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Transforming Diagnostics Through Artificial Intelligence: Insights from Moscow's
Healthcare Integration





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Transforming Diagnostics Through Artificial Intelligence: Insights from Moscow's Healthcare Integration

Moscow's AI healthcare initiative transforms diagnostics and treatment, using advanced tools to detect conditions like lung cancer, pneumonia, breast cancer, spine osteoporosis, stroke, gallstone disease etc. AI improves accuracy, speeds workflows and prioritises preventative care. Public performance evaluations and regulatory standards ensure safety and effectiveness, setting a global standard. This initiative showcases the synergy of technology and medical expertise for accessible, precise and efficient healthcare systems.



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key points

- AI enhances healthcare in Moscow, improving accuracy in radiology.
- Automated tools optimise radiology workflows.
- Preventative care with AI improves early detection, reducing burdens on healthcare workers.
- Rigorous testing and public evaluations ensure safe and effective AI deployment.
- Moscow sets a global standard for AI integration in healthcare.

The Center for Diagnostics and Telemedicine of the Moscow Healthcare Department is a leading scientific organisation within the Social Development Complex of the Moscow Mayor's Office. It focuses on the integration of artificial intelligence in medicine, advancement of radiology, management of medical departments, research and education of healthcare professionals.

The Center is at the forefront of integrating artificial intelligence (AI) into healthcare, marking a significant milestone in medical innovation. From detecting gallstones with precision to enhancing the early diagnosis of breast

cancer, AI applications are profoundly transforming diagnostics and treatment. This technological advancement is not limited to a single use case but spans multiple domains, improving diagnostic accuracy and enabling early interventions for various medical conditions. These pioneering efforts highlight AI's potential to modernise healthcare systems around the world.

Innovative AI Tool Enhances Abdominal CT Scan Analysis for Cholelithiasis

A new artificial intelligence service for the detection of gallstone disease on CT



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scans has been launched in Moscow. This advanced neural network automates the identification of gallstones in the gallbladder, accurately measuring their size and accelerating the diagnostic process. Such technological innovation is expected to enhance the likelihood of successful treatment and patient recovery.

Anastasia Rakova, Deputy Mayor of Moscow for Social Development, remarked on the initiative, highlighting the city's active integration of artificial intelligence into its healthcare system. She explained that an algorithm designed to detect gallstone disease on CT scans of abdominal organs had been deployed for the first time. According to her, this condition affects one in five adult patients on average and often remains asymptomatic for long periods, which poses challenges for timely diagnosis. In this case, radiologists can resort to computed tomography (CT), a highly regarded diagnostic tool, especially when initial assessments are inconclusive or require confirmation. Computer vision technology is a crucial support mechanism for radiologists, drawing their attention to the presence of gallstones and providing automatic size measurements, thereby enhancing diagnostic efficiency.

Prior to implementation in real patient cases, the AI service underwent rigorous testing to ensure its efficacy in identifying gallstones without mistakenly interpreting other conditions as anomalies. The integration of computer vision technology in medical practice aims to reduce diagnostic time and enhance accuracy.

“AI reduces the time required to interpret mammograms by over eight times while maintaining high diagnostic accuracy.”

Yuri Vasiliev, Chief Consultant for Radiology and CEO of the Center for Diagnostics and Telemedicine of the Moscow Healthcare Department, explained that developing artificial intelligence capabilities within the healthcare sector aims to automate processes, freeing radiologists from repetitive measurements. These algorithms also serve as tools for validating clinical assessments, enabling physicians to cross-verify their evaluations. Vasiliev expressed satisfaction that the capital's innovations would soon be accessible to regions nationwide. At the beginning of 2024, the Moscow artificial intelligence platform 'MosMedAI' was launched for healthcare professionals, offering 17 AI services designed to assist radiologists in detecting various conditions,

including osteoporosis, breast cancer, pneumonia and other diseases.

The Moscow Experiment: Advancing AI in Healthcare

Moscow was among the first cities globally to integrate computer vision technologies into healthcare. Initiated in 2019, the experiment is managed by the Center for Diagnostics and Telemedicine in collaboration with the Moscow Social Development Complex and the Department of Information Technology. It represents the world's largest prospective scientific study in this field.

When a patient undergoes an imaging procedure, the results are automatically uploaded to the Unified Radiological Information Service (URIS) of the Unified Medical Information and Analytical System (UMIAS). Neural networks analyse the images in real time, detecting signs of pathology, making measurements and highlighting findings for radiologists. Radiologists receive both the original and AI-processed studies to form their final report.

Currently, 150 medical facilities in Moscow, including children's hospitals, use these technologies. Moscow specialists develop and test services, ensuring rigorous control over their performance. Current algorithms are nearing the high level of precision typically associated with medical professionals.

Neural networks assist in identifying signs of lung cancer, pneumonia, spine osteoporosis, aortic aneurysm, ischaemic heart disease, stroke and pulmonary hypertension. AI significantly supports

physicians by streamlining workflows and enhancing diagnostic accuracy while maintaining the physician's leading role in patient care.

“Gallstone disease (...) affects one in five adult patients on average and often remains asymptomatic for long periods.”

The Moscow experiment ensures strict oversight of AI solutions, with doctors and scientists closely monitoring their performance. Algorithms undergo continuous evaluation, and any underperforming service is revised. The testing and subsequent refinement of services constitute a vital phase of the experiment. Notably, the experiment integrates public and open assessment of the algorithms' quality from the outset. Since 2023, algorithm performance has been publicly assessed through a “maturity matrix,” offering quarterly reports that track accuracy and improvements (Center of Diagnostics and Telemedicine 2024).

This approach allows medical institutions to evaluate service effectiveness and provides developers with benchmarks to refine their products. In summary, these public quarterly reports offer a comprehensive analysis of the performance of all AI solutions utilised by radiologists. Using the matrix,

specialists from medical institutions can evaluate the accuracy of specific services and monitor their quality improvement over time. Moreover, algorithm developers can compare their products against similar offerings, facilitating improvement to meet industry standards.

To establish a regulatory framework for AI in medicine, national standards (GOSTs) have been developed by the Center for Diagnostics and Telemedicine. These standards outline requirements for the technical and clinical trials of AI in radiology, culminating in a registration certificate that authorises their use in hospitals. Beyond these standards,

experts emphasise the need for robust regulations on methodology for clinical trials, data requirements and ongoing software quality control to ensure safe AI deployment.

Effective regulation of software quality control methods post-state registration is essential, along with timely updating of registration certificates as new software versions are released. Ensuring the safety of AI applications in medicine is a top priority for the Center for Diagnostics and Telemedicine of the Moscow Healthcare Department.



To date, radiologists in Moscow have access to over 50 different AI services supporting imaging studies' interpretation. Of these, nine integrated solutions are actively operational in the healthcare sector, with the neural network designed to detect multiple diseases on a single medical image. This development aligns with Moscow's healthcare strategy, which outlines initiatives extending through 2030.

Preventative Imaging and AI in Routine Mammograms

Breast cancer is currently one of the most prevalent cancers among women. Various social, demographic and economic factors contribute to delayed diagnoses. To address this issue, radiologists advocate for the early identification of potential signs of breast cancer through screening. This approach entails mass examinations of the population, including asymptomatic individuals, utilising the safest and most straightforward method available—mammography. Mammography is a safe and effective method, exposing women to a minimal radiation dose of approximately 0.25 mSv, well within the annual safety limit of 1 mSv for preventative procedures.

According to Russian normative documents, mammography results must be reviewed by two radiologists to ensure diagnostic accuracy and minimise the risk of missed pathologies. This double reading is particularly critical during screening, where timely identification of abnormalities is essential for early intervention. However, mammography is a complex diagnostic modality requiring significant expertise and experience, especially for detecting early-stage disease. Since 2019, the Ministry of Health of the Russian Federation has mandated

biennial mammography screenings for women aged 40 to 75 years, with the goal of achieving 100% population coverage within the recommended age group. Meeting this demand poses significant challenges for the healthcare system, including financial costs and a shortage of qualified radiologists. As the demand for this type of imaging study continues to rise, there will inevitably be a shortage of radiologists available to conduct mass screening programmes.

“The integration of artificial intelligence into Moscow's healthcare system exemplifies how technology can deeply transform medical practices.”

The Role of AI in Screening Programmes

One potential solution to this challenge lies in the implementation of artificial intelligence and automation. Artificial intelligence offers a transformative solution to these challenges by automating and streamlining key aspects of the screening process. Neural networks can analyse large volumes of medical images far faster than humans, flagging those that require immediate attention.

In Moscow, AI is now integrated into several stages of the radiology workflow:

- 1. Radiology Decision Support System.** AI simplifies and accelerates radiology report preparation by providing pre-filled templates with standardised descriptions of common pathologies. Radiologists review and finalise these protocols, significantly reducing their workload.
- 2. Automated Measurements:** AI performs precise morphometric analyses, including length, area and volume measurements. These routine tasks, now significantly automated, are conducted with greater accuracy than manual methods. In other words, it works like a kind of ruler.
- 3. First Opinion in Mass Screening:** Artificial intelligence has progressed beyond experimental phases and is now being integrated as a practical healthcare service within the framework of compulsory health insurance. Since early 2023, the double-reading of mammograms for residents of Moscow has been conducted by both artificial intelligence and a radiologist. This AI-powered medical device is fully authorised for use under Russia's regulatory framework and is integrated into the national compulsory health insurance system. Moscow has reported positive outcomes from this implementation.

Proven Benefits

Moscow's implementation of AI in mammography has yielded significant benefits. Research by the Center for Diagnostics and Telemedicine demonstrates that AI reduces the time required to interpret mammograms by over eight times while

maintaining high diagnostic accuracy. This efficiency enables faster results delivery to patients and allows radiologists to allocate their time more effectively.

AI integration has also encouraged a shift in focus towards preventative medicine. Early detection through screening significantly increases the chances of successful treatment and reduces the overall burden on the healthcare system. Additionally, AI-driven tools provide consistent, high-quality results that help eliminate variability caused by human error, ensuring equitable healthcare outcomes.

By combining AI's speed and precision with radiologists' expertise, Moscow has set a benchmark for leveraging technology to enhance early detection and improve breast cancer outcomes in large-scale preventative healthcare.

Conclusion

The integration of artificial intelligence into Moscow's healthcare system exemplifies how technology can deeply transform medical practices. The deployment of AI systems in identifying gallstones and breast cancer, among other conditions, showcases the versatility and effectiveness of AI in addressing diverse healthcare challenges.

Furthermore, AI enables the prioritisation of preventative measures, such as the early detection of conditions that might otherwise go unnoticed until advanced stages. AI also promotes consistency and quality in diagnostic practices, minimising the variability introduced by human error and fostering equitable healthcare for all.

The public transparency of algorithm performance, coupled with stringent regulatory standards, ensures that these technologies remain safe and effective. The Center's commitment to innovation, rigorous

testing and continuous refinement sets a benchmark to follow. As these AI systems expand to other regions, they have the potential to redefine global healthcare norms.

By blending technological innovation with medical expertise, Moscow exemplifies the transformative potential of AI when applied thoughtfully and systematically. The city's achievements in healthcare technology serve as an inspiring model for the integration of AI into medical systems worldwide, promising a future where healthcare is more precise, accessible and impactful.

Conflict of Interest

None

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