жана форматтары иштелип чыккан; жыйынтыктарды визуализациялоо үчүн картографиялык тиркемеси менен болгон маалымат системасы түзүлгөн. Жүргүзүлгөн текшерүү иштери иштелип чыккан системанын натыйжалуулугун көрсөттү, бул аларды Роспотребнадзордун иш-аракетине киргизүүгө мүмкүндүк берди.

Негизги сөздөр: санитардык-эпидемиологиялык ийгиликтүүлүк; геомаалымат системасы; «Россия Арктикасынын калкынын санитардык-эпидемиологиялык ийгиликтүүлүгү» геопорталы; ичүүчү суунун сапатын көзөмөлдөөнүн интерактивдүү картасы.

СОВРЕМЕННЫЕ ИНФОРМАЦИОННЫЕ ТЕХНОЛОГИИ ОБЕСПЕЧЕНИЯ САНИТАРНО-ЭПИДЕМИОЛОГИЧЕСКОГО БЛАГОПОЛУЧИЯ НАСЕЛЕНИЯ

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Резюме. Проблема обеспечения санитарно-эпидемиологического благополучия населения - задача национальной безопасности. Одной и важных проблем в этой сфере является слабость информационного обеспечения, что приводит к недостаточной эффективности управленческих решений, принимаемых для улучшения санитарно-эпидемиологического благополучия. Для решения этой проблемы необходимо создание современных цифровых информационно-аналитических систем с картографическим интерфейсом. Анализ отечественного и зарубежного опыта показал, что в настоящее время не существует полноценного картографического онлайн ресурса по вопросам санитарно-эпидемиологического благополучия населения. Это обуславливает необходимость создания Единой цифровой платформы для сбора, систематизации и анализа медико-демографических, социально-экономических и санитарно-эпидемиологических данных. Целью исследования являлась разработка и внедрение в деятельность Роспотребнадзора современного инструмента для сбора, обработке, анализа и визуализации информации о состоянии санитарно-эпидемиологического благополучия населения. Проанализированы данные о состоянии санитарно-эпидемиологического благополучия населения Российской Арктики за 2007-2020 годы, лабораторные исследования качества воды централизованных систем питьевого водоснабжения за 2018-2021 годы. Для создания цифровой системы использовалась геоинформационная платформа ArcGIS Server Advanced Enterprise 10.7. Разработана концепция и сформирована базовая версия геоинформационного портала «Санитарно-эпидемиологическое благополучие населения Российской Арктики», который представляет собой многоуровневую систему сбора, хранения и анализа данных с картографическим приложением для визуализации результатов. Геопортал является первым в России и в мире информационным картографическим интернет-ресурсом, посвященный состоянию санитарно-эпидемиологического благополучия населения. Геопортал позволяет визуализировать пространственно-привязанные данные в разрезе муниципальных районов, субъектов или Арктической зоны России в целом с цветовой индикации территорий. Позволяет наглядно идентифицировать наиболее проблемные территории. Реализована функция представления данных в табличном виде и в виде гистограмм. В рамках федерального проекта «Чистая вода» создается информационная система «Интерактивная карта контроля качества питьевой воды в Российской Федерации» с целью предоставления населению и органам власти информации о качестве питьевой воды по конкретному адресу. В 2018-2021 году разработаны технические требования и форматы внесения данных о точках контроля, результатов лабораторных исследований качества воды централизованных систем питьевого и хозяйственно-бытового водоснабжения, создана информационная система с картографическим приложением для визуализации результатов. Проведенная апробация показала эффективность разработанных систем, что позволило внедрить их в деятельность Роспотребнадзора.
Ключевые слова: санитарно-эпидемиологическое благополучие; геоинформационная система; Геопортал «Санитарно-эпидемиологическое благополучие населения Российской Арктики»; интерактивная карта контроля качества питьевой воды.

THE MODERN INFORMATION TECHNOLOGIES FOR ENSURING THE SANITARY AND EPIDEMIOLOGICAL WELLBEING OF THE POPULATION

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Abstract. The problem of ensuring the sanitary and epidemiological well-being of the population is a task of national security. One of the important problems in this area is the weakness of information support, which leads to insufficient efficiency of management decisions. To solve the problem, it is necessary to create modern digital information and analytical systems with a cartographic interface. An analysis of domestic and foreign experience has shown that at present there is no full-fledged cartographic online resource on the issues of sanitary and epidemiological welfare of the population. This necessitates the creation of a single digital platform for the collection, systematization and analysis of medical and demographic, socio-economic and sanitary and epidemiological data. The aim of the study was to develop and introduce into the activities of Rospotrebnadzor a modern tool for collecting, processing, analyzing and visualizing information on the state of sanitary and epidemiological well-being of the population. Data on the state of sanitary and epidemiological well-being of the population of the Russian Arctic for 2007-2020, laboratory studies of water quality in centralized drinking water supply systems for 2018-2021 are analyzed. The geoinformation platform ArcGIS Server 10.7 was used to create the digital system. The concept and basic version of the geoinformation portal "Sanitary and epidemiological well-being of the population of the Russian Arctic" has been developed, which is a multi-level system for collecting, storing and analyzing data with a cartographic application for visualizing the results. The geoportal is the first information cartographic Internet resource in Russia and in the world dedicated to the state of sanitary and epidemiological well-being of the population. The geoportal allows you to visualize spatially-referenced data in the context of municipal districts, constituent entities or the Arctic zone of Russia as a whole from the color indication of territories. Allows you to visually identify the most problematic areas. The function of presenting data in tabular form and in the form of histograms has been implemented. Within the framework of the Clean Water federal project, an information system "Interactive map of drinking water quality control in the Russian Federation" is being created in order to provide the population and authorities with information about the quality of drinking water at a specific address. In 2018-2021, technical requirements and formats for entering data on control points, the results of laboratory studies of water quality of centralized drinking and domestic water supply systems were developed, an information system with a mapping application for visualizing the results was created. The conducted approbation showed the effectiveness of the developed systems, which made it possible to introduce them into the activities of Rospotrebnadzor.
Key words: Key words: sanitary epidemiologic wellbeing; geographic information system; Geoportal «Sanitary and epidemiological well-being of the population of the Russian Arctic2; interactive drinking water quality control map.

Introduction

Today the problem of ensuring the sanitary and epidemiological well-being of the population is a task of national security. Sanitary and epidemiological well-being of the population is the state of health of the population, the human environment, in which there is no harmful effect of environmental factors on a person and favorable conditions for his life are provided [1]. From the moment of its creation to the present, the system of social and hygienic monitoring (SHM) - one of the tools for ensuring sanitary and epidemiological well-being - has been functioning as a system for the long-term collection, processing and analysis of data on the state of environmental factors (atmospheric air, drinking water, soil, physical factors) and public health, medical, demographic and socio-economic indicators [2]. Based on the results of the SHM, information materials are formed on the state of the sanitary and epidemiological well-being of the population [3]. When conducting SHM, difficulties arise: the search for indicators that are adequate to the goals of SHM and testify to the influence of environmental factors on the health of the population. Methodological approaches to the formation of programs for laboratory studies of the environment have not been sufficiently developed. The possibilities of interdepartmental exchange of information on the state of health of the population, natural-climatic, socio-economic and environmental-hygienic factors are limited [4]. The lack of a differentiated approach to analytical data processing makes it difficult to establish causal relationships between the health status of the population and the environment. The weakness of information support is one of the main reasons for making insufficiently effective management decisions, which can lead

to management errors in 85-90% of cases [5].

Modern society, taking into account the ever-increasing possibilities of digital information technologies, has a reasonable need to inform about the state of sanitary and epidemiological well-being. An analysis of domestic and foreign experience has shown that at present there is no full-fledged cartographic online resource on the issues of sanitary and epidemiological welfare of the population.

The priority of creating open digital Internet resources that ensure the convenience of collecting, processing and analyzing information is also emphasized in the passports of the federal project "Digital Public Administration" [6] and the national project "Digital Economy of the Russian Federation" [7]. The advantage of these technologies is the convenience of collecting, analyzing and visualizing information directly related to the territory, which is especially important when working with large volumes of data tied to large areas [4, 8].

Among the promising tools for ensuring the sanitary and epidemiological well-being of the population, the following should be highlighted:

- Automation of the collection and analysis of data on the sanitary and epidemiological well-being of the population.

- Implementation of digital methods for data analysis using geographic information systems (GIS).

- Application of artificial intelligence to analyze large amounts of data on the state of public health and environmental factors.

All of the above necessitates the creation of a single digital platform for the collection, systematization and analysis of medical and demographic, socio-economic and sanitary and epidemiological data.

The purpose of the study: development and implementation in the scientific and practical activities of Rospotrebnadzor of a modern tool for collecting, processing, analyzing and visualizing information on the state of sanitary and epidemiological well-being of the population.

Materials and methods

Data on the state of sanitary and epidemiological well-being of the population of the Russian Arctic for 2007-2020, laboratory studies of water quality in centralized drinking and domestic water supply systems for 2018-2021, ESRI ArcGIS for Server Advanced Enterprise 10.7, statistical data processing.

Results

For visual representation of information on the state of sanitary and epidemiological well-being of the population in the context of large areas, it is convenient to use electronic atlases, which are traditionally divided into 5 types:

Type 1 - Fixed sets of video screen copies ("slides") or other raster cartographic graphics.

Type 2 - Generation of scalable vector maps (more often fixed sets) prepared on the basis of

digital maps or a set of GIS layers, from visualizations of a fixed list of content elements.

Type 3 - Type II electronic atlases with additional features, including access to the attributive part of the data, its addition with user data, the introduction of new (usually point) objects and their attribution, visualization.

Type 4 - Hybrid electronic atlases that provide visualization and navigation in heterogeneous graphic and non-graphic environments.

Type 5 - Similar to the fourth type of electronic atlases, supplemented by the design and creation of cartographic images, close or identical to full-featured cartographic visualizers.

At present, the improvement of the system for collecting information on the state of health of the population and environmental factors is becoming relevant. The problems of collecting, analyzing and visualizing large amounts of information related to the territory ("tied to a map") can be effectively solved using geographic information systems (GIS).

The concept of the Geoportal created by the authors is built on the basis of a geographic information system (GIS), a database server and an array of information about the factors of the human environment, the state of health of the population, socio-economic and medical-demographic indicators using information-analytical tools and methods of spatial data processing.

The geoportal was created as a multi-level system for collecting, storing and analyzing data, which is implemented on a cartographic basis and includes:

− the actual cartographic part;

− various spatial objects associated with the map;

− a set of analytical and calculation methods;

− managerial and expert decisions based on data analysis.

ESRI ArcGis Server Advanced Enterprise 10.7 software was chosen as the software environment for implementation. The visual implementation is based on a website on the Internet with access through a web browser window.

The geoportal covers the entire territory of the Russian Arctic, and these are 9 subjects wholly or partially included in the Arctic zone and more than 60 municipal districts within them. For each of them, a systematic collection of statistical information on the state of environmental factors and public health is carried out.

The list of data uploaded and processed in the Geoportal covers all important indicators of sanitary and epidemiological well-being in the territory.

Key features of the Geoportal include:

- implementation based on a geoinformation server, which provides interactivity and the ability to access from anywhere in the country and the world through a web browser, as well as the possibility of semi-automatic entry of relevant data from various sources thanks to the appropriate

download services.

- the possibility of multi-level access for different categories of users: bodies and institutions of Rospotrebnadzor, administrations of Russian regions, healthcare institutions, scientific and educational institutions.

At its core, the Geoportal is the first in Russia (and, possibly, in the world) information cartographic Internet resource dedicated to the problems of sanitary and epidemiological well-being of the population as a whole.

Currently, a website has been created at rusarctic.com with informational content on the problems of the impact of the environment on the health of the population in the Russian Arctic. The site has a personal user account with the ability to download, upload documents and view the history of events.

The cartographic application of the Geoportal allows you to visualize arrays of spatially referenced data in the context of municipal districts, constituent entities or the Arctic zone of the Russian Federation as a whole with the possibility of color indication of territories (gradient fill). Spatial analysis of the distribution of indicators and its visualization make it possible to visually identify the most problematic areas according to the selected indicator. The function of presenting spatially referenced data in tabular form and filtering them has been implemented (Fig. 1).

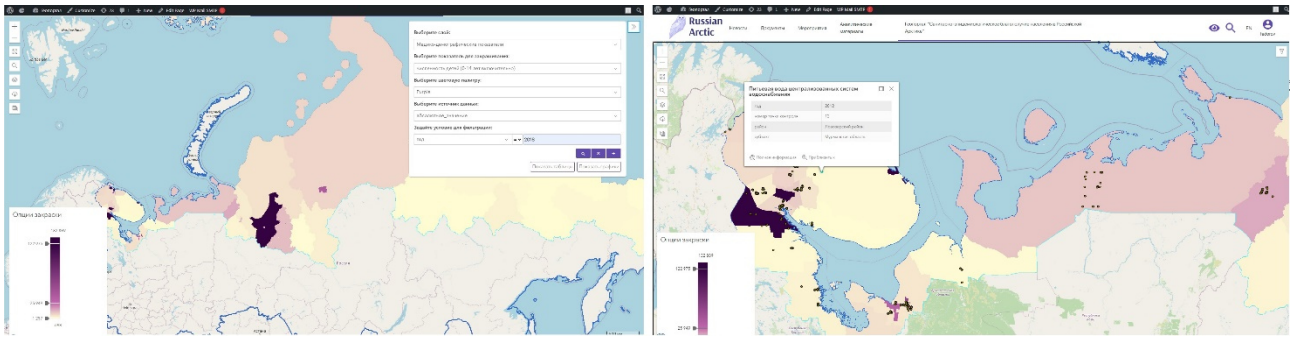

Figure 1. Examples of visualization of data characterizing the sanitary and epidemiological well-being of the population of the Russian Arctic

Data visualization tools have been developed using graphs, charts and histograms with the ability to build a trend to predict the dynamics of an indicator based on an analysis over the past period (Fig. 2).

In Russia, the regulation of drinking water quality remains the most important area of health protection and improvement of the quality of life of the population [9]. An analysis of the state of providing drinking water to the population of Russia for 2008-2017 revealed a number of main directions for eliminating the existing shortcomings, which were reflected in the federal project "Clean Water" [10].

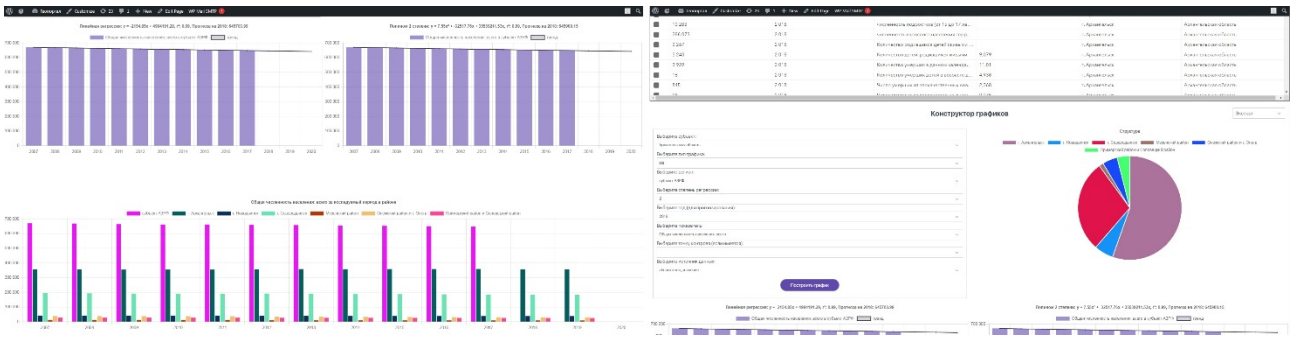

Figure 2. - Examples of data analysis characterizing the sanitary and epidemiological well-being of the population of the Russian Arctic.

The most informative and reliable source for assessing the quality of drinking water are the results of systematic laboratory studies during social and hygienic monitoring (SHM) and production control [11]. In order to integrate data on the quality of drinking water, which makes it possible to improve the accuracy of assessing the quality of drinking water and, as a result, to develop adequate measures to improve the quality of drinking water, methodological recommendations were developed and approved [12], which define approaches to the selection of control points in within the framework of the SHM, taking into account the size of the population; model passports for collecting information on the quality of drinking water have been developed; minimum mandatory lists of indicators for monitoring the safety and quality of drinking water, depending on the location of the point; the principles of organizing production control of the quality and safety of drinking water, the use of its results for a comprehensive assessment of the quality of drinking water, etc. are proposed.

Within the framework of the Clean Water federal project, an information system “Interactive map of drinking water quality control in the Russian Federation” (IS ICC) is being created, the main task of which is to provide the population with information about the quality of drinking water at a specific address [13]. In 2018-2021, technical requirements were developed, formats were developed for entering data on control points, the results of laboratory studies of water quality in centralized drinking and domestic water supply systems, and an information system was created (Fig. 3).

Information on more than 29.6 thousand drinking water quality control points of centralized drinking water supply systems and more than 72 million results of laboratory tests conducted during 2018-2023 has been entered into the database of IS KIK.

In the ICC IS, analytical processing of the entire array of information collected in an interactive map for each centralized cold water supply system is carried out to establish the compliance of drinking water with the “quality” category, identify problematic aspects in the organization of water supply to the population, predict the situation, and establish cause-and-effect relationships in the field of “water- health” and the formation of managerial decisions.

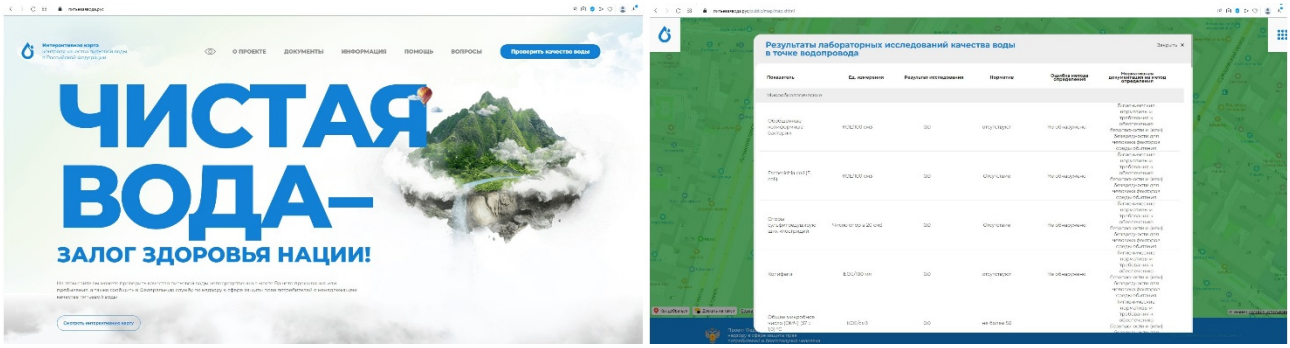

Figure 3. - Information system "Interactive map of drinking water quality control in the Russian Federation" and information on the quality of drinking water

Discussion

At its core, the Sanitary and Epidemiological Well-Being of the Population in the Russian Arctic Geoportal is an information and analytical system with an extensive database of environmental factors and the state of health of the population, which can be used as an effective tool for assessing the sanitary and epidemiological well-being of the population in the Russian Arctic as a whole and in individual territories, as well as a tool for substantiating management decisions in the field of preserving the sanitary and epidemiological well-being of the population and planning urban planning and environmental activities.

Conclusion

Formed technical requirements for software and hardware. Methodological approaches to the collection, analysis and visualization of information have been developed. A program has been created for generating a summary file from FIF SGM templates and statistical reporting forms. A site was developed on the basis of which a Geoportal with a basic set of functionality was deployed, and a site "Interactive map of drinking water quality control in the Russian Federation". The primary approbation of the efficiency and convenience of information resources was carried out.

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ПРОФЕССИОНАЛДЫК ЗЫЯНДУУЛУКТУН ТААСИР БЕРҮҮ ШАРТЫНДА ДЕРМАТОЛОГИЯЛЫК ООРУЛАРДЫН СТРУКТУРАСЫНЫН ӨЗГӨЧӨЛҮКТӨРҮ

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Ф.Ф. Эрисман атындагы гигиена Федералдык илимий борбору кардарлардын укуктарын жана адамдын жашоо ийгиликтүүлүгүн коргоо тармагындагы көзөмөлдөө боюнча Федералдык кызматы, Федералдык бюджеттик илимий мекемеси, Москва, Россия Федерациясы

Корутунду. Акыркы жылдары Россия Федерациясында аныкталган профессионалдык оорунун деңгээлинин төмөндөөсүнө карабастан (2012-жылдан 2021-жылга чейин 56,9%га) 2021-жылы өндүрүштүк химиялык факторлордун таасири менен байланышкан оорулар бардык жаңы аныкталган профессионалдык оорулардын 14,8% түзөт. Зыяндуу эмгек шартында иштеген жумушчулардын ден соолугун жана профессионалдык узак иштөөсүн сактоо үчүн профессионалдык тери ооруларын эрте аныктоо, дарылоо жана алдын алуу социалдык-экономикалык жактан эң чоң мааниге ээ. Биздин изилдөөлөрүбүздүн максаты ири машина куруучу ишканада көп жылдан бери иштеген жумушчулардын арасында дерматологиялык ооруларды изилдөө, теринин профессионалдык патологиясынын жана профессионалдык стигманын баштапкы көрүнүштөрүн аныктоо болгон. Биздин изилдөөлөрүбүздүн жүрүшүндө ири машина куруучу ишканада көп жылдан бери иштеген 680 жумушчулардагы дерматологиялык ооруларына анализ жүргүзүлдү, алардын 201 зыяндуу эмгек шарттарында иштеген, 5 жылдан 25 жылга чейинки иш стажысы менен болгон, 24 жаштан 69 жашка чейинки аялдар болгон, төмөнкү профессионалдык топтору алынган: полировщиктер, металлдарды жана эритмелерди эритүүчүлөр, электр ширетуучулер, жылмалоочулар, электроэро-зионисттер, пирометристер, насостук станциялардын машинистери, слесарь-чогултуучулар, термистамдар, гальваниктер жана башкалар. Ишканадагы негизги жагымсыз факторлор (атайын эмгек шарттарынын баалоосу боюнча (АЭШБ)) микроклиматты жылытуучу химиялык жана физикалык факторлор болгон. Жумушчулардын 31,8% (210 адам) теринин патологиясы аныкталды. Аныкталган теринин патологиялары: эпидермоз 46 (21,9%), аллергиялык дерматоздор 34 (16,2%), 21 (10%), псориаз 15 (7,1%), себорейндик дерматит 16 (7,6%), безетки оорусу 12 (5,7%), атопиялык дерматит 11 (5,2%), зыяндуу эмес жаңы пайда болгон шишиктер 41 (19,5%), теринин башка оорулары жана бшкалар 14 (6,8%). Өтө көп кездешүүчү профессионалдык стигмалар: мозолдуулук, манжалардын жана алакандагы гиперкератоз, алакандын бетиндеги гиперкератозу 35%да (231 адам) белгиленген, негизинен абразивдик материалдар менен байланышта болгон жылмалоочуларда, полировщиктерде, ошондой эле электроэрозионисттерде жана электр-газ менен ширетүүчүлөрдө болгон. Теринин эпидермоз жана профессионалдык стигмалар түрүндөгү спецификалык өзгөрүүлөрү аныкталган, ал эми дерматологиялык оорулардын калган структурасында микоздорго карата жана аллергиялык дерматоздор боюнча жалпы популациялыктан олуттуу айырмаланбайт, себореялык дерматит - популяциялыктан бир аз жогору. Жүргүзүлгөн изилдөөлөр теринин профессионалдык патологиясынын түзүлүүсү боюнча потенциалдык тобокелдик тобун аныктоого мүмкүндүк берди, демек бул ишканада тери ооруларын алдын алуудагы азыркы учурдун ыкмаларын иштеп чыгуу жана ишке ашыруу керек.

Негизги сөздөр: медициналык текшерүүлөр, профессионалдык дерматоздор, эмгектин зыяндуу шарттары

ОСОБЕННОСТИ СТРУКТУРЫ ДЕРМАТОЛОГИЧЕСКОЙ ЗАБОЛЕВАЕМОСТИ В УСЛОВИЯХ ВОЗДЕЙСТВИЯ ПРОФЕССИОНАЛЬНЫХ ВРЕДНОСТЕЙ

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Резюме. Несмотря на выявляемое снижение уровня профессиональной заболеваемости в Российской Федерации за последние годы (на 56,9% с 2012 по 2021гг) заболевания, связанные с воздействием производственных химических факторов, составляет 14,8% от всех впервые выявленных профессиональных заболеваний в 2021 году. Раннее выявление, лечение и профилактика профессиональных заболеваний кожи имеют важное социально-экономические значение для сохранения профессионального долголетия и здоровья работающих во вредных условиях труда. Целью нашего исследования было изучить дерматологическую заболеваемость у стажированных рабочих на крупном машиностроительном предприятии, выявить начальные проявления профессиональной патологии кожи и профессиональные стигмы. В ходе нашего исследования был проведен анализ дерматологической заболеваемости, обследованных 680 рабочих крупного машиностроительного предприятия, из них 201 женщина, со стажем работы от 5 до 25 лет во вредных условиях труда, в возрасте от 24 до 69 лет. профессиональные группы были представлены: полировщиками, плавильщиками металлов и сплавов, электросварщиками, шлифовщиками, электро-эрозионистами, пирометристами, машинистами насосной станции, слесарями-сборщиками, термистами, гальваниками и др. Основными неблагоприятными факторами производственной среды (по данным специальной оценки условий труда (СОУТ)) были химический и физический фактор, нагревающий микроклимат. Нами выявлена патология кожи у 31,8% рабочих (210 человек). Выявленная патология кожи была представлена: эпидермоз 46 (21,9%), аллергодерматозы 34 (16,2 %), 21 (10%), псориаз 15 (7,1%), себорейный дерматит 16 (7,6%), угревая болезнь 12 (5,7%), атопический дерматит 11 (5,2%), доброкачественные новообразования 41 (19,5%), другие заболевания кожи и др. 14 (6,8%). Наиболее часто встречаемые профессиональные стигмы: омозолелости, гиперкератоз пальцах и ладонной поверхности ладоней отмечались у 35 % (231человек), в основном у шлифовщиков, полировщиков, контактирующих с абразивными материалами, а также электроэрозионистов и электро-газосварщиков. Были выявлены специфические изменения кожи в виде эпидермоза и профессиональных стигм, а в остальном структура дерматологической заболеваемости значительно не отличается от общепопуляционной по аллергодерматозам и в отношении микозов, несколько выше популяционной- себорейный дерматит. Проведенные исследования позволили выделить группы потенциального риска по формированию профессиональной патологии кожи, что необходимо для разработки и внедрения современных методов профилактики заболеваний кожи на данном предприятии.
Ключевые слова: профосмотры, профессиональные дерматозы, вредные условия труда

FEATURES OF THE STRUCTURE OF DERMATOLOGICAL MORBIDITY UNDER CONDITIONS OF EXPOSURE TO OCCUPATIONAL HAZARDS

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Abstract. Despite the detectable decrease in the level of occupational morbidity in the Russian Federation in recent years (by 56.9% from 2012 to 2021), diseases associated with exposure to industrial chemical factors account for 14.8% of all newly diagnosed occupational diseases in 2021. Early detection, treatment and prevention of occupational skin diseases are of great socio-economic importance for maintaining occupational longevity and health of workers in hazardous working conditions. The aim of our study was to study dermatological morbidity in trained workers at a large machine-building enterprise, to identify the initial manifestations of professional skin pathology and professional stigmas. In the course of our study, an analysis of dermatological morbidity was carried out, examined 680 workers of a large machine-building enterprise, of which 201 were women, with work experience from 5 to 25 years in hazardous working conditions, aged from 24 to 69 years. professional groups were represented by: polishers, melters of metals and alloys, electric welders, grinders, electro-erosionists, pyrometrists, pump station operators, fitters, thermists, galvanizers, etc. The main unfavorable factors of the working environment (according to a special assessment of working conditions) were a chemical and physical factor heating the microclimate. We have identified skin pathology in 31.8% of workers (210

people). The revealed pathology of the skin was presented: epidermosis 46 (21.9%), allergic dermatosis 34 (16.2%), 21 (10%), psoriasis 15 (7.1%), seborrheic dermatitis 16 (7.6%), acne disease 12 (5.7%), atopic dermatitis 11 (5.2%), benign neoplasms 41 (19.5%), other skin diseases, etc. 14 (6.8%). The most common professional stigmas: calluses, hyperkeratosis of the fingers and the palmar surface of the palms were noted in 35% (231 people), mainly in grinders, polishers in contact with abrasive materials, as well as electroerosionists and electric gas welders. Specific changes in the skin in the form of epidermosis and occupational stigmas were identified, but otherwise the structure of dermatological morbidity does not differ significantly from the general population in terms of allergic dermatoses and in relation to mycoses, slightly higher than the population one - seborrheic dermatitis. The conducted studies made it possible to identify potential risk groups for the formation of professional skin pathology, which is necessary for the development and implementation of modern methods for the prevention of skin diseases at this enterprise.
Key words: professional examinations, occupational dermatoses, harmful working conditions

Introduction

Health-saving technologies and methods are the priority tasks of preventive medicine. Despite the detectable decrease in the level of occupational morbidity in the Russian Federation in recent years (by 56,9% from 2012 to 2021), diseases associated with the effects of industrial chemical factors, which are the leading etiological cause of occupational skin dermatoses, account for 14,8% of all newly identified occupational diseases in 2021.

The prevalence of this pathology, not only in the Russian Federation, but also in other countries, is associated with the presence of labor processes where workers have contact with substances of an allergizing and irritating nature. There are still industries with significant manual labor and types of professions where human manual labor cannot be avoided (medicine, hairdressers, etc.). It should be noted that occupational skin diseases are among the five most frequently reported occupational diseases in Europe. [9,7]

According to foreign authors in Germany, occupational allergodermatoses (eczema, contact dermatitis) account for 90% of all diseases associated with professional activity. Occupational pathology of the skin is most often represented by contact allergic dermatitis in young workers working in the healthcare, metallurgical, food or construction industries, working in a barber shop. Identification of occupational groups at risk of developing this pathology and identification of causal allergens is one of the basic aspects in the development and implementation of preventive measures. [5].

Earlier detection, treatment and prevention of these diseases are important due to the fact that the progression of the disease is accompanied by disability, both temporary and long periods of disability, up to the loss of the ability to carry out their professional activities, which can have significant socio-economic consequences. [7,6]

Many body systems (central nervous system, digestive, endocrine and others) are involved in the development of allergic dermatoses, occupational etiology. Data on immunological, humoral, neurovegetative and metabolic disorders detected in these diseases have been accumulated. All this gives reason to consider allergic dermatoses as multifactorial diseases. [2]

The skin provides first-line protection from environmental influences and includes physical, chemical and biological protection. One of the important aspects contributing to the development of occupational

pathology of the skin is a violation of the normal functioning of the skin barrier. Factors contributing to this include: genetic factors (mutations of the filagrin gene), exposure to skin-irritating substances in the course of work, as well as affecting the structure and composition of the stratum corneum [8].

The purpose of our study was to study the dermatological morbidity of trained workers at a large machine-building enterprise, to identify the initial manifestations of occupational skin pathology and occupational stigmas.

Materials and methods

We examined 660 workers, 201 of them women, JSC " Moscow machine-building enterprise named after V.V. Chernyshev", with work experience from 5 to 25 years in harmful working conditions, aged from 24 to 69 years, professional groups were represented by polishers, smelters of metals and alloys, electric welders, grinders, electro-erosionists, pyrometrists, pumping station machinists, assemblers, thermists, electroplators, etc.

The main unfavorable factors of the production environment (according to the special assessment of working conditions (SAWC)) were represented by chemical, physical factors and a heating microclimate.

Results and discussion

We found that the total dermatological morbidity was 210 people (31,8% of the total number of the examined contingent).

The most common skin pathology: epidermosis (dryness of the skin, peeling of exposed skin, cracks on the hands) 46 (21,9%), allergodermatoses (eczema, allergic dermatitis) 34 (16,2%), mycoses (onychomycosis, creatomycosis) 21 (10%), psoriasis 15 (7,1%), seborrheic dermatitis 16 (7,6%), acne 12 (5,7%), atopic dermatitis 11 (5,2%), benign neoplasms (angiomas, keratomas, melanocytic nevi) 41 (19,5%), other skin diseases (vitiligo, ichthyosis, etc. 14 (6,8%).

Allergic diseases of occupational etiology were not identified, however, a significant percentage of workers with epidermosis phenomena (dryness, peeling, cracks in the skin of the hands) were noted, this pathology was found in grinders (in combination with onychomycosis), polishers, modelers of smelted models, electroerozionists exposed to both chemical and physical factors. The most frequently encountered professional stigmas: numbness, hyperkeratosis of the fingers and palm surface of the palms were observed in 35% (231 people), mainly among grinders, polishers in contact with abrasive materials, as well as electroerozionists and electro-gas welders.

Conclusion

Thus, employees of a machine-building enterprise exposed to a complex of harmful occupational factors (chemical, physical, thermal) revealed specific skin changes in the form of epidermosis and occupational stigmas (35%), the structure of dermatological morbidity does not differ significantly from the general population in terms of allergodermatoses (20-25% of the population) [1], with respect to the

lesion nail plates with fungal infection (in the population up to 10%) [3], slightly higher than the population: seborrheic dermatitis (in the adult population 1-2%) [4].

The detection of manifestations of epidermosis in workers is an important aspect of the prevention of occupational skin pathology, a risk group for the development of occupational dermatoses is formed from a group of workers with these phenomena.

Common skin diseases of an allergic nature (atopic dermatitis, eczema, urticaria) deserve attention, since workers with a history of this pathology require timely treatment in case of exacerbation and are at risk for the formation of professional skin pathology.

Thus, our research has allowed us to identify the main common skin diseases and skin conditions that precede the development of occupational pathology, as well as professional stigmas that have appeared in workers in the course of their work. Based on the data obtained, groups of potential risk for the formation of occupational pathology of the skin are identified and require closer attention from dermatovenerologists. The results obtained are the basis for the development and implementation of modern methods for the prevention of skin diseases at this enterprise, taking into account industrial hazards.

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КЫРГЫЗ РЕСПУБЛИКАСЫНДА ЭМГЕК ГИГИЕНАНЫН ИЛИМ КАТАРЫ ӨНҮГҮҮСҮ

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Корутунду. Бул макалада Кыргыз Республикасында эмгек гигиенасынын илим катары калыптанышына тарыхый жана адабий сереп каралат. Тарыхый маалыматтарды изилдөө ар кандай дооpлордо ар кандай эмгек процесстеринин жана ар дайым өзгөрүп турган өндүрүш шарттарынын жумушчулардын организмине тийгизген таасирин изилдөөгө мүмкүндүк берди. Изилдөөнүн жүрүшүндө биз эмгек коопсуздугу жаатында билимдин жана практиканын өнүгүшүн орноттук, бул жумушчулар өндүрүштүк чөйрөдө ден соолукту сактоо менен туш болгон көйгөйдүн маанилүүлүгүн көрсөтүп турат. Тарыхый тенденцияларды кылдат талдоо аркылуу изилдөө эмгек коопсуздугунун парадигмаларындагы негизги мыйзам ченемдүүлүктөрдү жана өзгөрүүлөрдү аныктайт жана эмгек шарттарын жакшыртуу стратегияларын маалымдайт. Мындан тышкары, изилдөө эмгек шарттарын жакшыртууга жана жумушчулардын жалпы жыргалчылыгын камсыз кылууга багытталган ден соолукту чыңдоо жана алдын алуу чараларын иштеп чыгуу жана ишке ашыруу менен далилденгендей, анын жыйынтыктарын практикалык колдонууну баса белгилейт. Окумуштуулар жана адистер үчүн маанилүү маалымат катары кызмат кылган изилдөөнүн жыйынтыктары эмгек гигиенасы жөнүндөгү илимдин өнүгүшүн жана анын коопсуз жумушчу чөйрөнү камсыз кылууга берилгендигин баса белгилейт, ошондой эле Кыргыз Республикасы үчүн гана эмес, башка өлкөлөр үчүн да баалуу маалыматтарды берет.
Негизги сөздөр: эмгек гигиенасы, алдын алуу, тоо-кен өнөр жайы, бийик тоолор, максималдуу жол берилген концентрация, иштөө жөндөмдүүлүгү.

РАЗВИТИЕ ГИГИЕНЫ ТРУДА КАК НАУКИ В КЫРГЫЗСКОЙ РЕСПУБЛИКЕ

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Резюме. В данной статье рассматривается исторический и литературный обзор становление гигиены труда, как науки в Кыргызской Республики. Исследование исторических данных позволило изучить влияние различных трудовых процессов и постоянно меняющихся производственных условий на организм рабочих в разные эпохи. В ходе изучения нами установлено развитие знаний и практики в области безопасности труда, что указывает на важность проблемы, с которыми сталкивались работники при сохранении здоровья в условиях производственной среды. Путем тщательного анализа исторических тенденций исследование выявляет ключевые закономерности и изменения в парадигмах безопасности труда и информирует о стратегиях улучшения условий труда. Кроме того, в исследовании подчеркивается практическое применение его результатов, о чем свидетельствует разработка и реализация мер по укреплению здоровья и профилактике, направленных на улучшение условий труда и обеспечение общего благополучия рабочих. Результаты исследования, которые служат важной информацией для ученых и специалистов, подчеркивают развитие науки о гигиене труда и ее приверженность обеспечению безопасной рабочей среды, а также предоставляют ценную информацию не только для Кыргызской Республики, но и для других стран.
Ключевые слова: гигиена труда, профилактика, горнорудная промышленность, высокогорье, предельно допустимая концентрация, работоспособность.

DEVELOPMENT OF OCCUPATIONAL HYGIENE AS A SCIENCE IN THE KYRGYZ REPUBLIC

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Abstract. This article examines the historical and literary review of the formation of occupational hygiene as a science in the Kyrgyz Republic. The study made it possible to study the influence of various labor processes and constantly changing production conditions on the body of workers in different epochs. By carefully studying historical data, the study guides the development of knowledge and practice in the field of occupational safety and shows important milestones and challenges that workers face while maintaining their health. Through a thorough analysis of historical trends, the study identifies the main patterns and changes in occupational safety paradigms and informs about strategies for improving working conditions. In addition, the study emphasizes the practical application of its results, which is confirmed by the development and implementation of health and preventive measures aimed at improving working conditions and ensuring the general well-being of employees. The results of the study, which serve as important information for scientists and specialists, emphasize the development of occupational health science and its commitment to ensuring a safe working environment, and also provide valuable information not only for the Kyrgyz Republic, but also for other countries.
Key words: occupational hygiene, prevention, mining industry, highlands, maximum permissible concentration, working capacity.

Introduction

In the post-war years, during the period of stable development of industrial construction, agriculture and the mining industry in the Kyrgyz Republic, scientific developments in the field of occupational health began to be carried out.

Domestic founders in the study of occupational health were F.S. Okolov and K.A. Arshinov. In 1947, they compiled maps for the systematic study of the sanitary situation at the enterprises of the food and mining industries, which contributed to the quality of supervision of these objects in the Republic. In 1948 K.A. Arshinov and A.I. Preobrazhensky, in order to increase efficiency and reduce morbidity among workers at mining enterprises in Ak-Tyuz, Khaidarkan and Kadamzhay, conducted a sanitary assessment of production processes, as a result of which health measures were developed and implemented [1, 2].

In the scientific studies of V.M. Perelygin, the sanitary and hygienic characteristics of working conditions at sugar factories in Kyrgyzstan are described. As a result, recommendations were developed and implemented to improve technology and improve labor health, which made it possible to significantly reduce occupational injuries and morbidity among workers [3, 4, 5, 6, 7]. After defending his Ph.D. thesis (1954), V.M. Perelygin continued his research. His next work was the study of the physicochemical, biological and radiological composition of dust in bast and cotton ginning plants. According to the results of the studies, the role of organo-mineral aerosols in occupational pathology was noted and the maximum permissible concentration of dust in bast factories was established [5, 6, 7, 8, 9]. With the participation of V.M. Perelygina, V.I. Ershova, M.B. Shpirt studied working conditions at the Osh silk processing plant and developed hygiene

recommendations that gave a great economic effect [5]. For the first time in the conditions of Central Asia, V.M. Perelygin with his students L.A. Nesterova and E.V. Doroshchuk carried out work on the prevention of occupational diseases among workers in grain production and established the maximum permissible concentration of grain dust in the air of the working area, approved by the USSR Ministry of Health. Also, under his leadership, Ph.D. Perlovskaya (1972) on the topic "Toxicological and hygienic study of fenuron in the rationale for hygienic measures and its safe use in the national economy" [5, 8, 9].

G.A. Gudzovsky with his students: A.D. Dzhumabaev [10], G.G. Shcherbakov [10], Yu.P. Popov[10, 11] and R.G. Grishchenko [11] studied the effects of mixed and metallic dust from the mines of Kyrgyzstan on the lungs, which is formed in the conditions of metallurgical production. For the first time G.A. Gudzovsky studied the effect of antimony and its compounds on the body, and also established their cytotoxic and skin effects, as a result of which three hygienic standards (MPC) for its compounds were substantiated [12, 13].

In connection with the development of high-mountainous regions for the solution of national economic problems, the study of physical performance, as well as the problem of human adaptation to production work in the mountainous climate of the Republic, was of keen interest. It is known that until the 1970s this section of occupational health was little studied. In this connection, the associate professor of the department of general hygiene B.S. Mambetaliev carried out scientific work, which made it possible to assess the severity of the labor process in the mining industry in terms of energy consumption, as well as to develop standards for the regime of work and rest in the scientific organization of labor and wages for workers. B.S. Mambetaliev with his successors continued to study the peculiarities of labor in high mountains, so, under his leadership, 2 doctoral and 8 master's theses were defended [14-18].

An important contribution to the development of occupational hygiene and physiology was made by Professor K.U. Akynbekov. His scientific research was aimed at studying various aspects of the adaptation of the human body to the production and sanitary conditions of work of miners in the middle mountains of Kyrgyzstan and the physiological and hygienic assessment of the work of sheep breeders on remote pastures. Based on the results of the work carried out, a number of regulatory and security documents were prepared, which were used in the decisions and resolutions of the collegium of the Ministry of Health of the Republic. A special registration form No. 54 "Report on medical assistance to livestock breeders" was developed and approved, and a draft Government Decree "State Program for the Protection of Livestock Breeders' Health for 1996-2000" was prepared. A license and an incentive prize from the agency “Kyrgyzpatent” were obtained for registered titles of protection, based on samples of special clothing [19, 20, 21]. Students in the field of occupational health K.U. Akynbekov were K.O. Dzhusupov (1996) and A.A. Orozalieva (2000) [22].

Along with K.U. Akynbekov, scientific research was carried out by O.T. Kasymov. His works were devoted to the organization of labor on a rotational basis in extreme conditions of high mountains, as a result of which recommendations were developed for maintaining and strengthening health, as well as extending the life and working capacity of workers [5, 23, 24, 25]. Under the leadership of O.T. Kasymova in the field of occupational health carried out scientific work: A.A. Burabaeva (2000), V.A. Abdyldaeva (2003), K.K. Sadyrbekov (2005), K.M. Ormonkulova (2005) and others [22].

A significant contribution to the development of occupational health was made by B.M. Shpirt and Yu.I. Manuilenko. According to the results of scientific activity of B.M. Shpirt developed recommendations for optimizing the working and living conditions of transhumant workers in mountain climatic conditions, and the frequency of medical examinations. Together with Yu.I. Manuilenko developed guidelines for the training of workers and engineering workers (ITR) at industrial and agricultural enterprises. Scientific research Yu.I. Manuylenko, on the problem of working conditions for livestock breeders at the stages of obtaining and processing natural wool, the development of “Hygienic recommendations for the maintenance of points for electromechanical shearing of sheep” was developed. Based on the results of the study, 36 types of standard projects of electromechanical shearing stations for sheep for a different number of shearing machines for all climatic regions of the USSR were developed, and an industry standard OST 1795884 “Processes of manufacturing enterprises for the primary processing of wool. Safety requirements” [26-31].

Conclusion. When conducting a historical and literary analysis, it was established that the initial contribution to the development of occupational health was made by F.S. Okolov and K.A. Arshinov on the study of sanitary working conditions at the enterprises of the mining and food industries. Also, V.M. Perelygin and G.A. Gudzovsky with his students. They were the first to establish the maximum permissible concentrations of harmful substances in the air of the working area.

Since the 1970s, the greatest attention has been paid to occupational health in the mining industry at various altitudes. The main contribution of this area belongs to B.S. Mambetaliev, K.U. Akynbekov, O.T. Kasymov and other scientists.

In general, the importance of the introduction of evidence-based comprehensive health-improving measures and compensation for harmful natural and industrial working conditions in the mountains, as well as for a cycle of scientific works on high-mountain medicine Kasymov O.T. (1996), Mambetaliev B.S. (1998) were awarded the title of "Laureate of the State Prize of the Kyrgyz Republic in the field of science and technology."

Thus, during the period of the analysis (1947-2005), 34 scientific papers were prepared, of which 27 candidate and 7 doctoral dissertations. The results of scientific work contributed to the improvement of working conditions and increased efficiency among workers in industry and agriculture, and also gave a positive economic effect.

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ХОРЕОГРАФИЯЛЫК ОКУУ ЖАЙДЫН ЖАНА МУЗЫКАЛЫК МЕКТЕП-ИНТЕРНАТТЫН ОКУУЧУЛАРЫНЫН С ВИТАМИНИ ЖАНА КАЛЬЦИЙ МЕНЕН КАМСЫЗ БОЛУШУН БААЛОО

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Корутунду. Киришүү. Профилактикалык медицинанын жана педиатриянын актуалдуу проблемаларынын бири мектеп жашындагы балдарды витаминдер жана минералдар менен камсыз кылуу болуп саналат.
Изилдөөнүн максаты. Окуучулардын күнүмдүк рационунда С жана Са витамининин курамын изилдөө жана биологиялык үлгүлөрдөгү бул микроэлементтерди аныктоо. Хореографиялык окуу жайдын жана музыкалык мектеп-интернаттын окуучуларынын иш жүзүндөгү тамактануусун эсептөө методу менен изилдөө жүргүзүлдү (240 суткалык рацион). С витамининин заара менен бөлүнүп чыгышы Тилманс реактиви менен визуалдык титрлөө ыкмасы менен, мурексид индикаторун колдонуу менен комплексометриялык титрлөө менен кальций аныкталды. Изилдөөнүн жүрүшүндө Бишкек хореографиялык окуу жайынын (n=86) жана музыкалык мектеп-интернаттын (n=95) эки жыныстагы, 10 жаштан 18 жашка чейинки курактагы 181 окуучусу текшерилген. Хореографиялык окуу жайдын жана музыкалык мектеп-интернаттын окуучуларынын рационундагы С витамини менен кальцийдин курамын изилдөөдө төмөнкү натыйжалар алынган:

- Балет окуу жайынын окуучуларынын рационунда С витамининин камтылышы орточо 29,0±3,4 мг түздү, бул сунушталган нормадан 73,9% га төмөн. Музыкалык мектеп-интернаттын окуучуларында С витамини жогору болуп, орточо 47,2±2,6 мг түздү, бул сунушталган норманын 52,4% түзөт.
- Балет мектебинин окуучуларынын рационундагы кальций орточо 576,0±42,0 мг түздү, бул сунушталган нормадан 61,6% га төмөн. Музыкалык мектеп-интернаттын окуучуларында кальций жылдын мезгилине жараша 708,3 төн 853,6 мг га чейин өзгөрүп, сунушталган нормадан 28,8-40,9% га төмөн болгон.

С витамининин заара менен бөлүнүп чыгышына байланыштуу балет мектебинин окуучуларында эки курактык топ үчүн тең нормадан 50% төмөн экени аныкталган. Музыкалык мектеп-интернаттын окуучуларында орточо бөлүп чыгаруу 0,3 мг/саатты түзгөн, бул 10-11 жаштагы балдар үчүн нормага туура келет, бирок 12 жаштан жогорку балдар үчүн ал 35% га төмөн болгон, б.а. окуучулардын 39,3% ында С витамининин жетишсиздиги аныкталган. Биз жүргүзгөн изилдөөлөр маданият жана искусство мекемелеринде окуп жаткан балдардын жана өспүрүмдөрдүн С витамини жана кальций менен камсыз болушунун Олуттуу бузулууларын аныктады.
Ачкыч сөздөр: балдар жана өспүрүмдөр, чыныгы тамактануу, диета, заара бөлүп чыгаруу, С витамини, кальций, балет окуу жайы, музыкалык мектеп-интернат.

ОЦЕНКА ОБЕСПЕЧЕННОСТИ ВИТАМИНОМ С И КАЛЬЦИЕМ УЧАЩИХСЯ ХОРЕОГРАФИЧЕСКОГО УЧИЛИЩА И МУЗЫКАЛЬНОЙ ШКОЛЫ-ИНТЕРНАТА

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Резюме. Одной из актуальных проблем профилактической медицины и педиатрии является обеспеченность детей школьного возраста витаминами и минералами.
Цель исследования. Изучение содержания витамина С и Са в суточном рационе учащихся и определение этих микронутриентов в биологических пробах. Проведено изучение фактического питания учащихся хореографического училища и музыкальной школы-интерната расчетным методом (240 суточных рационов). Экскрецию с мочой витамина С определяли методом визуального титрования реактивом Тильманса, кальций - с помощью комплексометрического титрования с использованием индикатора мурексида. В ходе исследования были обследованы 181 учащихся обоего пола Бишкекского хореографического училища (n=86), и музыкальной школы-интерната (n=95) в возрасте от 10 до 18 лет. При исследовании содержания витамина С и кальция в рационах учащихся хореографического училища и музыкальной школы-интерната были получены следующие результаты:

- Содержание витамина С в рационах учащихся балетного училища составило в среднем 29,0±3,4 мг, что ниже рекомендуемой нормы на 73,9%. У учащихся музыкальной школы-интерната содержание витамина С было выше и составило в среднем 47,2±2,6 мг, что составляет 52,4% от рекомендуемой нормы.
- Содержание кальция в рационах учащихся балетного училища составляло в среднем 576,0±42,0 мг, что ниже рекомендуемой нормы на 61,6%. У учащихся музыкальной школы-интерната содержание кальция

варьировала в зависимости от сезона года от 708,3 до 853,6 мг, что находится ниже рекомендуемых норм на 28,8-40,9%.

Относительно экскреции витамина С с мочой было обнаружено, что у учащихся балетного училища она была ниже нормы на 50% для обеих возрастных групп. У учащихся музыкальной школы-интерната медиана экскреции составила в 0,3 мг/час, что соответствует норме для 10-11 летних, но для детей старше 12 лет она была ниже на 35%, т.е. у 39,3% учащихся выявлен недостаток витамина С. Медиана среднесуточного содержания кальция в моче во всех возрастных группах находится в пределах нормы. Проведенное нами исследование выявило существенные нарушения обеспеченности детей и подростков, обучающихся в учреждениях культуры и искусства витамином С и кальцием.
Ключевые слова: дети и подростки, фактическое питание, рацион, экскреция с мочой, витамин С, кальций, балетное училище, музыкальный школа-интернат.

ASSESSMENT OF VITAMIN C AND CALCIUM AVAILABILITY OF STUDENTS OF THE CHOREOGRAPHIC SCHOOL AND THE MUSIC BOARDING SCHOOL

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Abstract. One of the urgent problems of preventive medicine and pediatrics is the provision of vitamins and minerals for school-age children. The purpose of the study was to investigate vitamin C and Ca content in the daily diet of students and determination of these micronutrients in biological samples. The study of the actual nutrition of students of the choreographic school and the music boarding school by the calculated method (240 daily rations) was carried out. Urinary excretion of vitamin C was determined by visual titration with Tilmans reagent, calcium - by complexometric titration using the murexide indicator. In the course of the study, 181 students of both sexes of the Bishkek Choreographic School (n=86) and the boarding music school (n=95) aged from 10 to 18 years were examined. When studying the content of vitamin C and calcium in the diets of students of a choreographic school and a music boarding school, the following results were obtained:

- The content of vitamin C in the diets of ballet school students averaged 29.0±3.4 mg, which is 73.9% lower than the recommended norm. The students of the music boarding school had higher vitamin C content and averaged 47.2±2.6 mg, which is 52.4% of the recommended norm.
- The calcium content in the diets of ballet school students averaged 576.0 ±42.0 mg, which is 61.6% lower than the recommended norm. The students of the music boarding school had a calcium content varying depending on the season from 708.3 to 853.6 mg, which is below the recommended norms by 28.8-40.9%.

Regarding the excretion of vitamin C in urine, it was found that in ballet school students it was 50% lower than normal for both age groups. The median excretion of music boarding school students was 0.3 mg/hour, which corresponds to the norm for 10-11 year olds, but for children over 12 years old it was 35% lower, i.e. 39.3% of students showed a lack of vitamin C. The median average daily calcium content in urine in all age groups is within the norm. Our study revealed significant violations of the provision of vitamin C and calcium for children and adolescents studying in cultural and art institutions.
Keywords: children and adolescents, actual nutrition, diet, urinary excretion, vitamin C, calcium, ballet school, music boarding school.

Introduction

Children and adolescents are at increased risk of developing vitamin and mineral deficiencies.

Micronutrient deficiency negatively affects the health of students, reduces their performance, resistance to colds and infectious diseases, increases the negative impact of environmental conditions on the body of children [1, 2, 3].

One of the main reasons for the lack of these nutrients is their insufficient intake from food, caused by both the low content of these vitamins and minerals in food, and a change in the structure of nutrition, as well as a deviation from the principles of healthy nutrition [4].

A low content of vitamins in the urine can serve as an indicator of their intake from food, since the renal excretion of vitamins decreases earlier than their level in the blood [5]. With a

deficiency of calcium in the body, there is a decrease in the excretion of calcium in the urine, as the body adapts to a lack of calcium by increasing its absorption in the intestine and reducing excretion through the kidneys [6].

Deficiency of vitamins and minerals is particularly dangerous in adolescence, in particular for students of specialized educational institutions (colleges), whose level of micronutrient needs increases due to the combination of academic load with professional [1].

However, earlier studies conducted in the Kyrgyz Republic among children and adolescents focused only on students of general education institutions.

Therefore, the purpose of our work was to study the content of vitamin C and calcium in the daily diet of students of a choreographic school and a music boarding school, as well as to assess their excretion with urine.

Materials and methods

A one-stage study was conducted in order to study the actual meals provided in the dining room of the Bishkek Choreographic School (hereinafter Bishkek Ch. Sch.) and the Republican Secondary Specialized Music Boarding School (hereinafter RSSMBS). As part of the study, the content of vitamin C and calcium in diets was calculated using the calculation method. The obtained data were then compared with the recommended norms of food and energy consumption for children and adolescents [7].

To assess the level of vitamin C in the body, a method was used to measure the excretion of metabolites using a morning portion of urine, which was collected on an empty stomach for 30-120 minutes after night urination. Then visual titration was performed using Tilmans reagent to determine the vitamin C content [8].

Calcium was determined by complexometric titration using the murexide indicator [2].

The study examined 181 students of both sexes of the Bishkek Choreographic School (n=86, including 46 boys and 40 girls) and a boarding music school (n=95, including 76 boys and 19 girls) aged 10 to 18 years.

For statistical analysis, the programs SPSS Statistics (version 22, IBM, New York) and Excel (Microsoft Co, 2000, USA) were used. Verification of the normality of the distribution of variables was performed using the Kolmogorov-Smirnov criterion. The nonparametric Manna Whitney test was used to assess the statistical significance of differences between two independent groups with a distribution different from normal. The differences were considered statistically significant at a significance level of $p < 0.05$.

Results and discussion

Data on the vitamin and mineral composition of diets are presented in Table.1.

Table 1. The content of vitamin C and calcium (in mg / day) in the actual diet

Nutrient	Norm (mg)	Bishkek Ch. Sch. (M±m)		RSSMBS (M±m)		p
		Summer-autumn period (n=60)	Winter-spring period (n=60)	Summer-autumn period (n=60)	Winter-spring period (n=60)	
Vitamin C	60-90	29,7±3,5	28,4±3,2	43,7±2,4	50,8±2,1[a]	0,001
Calcium	1100-1200	557,1±35,0	594,9±49,0	708,3±49,4	853,6±46,6[b]	0,001

Note: to compare the content of nutrients in the diets of two institutions, the Mann-Whitney – R. test was used. A comparative analysis of the content of nutrients in the diets within the same institution in different seasons of the year was also carried out. The results showed that in the summer-autumn period, the significance level (p) was summer-autumn ar =0.03, and winter-spring mir =0.03.

Analyzing the data on the vitamin composition of the diet of ballet school students, it was found that the vitamin C content was 29.7 ± 3.5 mg in the summer-autumn period and 28.4± 3.2 mg in the winter-spring period, which turned out to be 73.9% lower than the recommended norms on average. When comparing the content of vitamin C in the daily diet in different periods of the year, no statistically significant differences were found ($p > 0.05$).

The content of ascorbic acid in the diets of pupils of the music boarding school in the summer-autumn period was 43.7 ± 2.4 mg, and in the winter-spring period there was an increase to 50.8 ± 2.1 mg ($p > 0.03$). However, these values were only 48.5-56.4% of the recommended consumption rates. A comparative analysis of the vitamin composition of the diets of students in a choreographic school and a music boarding school revealed statistically significant differences ($p > 0.001$).

Insufficient vitamin C content in the diets of students is apparently associated with low consumption of fresh vegetables and fruits, as well as the loss of this vitamin during prolonged storage and culinary processing of food products.

Analyzing the data from Table 1, it can be seen that the calcium content in the daily diets of ballet school students averaged 576.0 ± 42.0 mg, which is 61.6% lower than the recommended norms. In contrast, the calcium content in the diets of the pupils of the music boarding school was significantly higher (p0,001) and amounted to 708.3-853.6 mg in the summer-autumn and winter-spring periods of the year, respectively. However, the indicated calcium values are below the recommended norms by 28.8-40.9%. A comparative analysis of the calcium content in daily diets by seasons in the choreographic school did not reveal statistically significant differences, while in the music boarding school such differences were revealed (p0,03).

Based on the literature data, the level of calcium intake with food in the amount of 50-70% of the norm is considered moderate, and intake of less than 50% of the norm is considered a pronounced

deficiency. The insufficient amount of calcium in the daily diet of students is explained by the limited number of foods with a high content of bioavailable calcium, such as milk and dairy products.

The results of our study, presented in Table 2, showed that the median daily excretion of vitamin C in the urine of ballet school students was 50% lower than normal for both age groups. Among students aged 10-11 years, low excretion of ascorbic acid was observed in 73.7%, and among students aged 12-18 years – in 67.2%.

The median excretion of ascorbic acid was 0.3 mg/hour in the students of the music boarding school. This value corresponds to the norm for students aged 10-11 years. However, in children over 12 years of age, the median excretion of ascorbic acid was 35% lower, which indicates insufficient provision of vitamin C in adolescents. 39.3% of students in this age group had low urinary excretion of ascorbic acid.

Table 2. Urinary excretion of vitamin C and calcium by age (Me [Q1; Q3]) (mg/h; g/day, respectively)

Nutrient	Age	Norm	Bish. Ch. Sch.	RSSMBS	p
Vitamin C	10-11 лет	0,2	0,1 [0,1; 0,2]	0,3 [0,2; 0,5]	0,002
	12-18 лет	0,4	0,2 [0,1; 0,4]	0,3 [0,3; 0,5]	0,01
Calcium	10-18 лет	0,18–0,30	0,2 [0,18; 0,31]	0,2 [0,14; 0,34]	0,06

Note: significant differences in the excretion of vitamin C in urine in students of the two institutions were found at significance levels of $p < 0.002$ and $p < 0.01$.

The median average daily calcium content in urine in all age groups is within the normal range. A comparative analysis of the excretion of vitamin C in the urine of students of the choreographic school and pupils of the music boarding school revealed that students of the choreographic school had a lower excretion of vitamin C compared to students of the music boarding school in both age groups ($p < 0.002$, $p < 0.01$), there were no differences in calcium (p0,05).

Conclusion

The study revealed significant deficiencies in the provision of vitamin C and calcium in children and adolescents studying in cultural and art institutions. These disadvantages are due to the monotony of the diet and insufficient content of essential nutrients. The biochemical results of the study showed a low level of excretion of vitamin C in the urine of both students of the choreographic school and the music boarding school.

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ГЛОМЕРУЛОНЕФРИТТИН НЕФРОТИКАЛЫК СИНДРОМУНУН 2012-2021-ЖЫЛДАРДАГЫ ЭПИДЕМИОЛОГИЯЛЫК МҮНӨЗДӨМӨСҮ КЫРГЫЗ РЕСПУБЛИКАСЫНДА

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Кортунду: Иш Кыргыз Республикасынын Нарын облусу, Ат-Башы району, Бишкек шаарынын №8 Үй-бүлөлүк медицина борборунун (ҮМБ), Ош облусунун маалыматын колдонуу менен гломерулонефриттин нефротикалык синдрому менен 2012-2021-жылдардагы оорусун изилдөөгө арналган. Гломерулонефриттин нефротикалык синдрому менен 2012-2021-жылдар аралыгында катталган учурлары бардыгы болуп 26111 бейтапты түздү, анын ичинде аялдар 16819 (64,4±0,2), эркектер 9292 (35,6±0,2), анын ичинен Ат-Башы району боюнча - 623 (2,4±0,09) оорулуу, анын ичинен 403 аял (64,7±1,8) жана 220 эркек (35,3±1,8), Бишкек шаардан №8 ҮМБ – 320 (1,2±0,05) оорулуулар, анын ичинен 198 аялдар (61,9±2,7) жана 122 эркектер (38,1±2,7), Ош облусунан – 25168 (96,4±0,4) оорулуулар, анын ичинде 16218 (64,4±0,3) аялдар жана 8950 (35,6±03) эркектер. Гломерулонефриттин нефротикалык синдрому менен жылдар боюнча оорусу: - 2012-жылы 1379 оорулуу (5,3±0,1) гана катталган, анын ичинен 471 аялдар (2,8±0,1) жана 908 эркектер (9,8±1,2), 2013-жылга - бардыгы 1969 (7,5±0,1), анын ичинен 854 аялдар (5,1±0,1) жана эркектер 1115 (12,1±0,1), 2014-ж. – бардыгы 746 (2,9±0,1), анын ичинен 464 аял (2,7±0,1) жана 282 эркек (3,1±0,1), 2015-жылга – 1644 (6,3±0,1), анын ичинен 1091 аялдар (6,5±0,1) жана эркектер 553 (6,0±0,1), 2016-жылга – 5482 (21,0±0,2), анын ичинен 3816 (22,7) аялдар жана 1666 эркектер (17,8±0,1), 2017-жылы – 4765 (18,3±0,2), анын ичинен 3210 аялдар (19,1±0,3) жана эркектер 1555 (16,7±0,2), 2018-жылы – 4005 (15,3±0,2), анын ичинен аялдар 279 (16,6±0,2) жана эркектер 1214 (13,1±0,3), 2019-жылга – 3638 (13,9±0,2), анын ичинен 2494 аялдар (14,8±0,2) жана эркектер 1144 (12,3±0,3), 2020-жылга – 863 (3 ,3±0,1), анын ичинен 568 аял (3,4±0,1) жана 295 эркек (3,2±0,1), 2021-жылга – 1620 (6,2±0,1), анын ичинен 1060 аял (6,3±0,2) жана 560 эркек (6,0±0,2).

Негизги сөздөр: гломерулонефрит нефротикалык синдрому менен, бир жаштан 15 жашка чейинки балдар, 15 жаштан 18 жашка чейинки өспүрүмдөр, бойго жеткен бейтаптар, Ош облусу, Нарын облусу, Ат-Башы району, Бишкек шаарындагы №8 ҮМБнын медициналык маалымат борборунун маалыматтары.

ЭПИДЕМИОЛОГИЧЕСКАЯ ХАРАКТЕРИСТИКА ГЛОМЕРУЛОНЕФРИТА С НЕФРОТИЧЕСКИМ СИНДРОМОМ В ПЕРИОД 2012-2021гг. В КЫРГЫЗСКОЙ РЕСПУБЛИКЕ

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Резюме. Работа посвящена изучению заболеваемости гломерулонефрита с нефротическим синдромом в период 2012-2021гг. с использованием данных Нарынской области Ат-Башинского района, центром семейной медицины (ЦСМ) №8 г. Бишкек, Ошской области Кыргызской Республики. За период 2012 - 2021 годы зарегистрированных случаев заболеваемости гломерулонефрита с нефротическим синдромом всего составило 26111 больных, в том числе женщин 16819 (64,4±0,2), мужчин 9292 (35,6±0,2), из них в Ат-Башинском районе – 623 (2,4±0,09) больных, в том числе женщин 403 (64,7±1,8) и мужчин 220 (35,3±1,8), из г. Бишкек ЦСМ №8 – 320 (1,2±0,05) больных, в том числе женщин 198 (61,9±2,7) и мужчин 122 (38,1±2,7), из Ошской области – 25168 (96,4±0,4) больных, в том числе женщин 16218 (64,4±0,3) и мужчин 8950 (35,6±0,3). Заболеваемость гломерулонефрита с нефротическим синдромом по годам: – за 2012 год зарегистрированных случаев всего 1379 больных (5,3±0,1), из них женщин 471 (2,8±0,1) и мужчин 908 (9,8±1,2), за 2013 г. – всего 1969 (7,5±0,1), из них женщин 854 (5,1±0,1) и мужчин 1115 (12,1±0,1), за 2014г. – всего 746 (2,9±0,1), из них женщин 464 (2,7±0,1) и мужчин 282 (3,1±0,1), за 2015 г. – 1644 (6,3±0,1), из них женщин 1091 (6,5±0,1) и мужчин 553 (6,0±0,1), за 2016 г. – 5482 (21,0±0,2), из них женщин 3816 (22,7) и мужчин 1666 (17,8±0,1), за 2017 г. – 4765 (18,3±0,2), из них женщин 3210 (19,1±0,3) и мужчин 1555 (16,7±0,2), за 2018 г. – 4005 (15,3±0,2), из них женщин 2791 (16,6±0,2) и мужчин 1214 (13,1±0,3), за 2019 г. – 3638 (13,9±0,2), из них женщин 2494 (14,8±0,2) и мужчин 1144 (12,3±0,3), за 2020 г. – 863 (3,3±0,1), из них женщин 568 (3,4±0,1) и мужчин 295 (3,2±0,1), за 2021 г. – 1620 (6,2±0,1), из них женщин 1060 (6,3±0,2) и мужчин 560 (6,0±0,2).

Ключевые слова: заболеваемость гломерулонефрита нефротическим синдромом, дети от одного года до 15 лет, подростки от 15 до 18 лет, взрослые больные, данные из медико-информационного центра Ошской области, Нарынской области Ат-Башинского района, г.Бишкекского Центра семейной медицины №8.

EPIDEMIOLOGICAL CHARACTERISTICS OF GLOMERULONEPHRITIS WITH NEPHROTIC SYNDROME IN THE PERIOD 2012-2021. IN THE KYRGYZ REPUBLIC

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Abstract: The work is devoted to the study of the incidence of glomerulonephritis with nephrotic syndrome in the period 2012-2021. using data from the Naryn region, At-Bashi district, Family Medicine Center (FMC) No. 8, Bishkek, Osh region of the Kyrgyz Republic. For the period 2012 - 2021, registered cases of glomerulonephritis with nephrotic syndrome totaled 26,111 patients, including 16,819 women (64.4±0.2), 9292 men (35.6±0.2), of which in the At-Bashi district - 623 (2.4±0.09) patients, including 403 women (64.7±1.8) and 220 men (35.3±1.8), from the city. Bishkek FMC No. 8 – 320 (1.2±0.05) patients, including 198 women (61.9±2.7) and 122 men (38.1±2.7), from Osh region – 25168 (96.4±0.4) patients, including 16218 women (64.4±0.3) and 8950 men (35.6±0.3). Incidence of glomerulonephritis with nephrotic syndrome by year: - in 2012, there were only 1379 registered cases of patients (5.3±0.1), of which 471 women (2.8±0.1) and 908 men (9.8±1. 2), for 2013 - a total of 1969 (7.5±0.1), of which 854 women (5.1±0.1) and men 1115 (12.1±0.1), for 2014. – total 746 (2.9±0.1), of which 464 women (2.7±0.1) and 282 men (3.1±0.1), for 2015 – 1644 (6.3±0.1), of which 1091 women (6.5±0.1) and men 553 (6.0±0.1), for 2016 – 5482 (21 .0±0.2), of which 3816 (22.7) were women and 1666 men (17.8±0.1), for 2017 – 4765 (18.3±0.2), of which 3210 were women (19.1±0.3) and men 1555 (16.7±0.2), for 2018 – 4005 (15.3±0.2), of which 2791 women (16.6±0.2) and men 1214 (13.1±0.3), for 2019 – 3638 (13 .9±0.2), of which 2494 women (14.8±0.2) and 1144 men (12.3±0.3), for 2020 – 863 (3.3±0.1), of which 568 women (3.4±0.1) and men 295 (3.2±0.1), for 2021 – 1620 (6.2±0.1), of which 1060 women (6.3 ±0.2) and men 560 (6.0±0.2).

Keywords: incidence of glomerulonephritis nephrotic syndrome, children from one year to 15 years, adolescents from 15 to 18 years, adult patients, data from the medical information center of the Osh region, Naryn region, At-Bashi district, Bishkek Family Medicine Centre No. 8.

Introduction

One of the most pressing problems in recent years among the population is the high prevalence of chronic kidney disease (CKD), which is associated with a decrease in the quality of life and high mortality of patients. As of 2017, one in ten people in the world suffers from CKD [1]. It should be noted that a common cause that leads patients to end-stage renal failure is chronic glomerulonephritis, second only to diabetes mellitus and arterial hypertension [2].

Chronic glomerulonephritis is characterized by irreversible progression of the pathological process, leading to the formation of end-stage renal failure, which significantly worsens the patient's quality of life, and then progresses to dysfunction of internal organs, increasing the risk of premature overall cardiovascular mortality [3].

A decrease in renal function is an independent and important cause of the accelerated occurrence of changes in the cardiovascular system and is explained by metabolic and hemodynamic disorders that accompany renal dysfunction and cause the occurrence of non-traditional risk factors, such as albuminuria/proteinuria, systemic inflammation, oxidative stress, anemia [4].

In the early stages, chronic kidney disease is asymptomatic; as a result, it is most often detected only at a late stage, when only renal replacement therapy - dialysis or a kidney transplant - can help the patient [5].

Objective: Epidemiological characteristics of the incidence of glomerulonephritis with nephrotic syndrome in the Kyrgyz Republic in the period 2012-2021.

Materials and methods:

For the study, data from registered cases of glomerulonephritis with nephrotic syndrome in the At-Bashi district, Bishkek City Center for Medical Care No. 8 and Osh region for the period 2012-2021 were used.

In total, for the period 2012 - 2021, 26,111 cases of glomerulonephritis with nephrotic syndrome were registered, of which 16,813 were women (64.3 ± 0.2), 9,298 were men (35.7 ± 0.2). Of the 26,111 registered cases, 623 (2.4±0.09) patients were found in At-Bashi district, including 403 women (64.7±1.8) and 220 men (35.3±1.8), in Bishkek, FMC No. 8 – 320 (1.2±0.05), including 193 women (60.3±2.7) and 127 men (39.7±2.7), in Osh region – 25168 (96.4±0.4) including 16217 women (64.4±0.3) and 8951 men (35.6±0.3) (Table 1).

The age distribution of registered cases of 26,111 patients with glomerulonephritis with nephrotic syndrome is as follows: children from one year to 15 years old totaled 2,776 (10.7 ± 0.2) patients, of which 1,624 (58.5 ± 0.8) were girls and boys 1152 (41.5±0.8) (Table 1). Among adolescents (15-17 years old), 1058 (4.0±0.1) patients were identified, of which 643 were girls (60.7±1.5) and 415 were boys (39.3±1.5). In adult patients over 18 years of age, glomerulonephritis with nephrotic syndrome was found - 22277 (85.3±0.2), of which 14546 (65.2±0.3) were women and 7731 (34.8±0.3) were men (Table 1).

Of the 26,111 patients with glomerulonephritis with nephrotic syndrome in the Osh region, the total number was 25,168 (96.4 ± 0.1), of which 16,217 (64.4 ± 0.3) women were diagnosed, and 8,951 (35.6 ± 0.3)) men, including among children under 15 years old - 2656 (10.6±0.1), among adolescents - 1007 (4.0±0.1), among the older generation over 18 years old - 21505 (85.4± 0.2) cases, 623 (2.4±0.09) cases were identified in At-Bashi district of Naryn region, of which in 403 (64.7±1.8) women and 220 (35.3±1.8) men, including 71 (11.4±1.2) children under 15 years of age, 49 (7.9± 1.0) in adolescents and 503 (80.7±1.5) in older patients over 18 years of age, 320 (1.2±0.07) patients were registered at the Family Medicine Center No. 8 in Bishkek, of which 193 (60.3±2.7) women, and 127 (39.7±2.7) men, including 49 (15.3±2.0) in children under 15 years of age, only 2 (0. 6±0.1) in a teenager and 269 (84.1±2.0) in elderly people and over 18 years of age (Table 1).

The long-term dynamics of the incidence of glomerulonephritis with nephrotic syndrome in the population of the Osh region has the same indicators as general data for the Kyrgyz Republic. As we can see, from Figure 1. the incidence of glomerulonephritis and nephrotic syndrome by gender in children under 15 years of age, adolescents and adult patients for the period 2012-2021. in the Kyrgyz Republic, most cases occur in women.

In women with glomerulonephritis with nephrotic syndrome in the Osh region, the indicators are 64.4, in the At-Bashi district - 64.7, in Bishkek, FMC No. 8 - 60.3 in the Osh region, the indicators for teenage girls are 60.9, in the At-Bashi district - 61.2, in Bishkek, FMC No. 8, no cases of morbidity were

Table 1. Incidence of glomerulonephritis and nephrotic syndrome in children (under 15 years of age), adolescents and adult patients for the period 2012-2021. in the Kyrgyz Republic (n-26111)

Years	Floor	Children from one to 15 years old		Teenagers (from 15 to 18 years old)		Adult patients		Total	
		abs. % (p±m)	Total abs. %(p±m)	abs. % (p±m)	Total abs. %(p±m)	abs. % (p±m)	Total abs. %(p±m)	abs. % (p±m)	Total abs. % (p±m)
Osh region	f	1557 (58.6±0.9)	2656 (10.6±0.1)	613 (60.9±1.5)	1007 (4.0±0.1)	14047 (65.3±0.3)	21505 (85.4±0.2)	16217 (64.4±0.3)	25168 (96.4±0.1)
	m	1099 (41.4±0.9)		394 (39.1±1.5)		7458 (34.7±0.3)		8951 (35.6±0.3)	
At-Bashi district	f	43 (60.5±6.2)	71 (11.4±1.2)	30 (61.2±9.5)	49 (7.9±1.0)	330 (65.6±2.5)	503 (80.7±1.5)	403 (64.6±2.3)	623 (2.4±0.08)
	m	28 (39.5±6.2)		19 (38.8±9.5)		173 (34.4±2.5)		220 (35.4±2.3)	
FMC No. 8, Bishkek	f	24 (49.0±7.1)	49 (15.3±2.0)	-	2 (0.6±0.1)	169 (62.8±2.9)	269 (84.1±2.0)	193 (60.3±2.7)	320 (1.2±0.07)
	m	25 (51.0±7.1)		2 (100.0)		100 (37.2±2.9)		127 (39.7±2.7)	
Republic of Kyrgyzstan	f	1624 (58.5±0.8)	2776 (10.7±0.2)	643 (60.7±1.5)	1058 (4.0±0.1)	14546 (65.2±0.3)	22277 (85.3±0.2)	16813 (64.3±0.2)	26111
	m	1152 (41.5±0.8)		415 (39.3±1.5)		7731 (34.8±0.3)		9298 (35.7±0.2)	

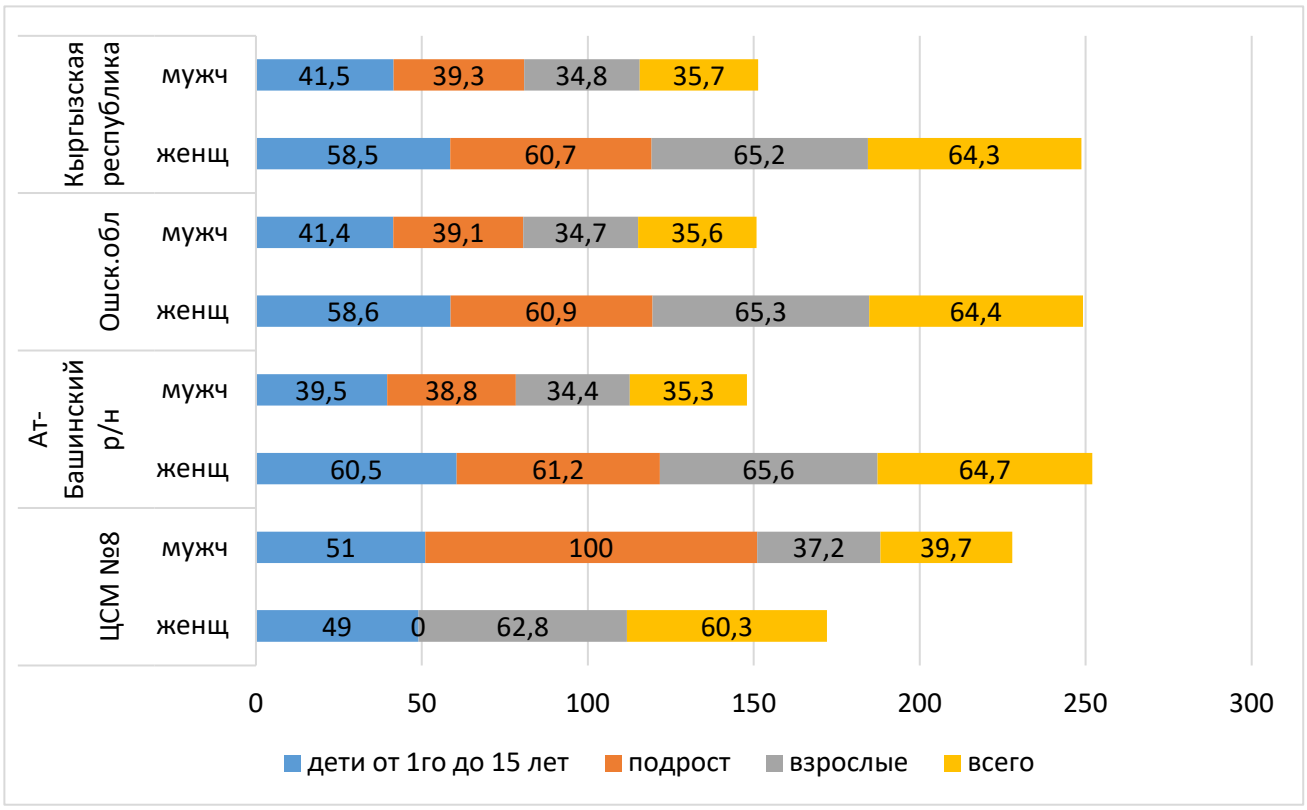

Fig.1. Incidence of glomerulonephritis and nephrotic syndrome by gender in children under 15 years of age, adolescents and adult patients for the period 2012-2021. in the Kyrgyz Republic

detected, for children under 15 years of age in the Osh region the indicators are 58.6 , in At-Bashi district - 60.5, in Bishkek, Family Medicine Centre (FMC) No. 8. Glomerulonephritis with nephrotic syndrome was more common in men in 2012 - 908 (65.8±0.7) and 2013 - 1115 (56.6±1.0), and since 2014 - more often in women: 2014 city – 464 (62.2±1.7), 2015 – 1091 (66.3±1.1), 2016 – 3816 (69.6±0.5), 2017 – 3210 (67, 3±0.6), 2018 – 2791 (69.7±0.7), 2019 – 2494 (68.6±0.7), 2020 – 568 (65.8±1.6), 2021 – 1060 (65.4±1.1) – Table 2.

The period of high incidence of glomerulonephritis with nephrotic syndrome in the population of the Kyrgyz Republic among boys under 15 years of age was 2016 (15.2±0.1), 2017 (22.4±0.1), among girls was 2016 (20 .4±0.1), 2017 (30.6±0.1), 2018 (17.5±0.1). In subsequent years, there was a decrease in incidence to 3.6±0.1 in boys and to 4.2±0.1 in girls in 2020. In boys and girls in adolescence, there is an annual rate of decline in the incidence of glomerulonephritis with nephrotic syndrome: - in 2020, the incidence of glomerulonephritis with nephrotic syndrome compared to 2012 decreased by 2.8 times in girls and 3.0 times in boys. In adult sick men, morbidity rates are characterized by a gradual rise to 18.5±0.1 in 2016, to 16.3±0.1 in 2017, to 12.7±0.1 in 2018, and in women 23.3±0.1 in 2016, to 18.5±0.1 in 2017, to 16.3±0.1 in 2018, in subsequent years there was a decrease in incidence to 2.8±0 .1 in men and up to 3.5±0.1 in women in 2020 (Table 2).

Incidence of glomerulonephritis with nephrotic syndrome by year: - in 2012, there were only 1379 registered cases of patients (5.3±0.1), of which 471 women (2.8±0.1) and 908 men (9.8±1. 2),

for 2013 - a total of 1969 (7.5±0.1), of which 854 women (5.1±0.1) and men 1115 (12.1±0.1), for 2014. – total 746 (2.9±0.1), of which 464 women (2.7±0.1) and 282 men (3.1±0.1), for 2015 – 1644 (6.3± 0.1), of which 1091 women (6.5±0.1) and 553 men (6.0±0.1), for 2016 – 5482 (21.0±0.2), of which women 3816 (22.7) and men 1666 (17.8±0.1), for 2017 – 4765 (18.3±0.2), of which 3210 women (19.1±0.3) and men 1555 (16.7±0.2), for 2018 – 4005 (15.3±0.2), of which 2791 women (16.6±0.2) and men 1214 (13.1±0.3), for 2019 – 3638 (13 .9±0.2), of which 2494 women (14.8±0.2) and 1144 men (12.3±0.3), for 2020 – 863 (3.3±0.1), of which 568 women (3.4±0.1) and men 295 (3.2±0.1), for 2021 – 1620 (6.2±0.1), of which 1060 women (6.3 ±0.2) and men 560 (6.0±0.2).

As we can see from Table 2, patients diagnosed with glomerulonephritis with nephrotic syndrome tend to intensively increase their indicators year after year. In 2012, 1379 (5.3±0.1) patients applied, of which 1334 (96.7±0.4) were the most frequently identified cases in the Osh region, then 32 (2.4±0.3) in the At-Bashi district) and in Bishkek, FMC No. 8 – 13 patients (0.9±0.2). In 2013 and 2015 - 1969 (7.5±0.1) and 1644 (6.3±0.1) treated cases, respectively, subsequent years, the figures increased by 1.4 times (2013), 1.2 times (2015), 4.0 times in 2016, 3.5 times in 2017 and 2.9 times in 2018 compared to 2012. In 2019 and 2020, there was a decrease in the incidence of glomerulonephritis with nephrotic syndrome by 1.1 times and 4.7, respectively, compared to 2018. This is due to the coronavirus pandemic throughout the world in the period from 2019-2020. In 2021, there is an increase in the incidence of glomerulonephritis with nephrotic syndrome by 1.9 times compared to 2020 (Table 2).

As we can see, from Figure 2, for patients in the Kyrgyz Republic in the long-term dynamics of the incidence of glomerulonephritis with nephrotic syndrome for the period 2012-2021 in children under 15 years of age during the entire observation period, the rates range from 4.3% from 2012 to 22. 0% in 2017 in relation to 100 thousand people, among adolescents in 2012, 8.2% were registered, in 2016 the rates increased to 22.1%, then decreased to 3.2% by 2020, in adult patients the rates were 5.3% in 2012 and there was an increase in indicators to 21.7% by 2016.

Since 2020 and in subsequent years, the incidence of glomerulonephritis with nephrotic syndrome has rapidly decreased to 2.9% per 100 thousand population. This is due to the coronavirus pandemic around the world in 2019-2020, during which cases of reduced monitoring of data on the incidence of glomerulonephritis with nephrotic syndrome were recorded.

Thus, in the research work, the total number of patients with the incidence of glomerulonephritis with nephrotic syndrome was noted in the amount of 26,111 registered cases; a large number of 16,686 (64.4 ± 0.2) patients were identified in women, including in the At-Bashi district - 270 women (66.8±2.3), Bishkek FMC No. 8 -198 women (61.9±2.7), Osh region -16218 women (64.4± 0.3) in the period from 2012-2021. As well as glomerulonephritis with nephrotic syndrome, 1624 (58.5±0.8) were found in girls under 15 years of age, 643 (60.7±1.5) in adolescents

Table 2. Dynamics of the incidence of glomerulonephritis and nephrotic syndrome in children under 15 years of age, adolescents and adult patients in the Osh region, At-Bashi district, Bishkek City Medical Center No. 8 for the period 2012-2021. (n-26111)

Years	Floor	At-Bashi district		FMC No. 8, Bishkek		Osh region		Total	
		abs. % (p±m)	Total abs. %(p±m)	abs. % (p±m)	Total abs. %(p±m)	abs. % (p±m)	Total abs. %(p±m)	abs. % (p±m)	Total abs. %(p±m)
2012	f	21 (5,2±2,4)	32 (5,1±0,8)	13 (6,6±1,7)	13 (4,0±1,0)	437 (2,7±0,1)	1334 (5,3±0,1)	471 (2,8±0,1)	1379 (5,3±0,1)
	m	11 (5,0±2,4)		-		897 (10,0±0,1)		908 (9,8±1,2)	
2013	f	24 (6,0±2,4)	41 (6,6±0,9)	12 (6,1±1,6)	20 (6,3±1,1)	818 (5,0±0,1)	1908 (7,6±0,1)	854 (5,1±0,1)	1969 (7,5±0,1)
	m	17 (7,7±2,4)		8 (6,6±2,2)		1090 (12,2±0,1)		1115 (12,1±0,1)	
2014	f	23 (5,7±2,4)	36 (5,8±0,8)	16 (8,1±1,9)	23 (7,2±1,1)	425 (2,6±0,1)	687 (2,7±0,1)	464 (2,7±0,1)	746 (2,9±0,1)
	m	13 (5,9±2,4)		7 (5,7±2,0)		262 (2,9±0,2)		282 (3,0±0,1)	
2015	f	31 (7,7±2,4)	53 (8,5±1,0)	20 (10,1±2,0)	34 (10,6±1,7)	1040 (6,4±0,2)	1557 (6,2±0,1)	1091 (6,5±0,1)	1644 (6,3±0,1)
	m	22 (10,0±2,4)		14 (11,5±2,8)		517 (5,8±0,2)		553 (6,0±0,1)	
2016	f	34 (8,4±2,4)	57 (9,1±1,1)	32 (16,1±2,6)	52 (16,3±2,0)	3750 (23,1±0,1)	5373 (21,3±0,2)	3816 (22,7±0,3)	5482 (21,0±0,2)
	m	23 (10,5±2,4)		20 (16,4±3,3)		1623 (18,2±0,4)		1666 (17,8±0,2)	
2017	f	57 (14,4±2,4)	81 (13,0±1,3)	23 (11,6±2,2)	36 (11,3±1,7)	3130 (19,3±0,3)	4648 (18,4±0,2)	3210 (19,1±0,3)	4765 (18,3±0,2)
	m	24 (10,9±3,3)		13 (10,7±2,7)		1518 (17,0±0,3)		1555 (16,7±0,2)	
2018	f	101 (25,0±2,9)	128 (20,5±1,6)	20 (10,1±2,0)	31 (9,7±1,6)	2670 (16,5±0,2)	3846 (15,3±0,2)	2791 (16,6±0,2)	4005 (15,3±0,2)
	m	27 (12,3±3,4)		11 (9,0±2,5)		1176 (13,1±0,3)		1214 (13,1±0,3)	
2019	f	42 (10,4±2,1)	69 (11,1±1,2)	18 (9,1±2,0)	32 (10,0±1,6)	2434 (15,0±0,2)	3537 (14,1±0,2)	2494 (14,8±0,2)	3638 (13,9±0,2)
	m	27 (12,3±3,4)		14 (11,5±2,8)		1103 (12,3±0,3)		1144 (12,3±0,3)	
2020	f	35 (8,6±2,0)	59 (9,5±1,1)	18 (9,1±2,0)	35 (10,8±1,6)	515 (3,2±0,1)	769 (3,1±0,1)	568 (3,4±0,1)	863 (3,3±0,1)
	m	24 (10,9±3,3)		17 (13,8±3,1)		254 (2,8±0,2)		295 (3,2±0,1)	
2021	f	35 (8,6±2,0)	67 (10,8±1,1)	26 (13,1±2,3)	44 (13,8±1,9)	999 (6,2±0,2)	1509 (6,0±0,1)	1060 (6,3±0,2)	1620 (6,2±0,1)
	m	32 (14,5±3,6)		18 (14,8±3,2)		510 (5,7±0,2)		560 (6,0±0,2)	
Total	f	403 (64,7±1,8)	623 (2,4±0,09)	198 (61,9±2,7)	320 (1,2±0,05)	16218 (64,4±0,3	25168 (96,4±0,4)	16819 (64,4±0,2)	26111
	m	220 (35,3±1,8)		122 (38,1±2,7)		8950 (35,6±0,3)		9292 (35,6±0,2)	

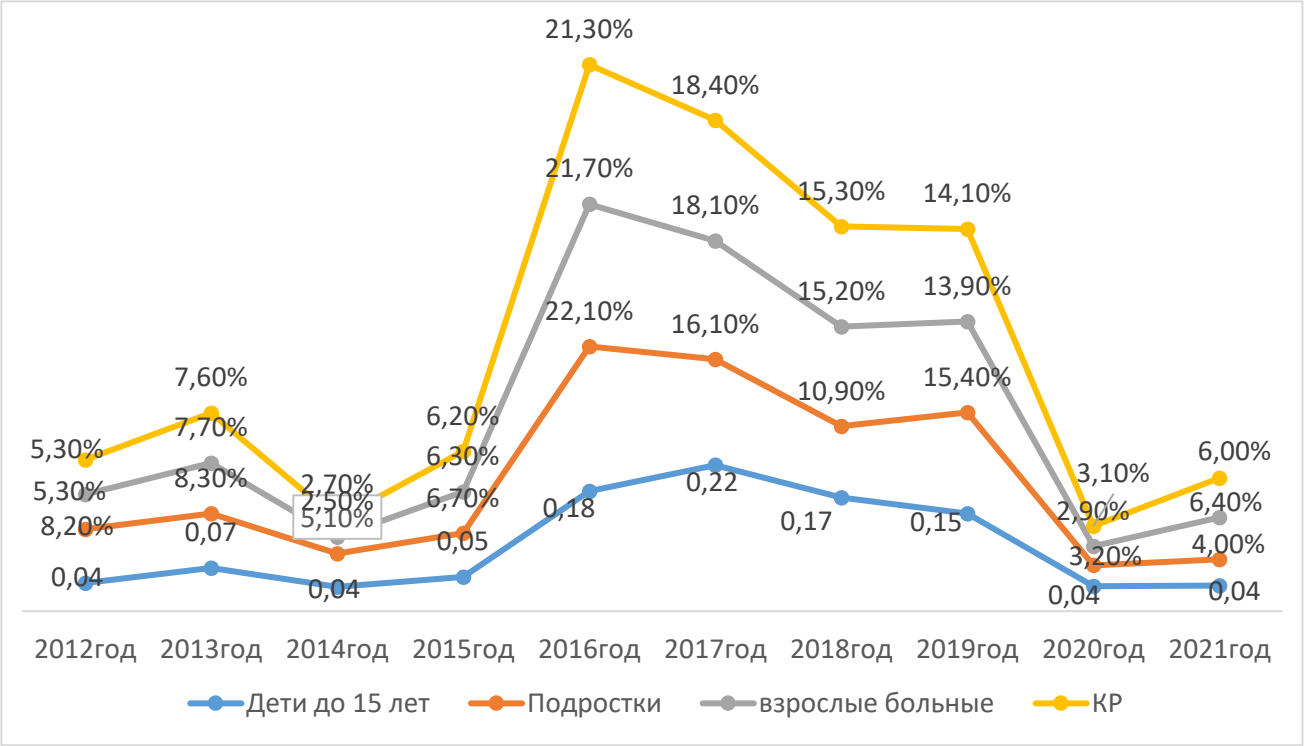

Figure 2. Incidence of glomerulonephritis with nephrotic syndrome in children (under 15 years), adolescents and adult patients in the Kyrgyz Republic for the period 2012-2021.

15-17 years old and 14,546 (65) in women over 18 years of age. .2±0.3) patients. Glomerulonephritis with nephrotic syndrome has been growing rapidly year after year. In 2012, 1379 (5.3±0.1) patients applied, of which 1334 (96.7±0.4) cases of disease were detected in the Osh region, then in At-Bashi district 32 (2.4±0.3) and in Bishkek FMC No. 8 – 13 patients (0.9±0.2). In 2013 and 2015 - 1969 (7.5±0.1) and 1644 (6.3±0.1) treated cases, respectively, in subsequent years the growth increased by 1.4 times (2013), 1.2 times (2015) , 4.0 times in 2016, 3.5 times in 2017 and 2.9 times in 2018 compared to 2012. It should be noted that the incidence rate showed an increasing trend and, as a result, by 2017 it amounted to 21.0% per 100 thousand population, according to which the incidence rate increased 4 times. In 2019 and 2020, there was a decrease in the incidence of glomerulonephritis with nephrotic syndrome by 1.1 times and 4.7 times, respectively, compared to 2018. This is due to the coronavirus pandemic in the world in 2019-2020, due to which data recording was not controlled. In 2021, there is an increase in the incidence of glomerulonephritis with nephrotic syndrome by 1.9 times compared to 2020 (Table 2**).**

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