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ORCID numbers: Mikhail A. Murashko 0000-0002-4426-0088; Vadim V. Vankov 0009-0004-5347-4098; Oliyа R. Artemova 0000-0001-6472-6036; Aleksandr V. Gusev 0000-0002-7380-8460

Correspondence to: Aleksandr V. Gusev
E-mail: agusev@webiomed.ai

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Implementation of artificial intelligence technologies in Russian healthcare: results of 2018–2024

Mikhail A. Murashko, Vadim V. Vankov, Oliyа R. Artemova, Aleksandr V. Gusev

Mikhail A. Murashko, Dr of Sci. (Med.), Minister of Health of the Russian Federation, Ministry of Health of the Russian Federation, 3, Rakhmanovsky per., Moscow, 127994, Russia

Vadim V. Vankov, Deputy Minister of Health of the Russian Federation, Ministry of Health of the Russian Federation, 3, Rakhmanovsky per., Moscow, 127994, Russia

Oliyа R. Artemova, Deputy Director, Department of Digital Development and Information Technologies, Ministry of Health of the Russian Federation, 3, Rakhmanovsky per., Moscow, 127994, Russia

Aleksandr V. Gusev, Cand. of Sci. (Techn.), Expert, Examination Department, Central Research Institute for Healthcare Organization and Informatization of the Ministry of Health of the Russian Federation, 11, Dobrolyubova str., Moscow, 127254, Russia

ABSTRACT

Background: Healthcare is one of the priority sectors for the implementation of artificial intelligence (AI) worldwide, including Russia. The key area of AI implementation is the integration of AI-based medical devices into the Unified Digital Framework in the healthcare sector of the constituent entities of the Russian Federation. The aim of this study is to analyze the development and implementation outcomes of AI in the Russian healthcare system in 2018–2024.

Materials and methods: The data regarding AI implementation were extracted from legislation, scientific publications and provided by the Ministry of Health of the Russian Federation and the national technical committee for standardization in the AI technologies.

Results: In Russia, 77% of AI-based medical devices are intended for medical image analysis. Between 2018 and 2024, 69% of investments in the development and implementation of AI solutions in healthcare came from state sources. Scientific research in this field is actively progressing: research institutions under the Russian Ministry of Health are implementing 215 AI-related healthcare projects. A total of 21 national and pre-liminary technical standards in the field of AI for healthcare have been

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developed and approved. In 2023, the deployment of AI-based medical devices began across the Russian regions. As of 01.01.2025, a total of 412 AI-based medical devices had been implemented, of which 83% are used for image analysis and 16% for electronic health record analysis.

Conclusion: A set of measures is being developed to actively introduce AI into healthcare, including the legal frameworks, attracting investments, conducting research and developing new products.

Key Words: artificial intelligence; medical devices; medical images; electronic health record; EHR

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Introduction

The introduction of artificial intelligence (AI) technologies is one of the key areas of digital transformation of healthcare. The prospect of AI technologies is due to several factors at once: the accumulation of a large amount of data, including widespread implementation of electronic health records (EHR) and digital diagnostics, the development of machine learning methods, the availability of high-performance graphics accelerators, etc. The accumulated experience in the development and application of various AI systems, as well as the results of research in this area demonstrate that AI technologies can significantly contribute to increasing the efficiency of healthcare organizations and rational use of available financial and human resources, improve healthcare management and offer new digital services for patients [1, 2].

The President of Russia V.V. Putin has repeatedly given various instructions regarding the development and implementation of AI technologies in healthcare¹. According to the “National Strategy for the Development of Artificial Intelligence in Russia until 2030 (as amended in 2024)”, the main goals of AI development in healthcare are:

1. Development of a comprehensive system of legal regulation, including ensuring the safety of using AI technologies.
2. Support for organizations developing AI technologies.
3. Support for research and development to achieve pioneering advancements in AI.
4. Enhancing competency levels and raising awareness about AI technologies.
5. Promoting the adoption of AI technologies.

The objective of this paper was to study the results of the development of artificial intelligence technologies in healthcare in the Russian Federation based on the results of 2018–2024.

Materials and methods

The sources of data for the study were scientific publications and reports of the Ministry of Health of the Russian Federation on the topic of creation, development and implementation of software using artificial intelligence technologies, as well as current regulatory legal acts on this

¹ List of assignments following the conference “Journey into the World of Artificial Intelligence” dated January 29, 2023 No. Pr-172. [In Russian] Accessed 01.08.2025. <http://www.kremlin.ru/acts/assignments/orders/70418>

issue. In addition, information provided by subordinate scientific centers of the Ministry of Health of the Russian Federation, as well as data from the national technical committee responsible for standardization in the field of AI technologies, were used to collect data.

Results

Creating basic conditions for the implementation of AI technologies

In 2011–2024, the Russian Ministry of Health implemented two major projects: “Development of the Unified State Information System in Healthcare” and “Creation of a Unified Digital Framework in Healthcare Based on the Unified State Health Information System”.

Through these activities, all the necessary basic conditions were created for the subsequent introduction of AI technologies, including equipping healthcare facilities with computer equipment, introducing healthcare information systems of healthcare organizations and state healthcare information systems in the constituent entities of the Russian Federation.

The main information technology infrastructure has been created in Russian regions. More than 1 million automated workplaces of medical staff are connected to healthcare information systems, a secure data transmission network has been implemented. State and municipal healthcare organizations and systems of the regions of the Russian Federation use healthcare information systems to organize and provide medical care to citizens and ensure information interaction with the Unified State Health Information System, including the widespread maintenance of EHR, central archives of medical images, an electronic method of information exchange in the field of compulsory health insurance, etc.

The Russian Ministry of Health transfers the healthcare system to paperless document management. This process includes the development of structured electronic medical documents. To ensure the transition of the healthcare system to paperless electronic document management, 126 types of structured electronic medical documents have been developed since 2019, which provide more than 80% of the needs of healthcare organizations for organizing paperless medical document management in all types of medical activities.

The transition of the healthcare industry to electronic document management provided conditions for the formation of large structured databases, the use of which contributed to the accelerated development and implementation of artificial intelligence technologies.

Development of a comprehensive system of legal regulation

The main guidelines, requirements, and approaches to the legal regulation of AI in the Russian Federation are defined in the “Concept for the Development of Regulation of Artificial Intelligence and Robotics”, approved by Order of the Government of the Russian Federation No. 2129-r of 19.08.2020².

Based on the approaches and recommendations of the International Medical Device Regulators Forum, AI systems in Russia were divided into 2 main groups: AI-based medical devices (AI MDs), intended for use by medical personnel in the direct provision of medical care and AI services that are not medical devices (MDs) [3].

² Order of the Government of the Russian Federation No. 2129-r of 19.08.2020 on approval of the “Concept for regulating artificial intelligence and robotics until 2024”. (In Russian). Accessed 01.08.2025. <http://publication.pravo.gov.ru/Document/View/0001202008260005>

In 2019, the Russian Ministry of Health and the Federal Service for Surveillance in Healthcare (Roszdravnadzor) created an interdepartmental working group tasked with developing amendments to the current legal regulation of medical devices in terms of AI technologies. The working group included representatives of expert and research organizations subordinate to the Ministry of Health and Roszdravnadzor, representatives of developer companies and experts in the field of AI technologies. The key principles of the working group's work were to develop a consolidated position on the main approaches to legal regulation in order, to enable the introduction of safe and effective AI MDs to the market, and avoid the creation of excessive regulatory barriers as well as leave room for investment and the creation of new products. Due to the activities of this working group, in 2020–2021, amendments were made to the national legislation of the Russian Federation, allowing the marketing authorization of AI systems as AI MDs. During 2023–2024, targeted changes were constantly made to the current legal acts aimed at reducing the time of authorization of new AI MDs while simultaneously strengthening post-authorization monitoring of the solutions. At the same time, similar regulatory approaches were implemented in the legislative acts of the Eurasian Economic Commission.

In order to speed up and simplify the introduction of AI MDs to the market, amendments were made to the legislation in 2024 that simplify the marketing authorization of MDs and minimize the number of refusals. Thus, the period for marketing authorization of MD from the moment of applying with Roszdravnadzor is projected to be 10 working days.

The new authorization rules also introduce a simplified procedure for making changes to the documents contained in the authorization dossier for AI MDs. This allows developers of such products to update the registration dossier when releasing new versions, provided that the changes do not affect the intended purpose and/or the principle of operation of the AI MD. Furthermore, this applies only if the AI MD includes a built-in function for automatic transmission of information on processed data and the outcomes of the MD's operation to the automated information system of the registration authority, in accordance with the procedure established by that authority. In such cases, and where the information stipulated by the procedure for reporting adverse events is also transmitted, the amendments may be made without conducting an assessment of the quality, efficacy, and safety of the MD.

For 2025 and the planning period of 2026 and 2027, provisions have been included on financing expenses related to the use of clinical decision support systems in the provision of medical care using AI.

The Russian Ministry of Health, with the active participation of the head specialists of the Russian Ministry of Health, has developed a Code of Ethics for the Use of Artificial Intelligence in Healthcare.

The Industry Code of Ethics for the Use of Artificial Intelligence in Healthcare is intended to regulate the ethical aspects of the development, implementation and use of AI technologies in the field of healthcare, including a set of principles and recommendations that apply to all stages of the life cycle of an AI system. Artificial intelligence, like any technology, carries risks, which is why the development of the Code is due to the need to:

- protect the interests of people, individual groups and each person, whose rights and freedoms are considered the highest value;
- develop a responsible approach among AI community members;
- strengthen patient, physician and public trust in AI.

The Code of Ethics reflects the point of view of the professional and academic community on the current challenge of strategic

development of the healthcare system, is based on concepts important to the healthcare community, and reflects the roles, rights and responsibilities of all participants. Thus, the use of artificial intelligence in the healthcare system will take place in a single terminological field and taking into account the needs of all participants in the process.

Following the provisions of the Code of Ethics will increase Russians' trust in this technology and help developers of artificial intelligence systems create safe and competitive solutions that are necessary for the industry.

Of course, an important direction in the development of regulation was the creation in 2019 of the "Artificial Intelligence in Healthcare" subcommittee within the "Artificial Intelligence" technical committee for standardization. Thanks to the activities of this subcommittee, a set of national standards in the field of artificial intelligence for healthcare has been created in Russia, including 4 National Standards in 2021, 7 – in 2022, 3 – in 2023, 7 – in 2024 (total 21 National Standards) and a preliminary technical standard.

The documents regulate many key aspects of the creation and verification of the AI, including procedures for preparing datasets for machine learning and validation of the AI, technical and clinical tests, basic provisions and requirements for the AI for radiation diagnostics, clinical decision support systems, predictive analytics, etc.

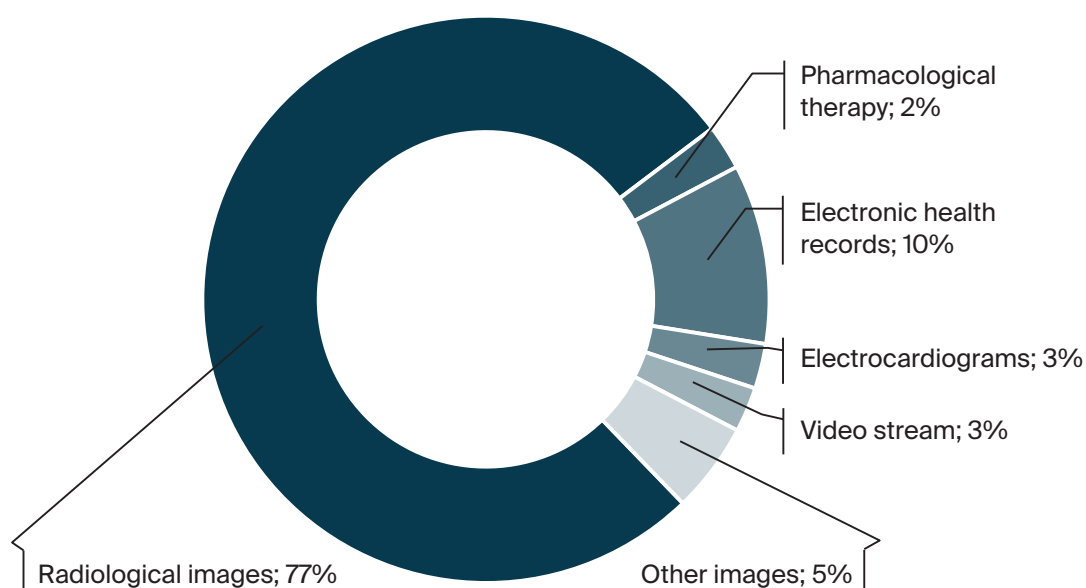
According to the 2024 results in Russia, among all registered AI MDs, 77% are in the medical image analysis segment. 10% are intended for EHR analysis, and 13% of AI MDs are intended for the analysis of other medical data (fig. 1).

A large share of registered AI MDs (34 or 87%) are domestic developments; information about these AI MDs is available in the Unified Register of Russian Software for Electronic Computers and Databases.

Support for organizations developing AI technologies

In Russia, a system of support for development companies and research teams working on the creation of applied solutions in the field of AI for healthcare has been created and is functioning effectively. In particular,

FIG. 1. Distribution of authorized medical devices with artificial intelligence technologies by types of processed data



state development institutions have created and supported several programs with targeted support measures specifically for developers of AI solutions. The leading ones are the Skolkovo Foundation, the National Technology Initiative, the Innovation Development Fund, etc. Private investors and professional investment funds also invest in the creation of relevant products.

At the request of the Ministry of Health to various state and commercial investment funds and development institutions sent in January 2025, consolidated data on investments, including various state support measures, were received and analyzed. All investments made in Russia can be divided into 3 main groups: state (development institutions), private (business angels, investment funds and commercial companies) and syndicated (rounds in which different investors participated). The distribution of all investments by investment sources is presented in fig. 2.

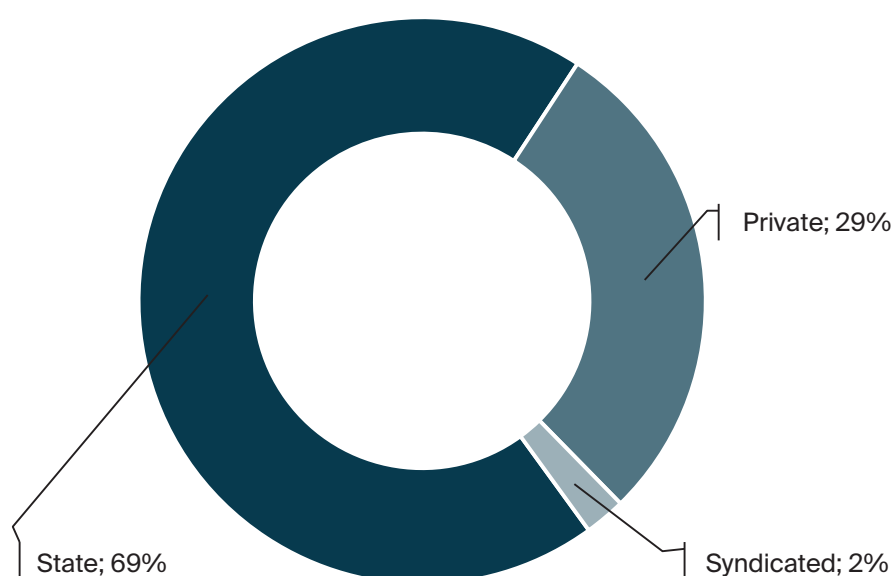
As can be seen from fig. 2, public investment in the development of AI for healthcare is the main source – it accounted for 69% of all investments. Among public investments, Moscow plays a leading role, having allocated 55.2% of public investments and 38.2% of total investments in market development as part of the Moscow Experiment on Computer Vision in 2020–2024. The second important source is the National Technology Initiative Fund – it accounted for 18.9% of public investments. The third in line is the Skolkovo Foundation, which allocated many different grants, which amounted to 12.9% of public investments.

Private investments accounted for 28.4% of all investments. In this segment, investments from various venture funds are in the lead, having allocated a total of 45.3% of the segment. In second place are private investors (business angels), having invested 33.7% of the segment. Next come commercial companies, which accounted for 21%.

Support for research and development

The Russian Ministry of Health, together with its subordinate institutions, is conducting systematic work in terms of scientific research and the creation of new developments in the most priority areas.

FIG. 2. Distribution of investments in artificial intelligence for healthcare by source



In 2024, the most in-demand clinical tasks that can be solved with the help of AI were identified. The development of over 200 new innovative domestic AI solutions, spanning various technological readiness levels, has been initiated. The majority of AI solutions for medical care stages are being developed for Diagnostics (150 AI solutions under development, addressing 54 clinical tasks). Additionally, 23 AI solutions target Prevention (13 clinical tasks), 37 AI solutions focus on Treatment (27 clinical tasks), and 9 AI solutions are designed for Rehabilitation (5 clinical tasks).

Over 190 datasets for machine learning have been prepared at the expert level, and over 100 clinical tasks have been identified. The most widely represented solutions are in the following areas: oncology, general practice, obstetrics and gynecology, radiology and radiotherapy, and endocrinology.

In 2023, as part of the implementation of the “Artificial Intelligence” federal project, the research center in the field of artificial intelligence in healthcare was created at the Federal State Budgetary Institution “N.N. Blokhin Russian Cancer Research Center” of the Russian Ministry of Health.

The research center is currently implementing projects at various stages aimed at:

- early detection of oncological diseases based on socio-demographic data, identifying people with the highest risk of developing oncological diseases and developing proposals for subsequent optimization of national screening programs;
- diagnostics and treatment of cancer patients, including the development of solutions for radiation therapy on modern linear accelerators;
- tertiary prevention and efficient use of resources in providing medical care to patients with oncological diseases.

The research center is focused on AI-based methods for creating software that can reduce the development time of personalized antitumor vaccines and research on finding tumorotropic pharmacological transport platforms for delivering therapeutic agents in radiation and nuclear medical technologies.

Development of educational programs, training courses, teaching and methodological and educational materials on AI is underway.

The Almazov National Medical Research Center of the Russian Ministry of Health, together with Sber, has created the Artificial Intelligence Center. The Center, together with industrial partners, is working on the creation of integration, platform solutions, frameworks that will allow working with an array of big data, developing predictive analytics and creating DSSs, moving from a digital clinic model to a smart clinic model. Work is underway to create digital twins of processes and digital twins of patients to conduct so-called “in silico” experiments to test innovative treatment methods and implement the concept of data-based management.

As part of the Center’s program, 5 digital MDs were created, 3 of which are AI MDs (tests are being completed). The Center has been accredited under the quality management system of the site for the production of AI MDs. Together with Sber, several new AI MDs are being developed: a model for predicting inpatient risks and a model for automated calculation of the SyntaxScore for coronary studies, approbation and refinement of “CT Stroke” AI MD (SberMedAI) to improve the methodology of its implementation in Russian regions to enhance the provision of medical care to patients with cerebrovascular accident.

In 2024, significant results were achieved in training the large language model GigaChat in collaboration with Sber. The project involved over 300 employees and trainees from the Almazov National Medical

Research Centre (under the Russian Ministry of Health). A key milestone was the model's successful passing of the final certification exam in the specialty of General Medicine. The Centre continues to advance GigaChat's training and is developing a broad range of applied products for patients, healthcare professionals, and medical students. Efforts are underway to integrate the model into the healthcare information system and the remote patient monitoring system for cardiovascular care. Additionally, the application of multimodal generative models across all stages of medical care, including testing on digital twins, is one of the main priorities of the Center's future research.

The Russian Ministry of Health is developing a classification system for assessing the technological readiness levels of AI solutions. The proposed classification includes 9 levels, ranging from concept formulation to readiness for mass production of authorized medical devices.

In 2024, the Ministry issued recommendations to constituent entities of the Russian Federation to develop and publish scientific articles on the application of AI technologies in healthcare, based on the results of AI implementation in medical practice. Each constituent entity has appointed officials responsible for research activities. To date, 13 constituent entities have produced 19 publications, including 9 scientific articles.

In addition, the Russian Ministry of Health has recommended that research centers and developers of various AI solutions conduct and publish studies on the effectiveness of the created products in the scientific literature, including their impact on strategic indicators of the healthcare system, such as morbidity and mortality, as well as an assessment of the financial and economic feasibility of implementing AI technologies in practice. The first studies in this area show that the use of AI allows for a 10% increase in the detection of malignant neoplasms and a 15% reduction in the labor costs of physicians when using AI in radiation diagnostics [4]. The use of AI in preventive medicine allows for a 55% reduction in the risk of death from cardiovascular diseases, while receiving about 277 million rubles of economic effect per 1 million citizens annually due to more effective prevention of cardiovascular diseases' complications [5].

Raising the level of competence and awareness of AI technologies

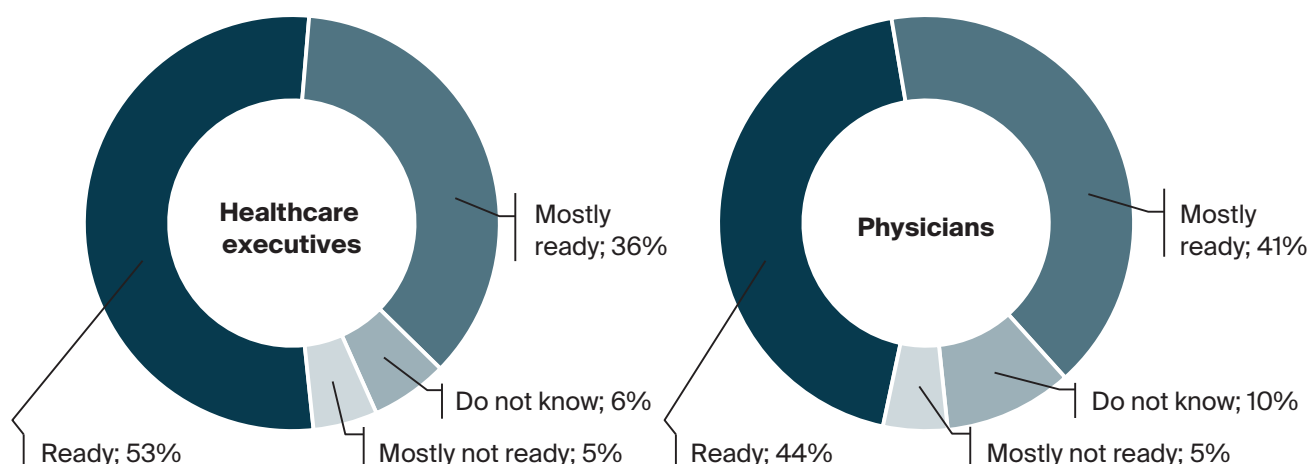
Russian healthcare executives and physicians are quite positive about the implementation of AI technologies. As can be seen from fig. 3, the relevant surveys showed that 89% of executives and 85% of physicians agree with the statement that the implementation of AI technologies will have a positive impact on work efficiency [6, 7].

According to our data [7], 63% of Russian healthcare executives consider themselves to be aware of AI, and 89% see the value of using AI technologies in healthcare, while 73% believe that in the future AI will always be used to support medical decision-making.

Targeted work is underway to create educational programs for training specialists in the field of development and application of artificial intelligence technology in the field of healthcare. Each program is designed for a specific category of listeners, including students, physicians of all specialties, medical, pharmaceutical, scientific, and pedagogical workers, as well as information technology specialists of healthcare organizations.

Research teams publish practical and methodological guidelines on the research, development, and application of AI technologies. Thus, in 2024, based on the scientific and practical results of the Moscow

FIG. 3. Results of surveys of healthcare executives and physicians regarding the prospects for the implementation of artificial intelligence technologies



Experiment on Computer Vision in Radiology, the first manual in the Russian Federation on preparing data sets for training and testing software based on artificial intelligence technology was published. This publication has been endorsed by the Coordination Council for the Educational Field of “Healthcare and Medical Sciences” as an official textbook³.

Implementation of AI technologies in the regions of the Russian Federation

Focusing on a risk-oriented approach and the key principle of ensuring safe and controlled use of AI, the strategic direction in the field of digital transformation of healthcare, approved by the Order of the Government of the Russian Federation of 17.04.2024 No. 959-r, it was decided that the primary task for Russian healthcare is the implementation of AI MDs⁴.

Under this decision, by 2030, all healthcare institutions within the state healthcare system of the Russian Federation must ensure a progressive increase in the use of AI MDs. In 2023, each constituent entity of the Russian Federation was required to implement at least 1 AI MD. In 2024, this target was raised to a minimum of 3 AI MDs. By 2030, all constituent entities must utilize at least 12 AI MDs in their operations (fig. 4).

The primary areas selected for the initial implementation of AI technologies in healthcare were medical image analysis and EHR analysis. These categories were prioritized due to the highest number of marketing authorizations of AI-based products as medical devices.

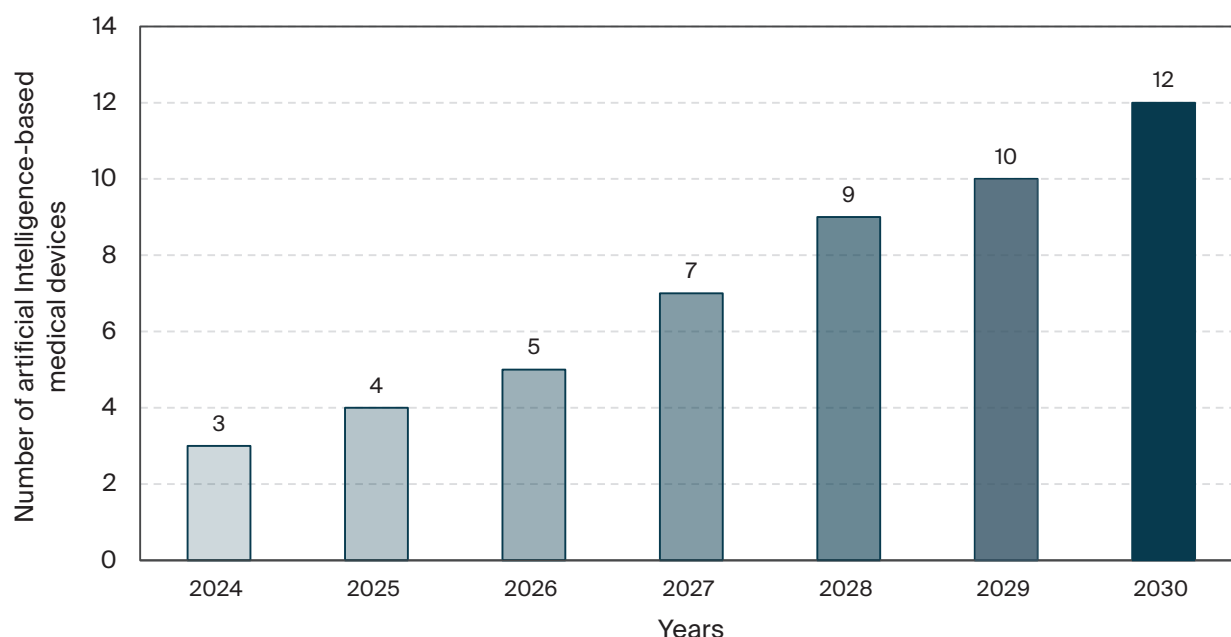
Russian regions were advised to prioritize projects aimed at reducing morbidity and preventable mortality from cardiovascular and oncological diseases, as these areas are key priorities within the framework of the “Healthcare” national project.

To support procurement and implementation of AI MDs, expert guidelines were developed with the participation of specialists from the Ministry of Health and Roszdravnadzor. These guidelines include standard requirements for AI MDs, covering product delivery

³ Vasiliev YuA, Arzamasov KM, Vladimirov AV, et al. Preparing a dataset for training and testing software based on artificial intelligence technologies: a tutorial. Moscow: Izdatel'skie resheniya; 2024. 140 p. ISBN 978-5-0062-1244-2. (In Russian).

⁴ Order of the Government of the Russian Federation No. 959-r of 17.04.2024. (In Russian). Accessed 01.08.2025. <http://publication.pravo.gov.ru/document/0001202404190016>

FIG. 4. A regulatory requirement for the number of artificial intelligence-based medical devices that must be applied on a permanent basis in the constituent entities of the Russian Federation



and deployment conditions, typical integration and application scenarios, and other relevant aspects.

In October 2024, a departmental initiative was launched to facilitate the integration of AI technologies into clinical practice. The goal of the initiative is to ensure that each constituent entity of the Russian Federation meets the target criteria for AI implementation in healthcare: at least three AI MDs must be implemented and used in routine medical care in every region.

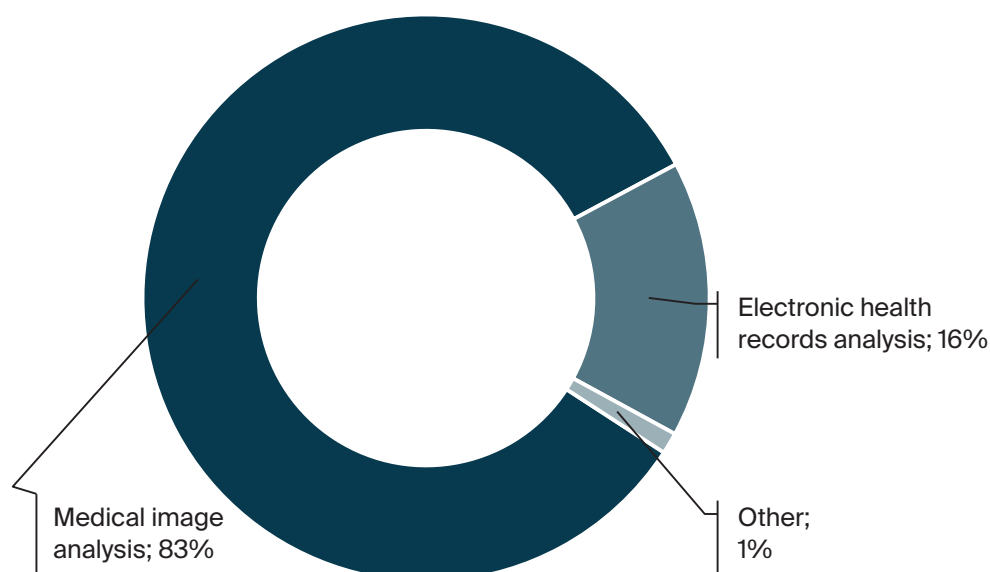
As part of this initiative, monitoring of implementation indicators was conducted in healthcare organizations, along with an analysis of regional infrastructure necessary for the operation of AI MDs and the development of recommendations for its improvement. Standard scenarios for the use of AI in clinical practice are being developed and implemented, and training programs are being created to support healthcare professionals in applying AI MDs.

Implementation of AI-based medical devices in the regions of the Russian Federation

As a result of the projects implemented in 2023 and 2024, by January 2025, the constituent entities of the Russian Federation had deployed a total of 412 authorized AI MDs of domestic origin (fig. 5). Four newly established regions were not required to implement AI MD deployment activities due to the need to first develop infrastructure and establish basic digitalization.

The majority of regions opted for a mixed implementation approach, deploying AI technologies for both medical image analysis (85 regions) and EHR analysis (58 regions), and only 5 regions implemented AI MDs intended for other purposes.

FIG. 5. Distribution of artificial intelligence-based medical devices by types of implementation



The growing prevalence in Russia of AI-enhanced medical tools utilizing computer vision to interpret and process medical imagery is fully aligned with international trends⁵ [8].

Conclusion

At present, all necessary conditions have been established in the Russian healthcare system for the development and implementation of AI technologies. These include the creation of basic infrastructure, the establishment of the legal framework, the attraction of investments, the conduct of scientific research, and the development of new products.

The current key challenges are as follows:

- building trust in AI technologies among physicians and patients;
- ensuring monitoring and oversight of AI applications;
- training personnel to work with AI in healthcare;
- data management: access, protection, and confidentiality;
- further development of data processing infrastructure.

To address these challenges and mitigate associated risks, a range of initiatives is being implemented. These include the development of educational programs, the establishment of data management and data storage approaches, fine-tuning the infrastructure of centralized medical image archives, and the exchange of best practices in AI implementation. Such discussions take place at conferences, professional forums, and during regular meetings between the Ministry of Health and regional authorities as part of the federal AI implementation initiative, where reports on best practices are presented and reviewed.

The key areas for the development and application of AI technologies in 2025 include:

- continued implementation of domestic AI systems aimed at solving clinical tasks, automating routine processes, and improving healthcare management efficiency;
- increasing the number of AI MDs used within the State Healthcare Information Systems of regions;

⁵ Vladzimirsky AV, Vasiliev YuA, Arzamasov KM, et al. Computer vision in radiation diagnostics: the first stage of the Moscow experiment. 2nd edition. Moscow: Izdatel'skie resheniya; 2023. 388 p; ISBN 978-5-0059-3043-9. (In Russian).

- integration of AI solutions in institutions subordinate to the Ministry of Health;
- scaling up best practices and developing standard use-case scenarios;
- regular training of healthcare professionals on the use of AI in their daily practice;
- fine-tuning infrastructure and data management to increase AI coverage and enhance the performance of AI-based medical devices;
- monitoring the effectiveness of AI technologies in healthcare delivery;
- monitoring the safety of AI usage, including adverse event reporting and usage statistics analysis;
- ensuring compliance with information security requirements.

One of the priority tasks for the future development and launch of new AI projects in healthcare is identifying existing “white spots”—clinical tasks or use cases where effective and ready-to-use AI solutions are lacking. In this regard, the Ministry of Health is exploring new AI payment models, including service-based models. This approach could attract additional investment into the industry while offering a more effective and rational method of financing such products.

Thus, the model of AI service application is shifting from direct state investment in the procurement of AI medical devices toward long-term investment through the Federal Compulsory Health Insurance Fund. This transition enables AI developers to embed AI technologies into the delivery of medical care and receive funding as part of reimbursed healthcare services involving AI. This model fosters both the advancement of AI solutions and healthy competition among developers.

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