Global Conference on Medical and Health Sciences
Hosted Online from Madrid, Spain
Date: 14th June, 2026
Website: https://econferencia.com

ARTIFICIAL INTELLIGENCE IN MEDICAL DIAGNOSIS: CURRENT APPLICATIONS, CLINICAL OUTCOMES, AND FUTURE PERSPECTIVES

Fazliddin Arzikulov
Azizbek Sattarov
Rakhmatilla Amirkulov
Tashkent State Medical University, Tashkent, Uzbekistan
E-mail: arzikulovfazliddin1997@gmail.com

ABSTRACT

This article presents a systematic literature review examining the current applications of artificial intelligence (AI) in medical diagnosis, their documented clinical outcomes, and perspectives for implementation in low- and middle-income country healthcare systems. Publications from 2015 to 2024 indexed in PubMed, Scopus, Web of Science, and Cochrane Library were systematically analysed. The review covers AI diagnostic applications across imaging-based specialties including radiology, pathology, and ophthalmology, as well as clinical decision support in internal medicine, and addresses methodological quality, safety considerations, and implementation challenges. The analysis demonstrates that AI diagnostic systems achieve performance comparable or superior to specialist clinicians in specific, well-defined diagnostic tasks — including diabetic retinopathy screening (AUC 0.99), pneumonia detection on chest radiographs (AUC 0.93), and melanoma identification (AUC 0.91) — while facing significant barriers to real-world clinical deployment including training data quality, algorithmic bias, and regulatory uncertainty. Implications for AI diagnostic implementation in Uzbekistan's healthcare system are identified.

Global Conference on Medical and Health Sciences
Hosted Online from Madrid, Spain
Date: 14th June, 2026
Website: https://econferencia.com

Keywords: artificial intelligence, medical diagnosis, deep learning, clinical decision support, radiology, pathology, Uzbekistan, literature review.

1. INTRODUCTION

Artificial intelligence — and deep learning in particular — has achieved remarkable advances in medical diagnostic accuracy over the past decade, with landmark studies demonstrating performance at or above the level of board-certified specialists in specific diagnostic tasks across multiple clinical domains (Topol, 2019; Rajpurkar et al., 2022). The clinical significance of these advances is amplified by global diagnostic workforce shortages: the World Health Organization estimates a shortage of 18 million health workers globally by 2030, concentrated in low- and middle-income countries (WHO, 2016). AI diagnostic systems capable of supporting or replacing specialist interpretation in resource-constrained settings offer a potential partial solution to this access gap. In Uzbekistan, where specialist diagnostic services are concentrated in urban tertiary centres with limited penetration to rural areas, AI-enabled diagnostics represent a particularly significant opportunity (Ministry of Health, Republic of Uzbekistan, 2022). Tashkent State Medical University's Department of Biomedical Engineering, Informatics and Biophysics is directly engaged with these developments, making synthesis of the evidence base a practical priority. This review aims to critically analyse the current state of AI diagnostic applications, their documented clinical outcomes, and the implementation challenges relevant to Uzbekistan's healthcare context.

2. AI IN RADIOLOGICAL DIAGNOSIS

Radiology has been the most extensively studied domain for AI diagnostic applications, reflecting the inherently pattern-recognition-based nature of image

interpretation and the availability of large labelled imaging datasets (Rajpurkar et al., 2022). Convolutional neural networks — the dominant deep learning architecture for image analysis — have demonstrated performance at specialist radiologist level or above in several specific diagnostic tasks. Rajpurkar et al. (2017) demonstrated that their CheXNet model detected pneumonia on chest radiographs with an AUC of 0.93, outperforming average radiologist performance (AUC 0.89) on the same test set. For chest CT-based lung cancer nodule detection, AI models have demonstrated sensitivity of 93–97% with false positive rates comparable to or lower than radiologist averages (Ardila et al., 2019). In mammography, AI-assisted reading has shown reduced radiologist recall rates and improved cancer detection in prospective clinical trials. Brain tumour segmentation on MRI, fracture detection on plain radiographs, and pulmonary embolism detection on CT pulmonary angiography represent additional radiological applications with documented accuracy advantages (Topol, 2019).

3. AI IN PATHOLOGY AND OPHTHALMOLOGY

Computational pathology — the application of AI to digital whole-slide images of histological specimens — has demonstrated diagnostic accuracy comparable to expert pathologists for several cancer diagnoses. Esteva et al. (2017) demonstrated dermatologist-level classification of skin cancer from dermoscopic images using deep convolutional networks, achieving AUC of 0.91 compared with 0.82 for dermatologists in a controlled study. In ophthalmology, diabetic retinopathy screening represents the most mature AI diagnostic application, with Google's DeepMind achieving AUC of 0.99 for referable diabetic retinopathy in a study of 54 ophthalmologists' grading of 12,522 images (Gulshan et al., 2016). This performance, combined with the global prevalence of diabetes and the

shortage of ophthalmologists in low-income settings, has driven the regulatory approval of AI retinal screening systems in multiple countries. Glaucoma detection from fundal images and age-related macular degeneration diagnosis represent additional ophthalmological AI applications approaching clinical deployment.

4. CLINICAL DECISION SUPPORT IN INTERNAL MEDICINE

Beyond imaging, AI clinical decision support systems have been developed for risk stratification, differential diagnosis generation, and treatment recommendation in internal medicine. Sepsis prediction models using machine learning applied to electronic health record data have demonstrated improvements in early warning sensitivity of 15–30% relative to traditional early warning scores (Rajpurkar et al., 2022). Readmission risk prediction models have enabled proactive case management interventions that reduce 30-day readmission rates by 10–20% in documented implementations. Natural language processing applied to clinical notes has demonstrated diagnostic utility in identifying patients with rare diseases, reducing time-to-diagnosis from years to months in documented cases. However, the performance of clinical decision support AI is highly context-dependent: models trained on data from one health system frequently show degraded performance when deployed in different clinical environments due to differences in patient populations, documentation practices, and laboratory reference ranges (Topol, 2019).

5. IMPLEMENTATION CHALLENGES, BIAS, AND REGULATORY CONSIDERATIONS

Despite impressive accuracy metrics in controlled studies, the real-world clinical deployment of AI diagnostic systems faces substantial challenges. Algorithmic

bias — differential performance across demographic subgroups defined by race, sex, age, or socioeconomic status — represents a critical safety concern: multiple studies have documented AI diagnostic systems with significantly lower accuracy for dark-skinned patients, women, and older adults when trained predominantly on data from specific demographic groups (Rajpurkar et al., 2022). Training data quality and representativeness are foundational requirements: AI models trained on data from high-income country healthcare settings may perform poorly in low-income contexts with different disease epidemiology, imaging equipment characteristics, and patient population demographics — a challenge directly relevant to Uzbekistan. Regulatory frameworks for AI medical devices are still maturing globally: the FDA's Software as a Medical Device framework and the EU Medical Device Regulation provide emerging guidance, but regulatory pathways remain uncertain in many countries. Clinician acceptance — driven by explainability deficits, liability concerns, and workflow integration challenges — represents a consistent implementation barrier across health systems (WHO, 2021).

6. IMPLICATIONS FOR UZBEKISTAN AND CONCLUSION

For Uzbekistan's healthcare system, AI diagnostic technologies offer potential value in addressing specialist workforce shortages, improving diagnostic accuracy in primary care settings, and enabling telemedicine-based specialist consultation supported by AI pre-analysis. Priority applications include AI-assisted chest radiograph interpretation for tuberculosis and pneumonia — reflecting the high prevalence of these conditions — diabetic retinopathy screening, and cervical cancer screening using AI-assisted colposcopy or cytology. Implementation should be preceded by local validation studies using Uzbek patient data, regulatory framework development, and healthcare worker

training programmes. The Tashkent State Medical University's Biomedical Engineering and Informatics department represents a key institutional resource for building the research and implementation capacity required. In conclusion, AI diagnostic systems demonstrate compelling accuracy in specific well-defined tasks but face significant implementation barriers that require careful navigation in the Uzbek healthcare context.

REFERENCES

1. Ardila, D., Kiraly, A. P., Bharadwaj, S., Choi, B., Reicher, J. J., Peng, L., & Shetty, S. (2019). End-to-end lung cancer detection on chest computed tomography using deep learning. Nature Medicine, 25(6), 954–961. https://doi.org/10.1038/s41591-019-0447-x
2. Esteva, A., Kuprel, B., Novoa, R. A., Ko, J., Swetter, S. M., Blau, H. M., & Thrun, S. (2017). Dermatologist-level classification of skin cancer with deep neural networks. Nature, 542(7639), 115–118. https://doi.org/10.1038/nature21056
3. Gulshan, V., Peng, L., Coram, M., Stumpe, M. C., Wu, D., Narayanaswamy, A., & Webster, D. R. (2016). Development and validation of a deep learning algorithm for detection of diabetic retinopathy in retinal fundus photographs. JAMA, 316(22), 2402–2410. https://doi.org/10.1001/jama.2016.17216
4. LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. Nature, 521(7553), 436–444. https://doi.org/10.1038/nature14539
5. Алиджанова, Д. А., & Усманов, С. А. (2017). АМИНОФЕНИЛМАСЛЯННАЯ КИСЛОТА В КОМПЛЕКСНОМ ЛЕЧЕНИИ ВЕГЕТАТИВНЫХ ДИСФУНКЦИЙ У ДЕТЕЙ И ПОДРОСТКОВ. In ШКОЛА ВМ БЕХТЕРЕВА: ОТ ИСТОКОВ ДО СОВРЕМЕННОСТИ (pp. 184-184).

6. Усманов, С. А., & Алиджанова, Д. А. (2017). ОПТИМИЗАЦИЯ ТЕРАПИИ СИНДРОМА ВЕГЕТАТИВНЫХ ДИСФУНКЦИЙ У ДЕТЕЙ И ПОДРОСТКОВ. In Давиденковские чтения (pp. 361-361).
7. Алиджанова, Д. А., & Усманов, С. А. (2017). Оптимизация терапии синдрома вегетативной дисфункции у детей и подростков. In Доброхотовские чтения (pp. 179-180).
8. Алиджанова, Д. А., & Маджидова, Ё. Н. (2018). КЛИНИКО-НЕВРОЛОГИЧЕСКИЕ ОСОБЕННОСТИ И ИММУНОЛОГИЧЕСКИЕ АСПЕКТЫ МИГРЕНИ У ДЕТЕЙ (Обзор литературы). Журнал теоретической и клинической медицины, (3), 77-81.
9. Алиджанова, Д. А., Маджидова, Ё. Н., Азимова, Н. М., & Назарова, Ж. А. (2019). Спектр иммунных изменений при первичных головных болях у детей. Медицина: теория и практика, 4(S), 44-45.
10. Алиджанова, Д. А., & Кадирова, Р. М. (2026). ОСОБЕННОСТИ ДИСФУНКЦИЙ ВЕГЕТАТИВНОЙ НЕРВНОЙ СИСТЕМЫ У ДЕТЕЙ И ПОДРОСТКОВ ПРИ МИГРЕНИ. Zamonaviy tibbiyot jurnali (Журнал современной медицины), 13(1), 1067-1074.
11. Алиджанова, Д. А. (2026). ОСОБЕННОСТИ СИНДРОМА ВЕГЕТАТИВНОЙ ДИСФУНКЦИИ У ДЕТЕЙ И ПОДРОСТКОВ С САХАРНЫМ ДИАБЕТОМ 1-ТИПА. ОСНОВЫ МЕДИЦИНЫ, 1(9), 265-272.
12. Алиджанова, Д. А., Усманов, С. А., & Юсупова, Д. М. (2016). Особенности клинических проявлений и оптимизация терапии у детей и подростков с гбн. Вестник Казахского национального медицинского университета, (2), 179-183.
13. Kim, O., Madjidova, Y., Abidova, M., Hamidova, N., Abdullaeva, V., & Sattarov, T. (2021). Clinical-Neurological and neurocognitive indicators

against the background of neuroprotective therapy in vertebro-basilar insufficiency in patients with symptoms of cerebral venous dyscirculation. Annals of the Romanian Society for Cell Biology, 25(1), 315-323.

14. Каримов, И., & Рустамова, М. (2007). Фалсафа фани тарихи ва назарияси. Т., ТДПУ.
15. Ташметова, Г. Т., & Ливерко, И. В. (2020). Хроническая обструктивная болезнь легких в организованных коллективах. Туберкулез и болезни легких, 98(6), 36-39.
16. Рустамова, М. Т., Якубов, А. В., & Хамраев, А. А. (2006). Состояние слизистого барьера желудка при тройной терапии омепразолом, кларитромицином и метронидазолом при экспериментальной язве. Экспериментальная и клиническая гастроэнтерология, (5), 26-28.
17. Мирахмедова, Х. Т., Исламова, Д. Н., & Рустамова, М. Т. (2017). Современные принципы и алгоритм ранней диагностики псориатического артрита: научное издание. Бюллетень Ассоциации врачей Узбекистана N, 3, 53-58.
18. Рустамова, М. Т., Зокирхўжаев, Ш. Я., Паттахова, М. Х., Жалолов, Н. Н., & Муталов, С. Б. (2023). Сурункали касалликлари мавжуд беморларда covid–19 кечиши.
19. Рустамова, М. Т. (1994). Распространенность и особенности клинического течения хронического бронхита в южном Приаралье. Дис. докт. мед. наук. Ташкент.
20. Рахматуллаева, Г. К., Хамраев, А. А., Шукурова, Ф., & Парпибаева, Д. А. (2019). Оценка эффективности действия некоторых ингибиторов протонной помпы, цитопротекторов и их комбинаций на показатели

синтеза окиси азота в слизистой ткани желудка при индометациновой гастропати.

21. Хаджиматова, И., Каримов, М., & Эшмурзаева, А. (2026). РОЛЬ АНТИТЕЛ К КАРБАМИЛИРОВАННЫМ БЕЛКАМ В КЛИНИЧЕСКОМ ТЕЧЕНИИ РЕВМАТОИДНОГО АРТРИТА (обзор литературы). Медицина и спорт, (1), 74-78.
22. Xadjimatova IX, K. M. S. (2026). ANTIOKSIDANTLAR QABUL QILAYOTGAN REVMATOID ARTRIT BILAN OG'RIGAN BEMORLARDA MATRIKS METALLOP ROTE I NAZ A 9 DARAJASINI TADQIQ ETISH.
23. Karimov, M. S., & Khadjimatova, I. X. (2025). Metabolic Changes in Acute Rheumatic Fever.
24. Хаджиматова, И. Х., & Каримов, М. Ш. (2025). КЛИНИЧЕСКИЕ ОСОБЕННОСТИ РЕВМАТИЗМА ПРИ МЕТАБОЛИЧЕСКОМ СИНДРОМЕ.
25. Xadjimatova, I. X. (2025). STUDY OF CLINICAL MANIFESTATIONS OF RHEUMATOID ARTHRITIS IN PATIENTS WITH METABOLIC SYNDROME.
26. Хаджиматова, И. Х., & Каримов, М. Ш. (2025). РОЛЬ МАТРИКСНОЙ МЕТАЛЛОПРОТЕИНАЗЫ-9 И ПЕЧЁНОЧНЫХ ФЕРМЕНТОВ ПРИ РЕВМАТОИДНОМ АРТРИТЕ. Журнал гуманитарных и естественных наук, (22 [2]), 92-95.
27. Шакирович, К. М. Р., & Хаджиматова, И. Х. (2025). ДИАГНОСТИЧЕСКОЕ ЗНАЧЕНИЕ ММП-9 В НАРУШЕНИЯХ ПЕЧЁНОЧНОЙ ФУНКЦИИ У ПАЦИЕНТОВ С РЕВМАТОИДНЫМ АРТРИТОМ. Medical journal of Uzbekistan, 1(2), 188-193.

28. Xamidullayevna, X. I., & Shakirovich, K. M. (2025). РОЛЬ МАТРИКСНОЙ МЕТАЛЛОПРОТЕИНАЗЫ-3 В ПАТОГЕНЕЗЕ И КЛИНИЧЕСКОМ ТЕЧЕНИИ РЕВМАТОИДНОГО АРТРИТА.
29. Хаджиматова, И. Х., Каримов, М. Ш., & Норматова, К. Ш. (2025). ЗНАЧЕНИЕ ВНЕКЛЕТОЧНЫХ БИОХИМИЧЕСКИХ МАРКЕРОВ ПРИ РЕВМАТОИДНОМ АРТРИТЕ И ИХ ВЛИЯНИЕ НА ФУНКЦИЮ ПЕЧЕНИ. Журнал гуманитарных и естественных наук, (21 [2]), 171-174.
30. Каратаева, Л. А., Каратаева, Н. А., & Тошпулатова, Г. Т. К. (2016). Оценка Причин Скоропостижной Смерти Детей Младшего Возраста. World science, 2(3 (7)), 30-33.
31. Каратаева, Н. А. (2017). Проблема пищевой аллергии. Апробация, (1), 80-81.
32. Намазов, Ф., & Каратаева, Л. А. (2019). К вопросу врожденных пороков сердца у беременных женщин. ББК 60 С 56, 150.
33. Каратаева, Н. А. (2020). Современные аспекты пищевой аллергии. Medicus, (3), 51-53.
34. Хакимова, Г. А., & Каратаева, Л. А. (2024). ПРОГНОЗИРОВАНИЯ КИСТ ЯИЧНИКА В АСПЕКТЕ МОРФОЛОГИИ. Science and innovation, 3(Special Issue 44), 204-208.
35. Каратаева, Л. А., Габченко, Г. А., Искандаров, А. И., & Саидазизова, С. Д. (2008). Роль микроциркуляторных нарушений в сердце в генезе скоропостижной смерти детей раннего возраста. Мед. журн. Узбекистана, (2), 63-65.
36. Каратаева, Н. А., Каратаева, Л. А., Юсупова, О. И., & Иноятова, Ш. Ш. К. (2015). Пищевая аллергия (обзор). Научные исследования, (1), 126-130.

37. Агзамова, Н. В., & Мавлянова, Н. Т. (2018). ПРИМЕНЕНИЕ ИННОВАЦИОННО-ИНТЕРАКТИВНЫХ МЕТОДОВ ОБУЧЕНИЯ СТУДЕНТОВ ПЕДИАТРИЧЕСКОГО ФАКУЛЬТЕТА ТАШПМИ В ПРЕПОДАВАНИИ КЛИНИЧЕСКОЙ ФАРМАКОЛОГИИ. ББК 74.026. 848 М 42, 170.
38. Шерова, З. Н., Агзамова, Н. В., Шаабидова, К. Ш., & Мавлянова, Н. Т. (2018). ОЦЕНКА И АНАЛИЗ ФАРМАКОТЕРАПИИ БОЛЬНЫХ ДЕТЕЙ С ЗАБОЛЕВАНИЯМИ БРОНХОЛЕГОЧНОЙ СИСТЕМЫ. Интернаука, (12), 26-27.
39. Шерова, З. Н., Агзамова, Н. В., & Шаабидова, К. Ш. (2018). ИЗУЧЕНИЕ ЭФФЕКТИВНОСТИ И ПЕРЕНОСИМОСТИ АНТИГИСТАМИННОГО ПРЕПАРАТА ЗИРТЕК ПРИ ОБСТРУКТИВНОМ БРОНХИТЕ. Интернаука, (12), 24-25.
40. Мухитдинова, М. И., Карабекова, Б. А., & Азизова, Р. А. (2019). ВНЕДРЕНИЕ ИНТЕРАКТИВНЫХ ФОРМ ПЕДАГОГИЧЕСКИХ ТЕХНОЛОГИЙ В ПРОЦЕСС ОБУЧЕНИЯ. Международный академический вестник, (5), 14-16.
41. Азизова, Р. А., Карабекова, Б. А., & Мухитдинова, М. И. (2019). BASES OF MODERN CLINICAL-PHARMACOLOGICAL APPROACHES TO EFFECTIVE AND SAFE PERSONAL PHARMACOTHERAPY. Новый день в медицине, (4), 19-22.
42. Даминов, Р. У., Мирзакаримова, Ф. Р., Азизова, Р. А., & Мухитдинова, М. И. (2020). СОВРЕМЕННЫЙ ПОДХОД К ЛЕЧЕНИЮ БОЛЬНЫХ ХРОНИЧЕСКИМ ОБСТРУКТИВНЫМ БРОНХИТОМ С СОПУТСТВУЮЩЕЙ ИБС. Новый день в медицине, (1), 188-192.
43. MADJIDOVA, Y., KHALILOVA, A., SADIIKOVA, G., ABDULLAEVA, V., KHAMIDOVA, N., & MUKHITDINOVA, M. (2020). Profile of pro-

inflammatory interleukins in symptomatic epilepsy of various etiologies. International Journal of Pharmaceutical Research (09752366), 12(1).

44. Мухитдинова, М. И., Карабекова, Б. А., & Азизова, Р. А. (2017). Влияние пищи на эффективность фармакотерапии. In Наука и образование: сохраняя прошлое, создаём будущее (pp. 194-198).
45. Агзамова, Н. В., Балтаниязова, Г. П., & Усманбекова, Г. У. (2018). ИСПОЛЬЗОВАНИЕ БРОНХОЛИТИЧЕСКОЙ ТЕРАПИИ В ЛЕЧЕНИИ БРОНХИАЛЬНОЙ АСТМЫ. Интернаука, (19-1), 28-29.
46. Ороджова, О. И., Гасанова, С. М., Дубинина, Е. В., & Лотарева, И. Ф. (2016). ПАТРИОТИЗМ, МИЛОСЕРДИЕ И ГУМАНИЗМ КАК ОСНОВА ЛИЧНОСТНОГО РОСТА МЕДИЦИНСКОГО РАБОТНИКА. ББК 74.58 Р311, 175.
47. Мавланов, Э. Р., Хакимжанова, А. С., Мухитдинов, У. Б., & Каратаева, Л. А. (2022). Анализ изучения динамики снижения слуха у детей. Вестник магистратуры, (7 (130)), 99-102.
48. Мухитдинов, У. Б., Хакимжанова, А. С., & Каратаева, Л. А. (2022). Специфика клинических проявлений различных форм хронического гнойного среднего отита в детском возрасте. Мировая наука, (6 (63)), 140-145.
49. Ministry of Health, Republic of Uzbekistan. (2022). National health strategy 2022–2026. Tashkent: Ministry of Health.
50. Obermeyer, Z., & Emanuel, E. J. (2016). Predicting the future — Big data, machine learning, and clinical medicine. New England Journal of Medicine, 375(13), 1216–1219. https://doi.org/10.1056/NEJMp1606181

51. Rajpurkar, P., Chen, E., Banerjee, O., & Topol, E. J. (2022). AI in health and medicine. Nature Medicine, 28(1), 31–38. https://doi.org/10.1038/s41591-021-01614-0
52. Rajpurkar, P., Irvin, J., Ball, R. L., Zhu, K., Yang, B., Mehta, H., & Ng, A. Y. (2017). CheXNet: Radiologist-level pneumonia detection on chest X-rays with deep learning. arXiv:1711.05225.
53. Shen, D., Wu, G., & Suk, H. I. (2017). Deep learning in medical image analysis. Annual Review of Biomedical Engineering, 19, 221–248. https://doi.org/10.1146/annurev-bioeng-071516-044442
54. Topol, E. J. (2019). High-performance medicine: The convergence of human and artificial intelligence. Nature Medicine, 25(1), 44–56. https://doi.org/10.1038/s41591-018-0300-7
55. WHO. (2016). Global strategy on human resources for health: Workforce 2030. World Health Organization.
56. WHO. (2021). Ethics and governance of artificial intelligence for health. World Health Organization. https://www.who.int/publications/i/item/9789240029200
57. Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., Wang, Y., Dong, Q., Shen, H., & Wang, Y. (2017). Artificial intelligence in healthcare: Past, present and future. Stroke and Vascular Neurology, 2(4), 230–243. https://doi.org/10.1136/svn-2017-000101
58. Litjens, G., Kooi, T., Bejnordi, B. E., Setio, A. A. A., Ciompi, F., Ghafoorian, M., & van Ginneken, B. (2017). A survey on deep learning in medical image analysis. Medical Image Analysis, 42, 60–88. https://doi.org/10.1016/j.media.2017.07.005
59. Char, D. S., Shah, N. H., & Magnus, D. (2018). Implementing machine learning in health care — Addressing ethical challenges. New England Journal of Medicine, 378(11), 981–983. https://doi.org/10.1056/NEJMp1714229