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The Introduction of Artificial Intelligence(AI) in Medicine-Opportunities and Obstacles

Abstract

Main problem: the most key issue of Kazakhstan is its unpreparedness for the latest technologies. The introduction of artificial intelligence in medicine in Kazakhstan, which has both positive and negative sides, falls into this category. To start working with them, it is necessary to determine the attitude of citizens to them, especially if it concerns social activities. The work has social and scientific significance. The work highlights the main positive aspects of reducing the workload in the workplace, as well as the positive results of the active use of artificial intelligence in other countries.

Methods: Three methods were used for detailed analysis: interviews, content analysis and survey. All methods of obtaining information were used in further analyzing the problem and identifying the results.

Purpose: the main objective of the study is to find the existing practices for using AI in Kazakhstan. Moreover, the possible opportunities to develop AI implementation in medicine and how it can upgrade internal procedures in the medical field.

Results and their significance: At the end of the article, it is clearly seen that more and more people are exposed to AI technology on a daily basis, but its implementation in Kazakhstan remains relatively low, indicating that Kazakhstan is lagging behind other countries and that people are unaware of all the advantages of AI. It can also be noted that the introduction of AI in medicine can help remote areas in transmitting patient data.

Key words: artificial intelligence, healthcare, diagnosis, Kazakhstan, digitalization, technology, rural areas.

Introduction

The use of artificial intelligence dates back to 1950, when Alan Turing conducted tests on the ability of computers to replenish human intelligence [2]. After six years John McCarthy has defined the term “artificial intelligence” as the the science and engineering of making intelligent machines [4]. To be more precise, artificial intellegence means a set of technologies that enable computers to perform a variety of advanced functions, includind the ability to understanding, analyzing, and understanding languages. Integration of AI has some issues in the using on daily base, because integration depends on infrastructure, economic, and social state. However, after some decades, AI started a new era where it’s used as a tool in variety of fields, like gastroenterology and radiology. Directly these two fields are study of the ability to function of liver, stomach, pancreas and field where use X-rays(radiation) to search for any deviations from the norm, respectively. Nowadays, we can see advancing time, this phenomenon becoming very popular with comparison to the past. The main reason for this is the approval of the successful using AI in terms of daily life, work and medicine. The Kazakh Research Institute of Oncology and Radiology (KRIOR) approving AI as a possible medical tool and will develop it further, due to successful diagnosis of lung diseases via AI techniques.

Nowadays, we see the development of artificial intelligence in different spheres. Some of them are education, machine learning, and industry. They’re playing a significant role in our lives because of the simplification of day-to-day assignments, helping students to gain knowledge, and can even automatize the manufacturing processes. It is hard to imagine our future without artificial intelligence. Step by step they are becoming more important for us. With the increasing use in various fields, we notice the need to introduce it into medicine. Especially in Kazakhstan, we see the issue of lack of doctor’s number and unpreparedness for using of artificial intelligence. To solve this problem, we can find help in implementing AI tools on a daily base. Implementing means we can analyze, increase the

accuracy of diagnosis, and increase the work speed [2]. Moreover, try to highlight the advantages of integrating AI.

In other countries, we can see expanding the influence of Artificial Intelligence in the medical field. They are aggressively introducing AI into areas such as cardiology and radiology. Thus in cardiology, we see the successful results of improving diagnosis, forecasting patient outcomes, and selecting treatment strategies are frequently successful when high-quality data are abudant, and when the emphasis is on personalized diagnostic issues [1].

The main objective of the study is to find the existing practices for using AI in Kazakhstan. Moreover, the possible opportunities to develop AI implementation in medicine and how it can upgrade internal procedures in the medical field.

Methods

The research utilized three methods: interviews, content analysis, and surveys. The interview involved asking questions and recording answers, providing qualitative data relevant to the topic. Content analysis aimed at gathering qualitative data by investigating related issues and government actions. Lastly, the survey targeted a large audience to capture average opinions and employed standardized questionnaires for quantitative and comparable results. This anonymous, efficient method increased participant numbers. All approaches focused on integrating AI technologies to enhance efficiency, accuracy, and patient care outcomes.

These approaches are aimed at integrating AI technologies and developing recommendations for their integration to increase efficiency, accuracy and improve patient care outcomes.

Results

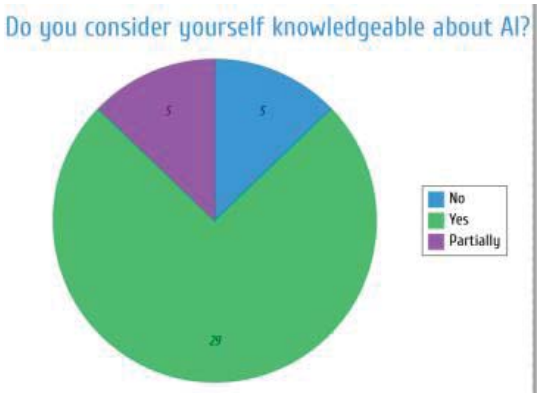

Figure 1– Introduction to Artificial Intelligence

The majority of the respondents 29 (74.4 %) were familiar with AI and its application in medicine and 5 (12.8 %) of them had additional knowledge, while 5 (12.8 %) had no idea about it at all.

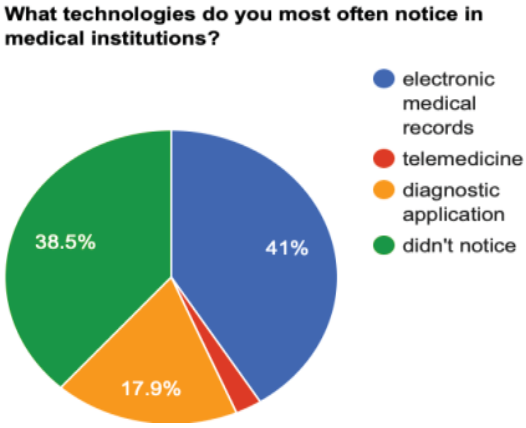

Figure 2 – Technologies in medical institutions

Furthermore, current technologies in use nowadays includes: electronic record systems 16 (41.0 %), diagnostic applications 7 (17.9 %) and telemedicine 1 (2.6 %).

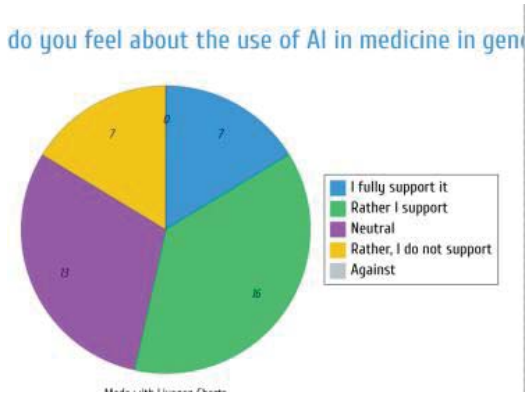

Figure 3 – Attitude to the use of artificial intelligence in medicine

Opinions toward AI and its application in medicine, 16(41.0 %) of the respondents approved while 7(12.8 %) individuals strongly approved AI and medicine, whereas 7 (12.8 %) did not approve at all and 13(33.3 %) of them were neutral.

Some of the most important barriers of remote healthcare consist of equipped resources 16(41.0 %), lack of doctors 15(38.5 %), and transportation challenges 3(7.7 %). This study shows that perception on the effective utilization of AI is positive as 33 (84.6 %) of the participants indicated that AI is capable of addressing these matters while 3(7.7 %) responded with fully effective AI, 2(5.1%) said it is ineffective, and 1(2.6 %) did not respond.

The findings highlight Kazakhstan's struggles to integrate AI into healthcare. Despite limited AI experience, 74.4% of participants recognized its medical applications, especially among youth. A significant 84.6 % believe AI can solve healthcare issues like doctor shortages and resource constraints. Although specific AI facilities in Kazakhstan weren't mentioned, there is public readiness for adoption, indicating a need for improved infrastructure, funding, and training to facilitate implementation.

Table 1 – Dependence of awareness of artificial intelligence on residence in remote areas

Remote Area \ Medical Technologies	Diagnostic applications	I haven't encountered any technologies	Telemedicine	Electronic medical records	Total
YES	2, 28.6% col 16.7% row,	7, 46.7% col 58.3% row,	0, 0.0% col 0.0% row	3, 18.8% col 25.0% row,	12, 30.8% col 100.0% row,
NO	5, 71.4% col 18.5% row,	8, 53.3% col 29.6% row,	1, 100.0% col 3.7% row,	13, 81.2% col 48.1% row	27, 69.2% col 100.0% row
Total	7, 100.0% col 17.9% row,	15, 100.0% col 38.5% row,	1, 100.0% col 2.6% row,	16, 100.0% col 41.0% row,	39, 100.0% col 100.0% row,

Content analysis

An examination of the body of research, legal papers, and current initiatives to apply AI to medicine in Kazakhstan was done in order to accomplish these objectives. Particular focus is placed on the following elements:

1. Medical staff training

One important component is the training of skilled professionals who can use AI tools efficiently. Instructional programs Kazakhstan is implementing programs designed to teach medical professionals how to use AI technologies. The Association for the Development of AI, for instance, offers seminars and trainings for medical professionals.

2. Project assistance and funding

AI in medicine is being developed with financial assistance from both public and private sources. Together with the Ministry of Digital Development, Innovation, and Aerospace Industry, the Ministry of Health of the Republic of Kazakhstan has determined where cutting-edge MedTech initiatives utilizing AI can be implemented.

3. Support for infrastructure

The efficient operation of AI systems requires the development of digital infrastructure, such as computing power and high-speed Internet. As part of the state program for Digital Kazakhstan, efforts are being made to upgrade the infrastructure in distant areas.

Some artificial intelligences are already being utilized today to assist those living in remote areas, for instance:

1. Improving early disease detection and diagnosis. Large volumes of medical data, including scan and lab test results, can be accurately analyzed by AI algorithms. Early disease detection is made feasible by this, which is particularly crucial in isolated locations with little access to professional medical treatment.

2. The advancement of remote monitoring and telemedicine.Telemedicine technologies that include AI enable better access to healthcare in isolated areas. For instance, more than 47 medical facilities in Kazakhstan, including those in distant places, use the CerebraAI initiative, which aims to detect strokes in a timely manner.

Table 2 – Questions and answers

Questions		Quotes
1. What artificial intelligence technologies are currently used in medical institutions in Kazakhstan?	DSRA	“In general, in medicine, artificial intelligence is actively used in diagnostic and scientific research, in particular pharmaceutical, and as an assistant for other purposes.”
2. How artificial intelligence has improved the diagnosis and treatment of patients	OT	“It is obvious, transparent, and the prospects for using technologies based on artificial intelligence are, well, how can I tell you, obvious,”
3. Are any artificial intelligence-based tools used to solve more advanced task by identify diseases?	GDM	“Google DeepMind It allows the use of artificial intelligence technology for more advanced epidemiological analysis of certain infectious and non-communicable diseases.”
4. How do patients and medical staff perceive the introduction of artificial intelligence in healthcare?	FU	“Doctors perceive attempts to integrate artificial intelligence into their daily practice, not all, but many, as a futile undertaking.

DSRA – diagnostics, scientific research and as an assistant
OT – obviously transparent
FU – futile undertaking
GDM – Google DeepMind
PORPIH – processes of routing patients inside hospitals

The interview was conducted with Azamat Anuarovich, Chairman of the Scientific society of Astana University, a member of the working group of young scientists of the National Academy under the President of the Republic of Kazakhstan. In total, a wide variety of artificial intelligences are currently being used, especially DSRA. Today, many doctors consider AI FU as they are against replacing personnel with AI, however, the specialist himself believes that AI should be perceived not as a holistic worker, but more as an assistant who will correct and help.

Conclusion & discussion

The main purpose of my study was examining how artificial intelligence (AI) is now being used in Kazakhstan's healthcare sector. The hypothesis of the paper was that, despite the fact that successful attempts to introduce artificial intelligence already exist in Kazakhstan, there are still opportunities to expand them across Kazakhstan, especially in rural areas.

Finding 1- Awareness of the potential of artificial intelligence in Kazakhstan is growing, but its adoption remains low. The study reveals that while awareness of artificial intelligence in Kazakhstan is increasing, its adoption remains low. Despite 74.4 % of people being fully aware of AI, 12.8 % are unaware. Many doctors and patients are aware of AI's potential, but they are unwilling to implement it due to their perception of it as futile. The study highlights the state's and population's unpreparedness for AI's integration in medicine. To address this, it is necessary to increase digital infrastructure, provide financial support, and introduce educational programs.

Finding 2- Kazakhstan seems to be lag the rest of the world in terms of implementing artificial intelligence. A survey reveals that 38.5% of people do not recognize artificial intelligence tools, with 41% using electronic medical records. AI is primarily used for diagnostics and scientific research, with only one person aware of CerebraAI. Kazakhstan's AI prevalence is small, with only pilot use in 47 medical institutions. This highlights Kazakhstan's lack of preparedness for AI implementation and its slow progress compared to other countries. No specific example of fully implemented AI is provided.

Finding 3- Doctors are wary about AI because they worry about job displacement and problems with diagnosis accuracy. A survey reveals that 74.4 % of people trust artificial intelligence depending on the situation, 23.1 % do not trust it at all, and 2.5 % trust it. Doctors are skeptical and do not see it as advisable to implement AI. Patients fear AI diagnoses and fewer doctor-patient meetings. AI is aimed at assisting rather than replacing doctors, but distrust and lack of preparedness persist. The survey and interview reveal concerns about AI's effectiveness.

Finding 4- AI has the potential to enhance healthcare access and alleviate Kazakhstan's doctor shortage. The survey highlights significant challenges in Kazakhstan's medical institutions, such as equipment shortages and access to medicine. AI could enhance workflow, while telemedicine improves remote care, though progress remains slow in rural areas.

Finding 5- Infrastructure development, financing, and government assistance are necessary for a successful AI integration. The survey reveals that 28.9% support special state funding for AI in medicine, while 24.4% favor training for medical staff. An interviewee asgues for transparency and adequate regulation without limiting AI’s use. Government and private sectors back AI initiatives, with the Ministry of Digital Deveopment and Health quiding implementation, emphasizing the need for infrastructure development in Kazakshtan.

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Ключевой проблемой Казахстана является его неготовность к новейшим технологиям. Внедрение искусственного интеллекта в медицину в Казахстане, имеющее как положительные, так и отрицательные стороны, попадает в эту категорию. Для начала работы с ними необходимо определить отношение к ним граждан, особенно если это касается общественной

деятельности. Работа имеет общественное и научное значение. В работе выделены основные положительные стороны снижения нагрузки на рабочих местах, а также положительные результаты активного использования искусственного интеллекта в других странах. Для детального анализа использовались три метода: интервью, контент-анализ и опрос. Все методы получения информации использовались при дальнейшем анализе проблемы и выявлении результатов.

Основной целью исследования является выявление существующих практик использования ИИ в Казахстане. Кроме того, возможные возможности развития внедрения ИИ в медицину и то, как это может модернизировать внутренние процедуры в медицинской сфере. В конце статьи наглядно видно, что все больше людей ежедневно подвергаются воздействию технологии ИИ, но ее внедрение в Казахстане остается относительно низким, что говорит об отставании Казахстана от других стран и о том, что люди не знают всех преимуществ ИИ. Также можно отметить, что внедрение ИИ в медицину может помочь отдаленным районам в передаче данных о пациентах.

Ключевые слова: искусственный интеллект, здравоохранение, диагностика, Казахстан, цифровизация, технологии, сельская местность.

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Қазақстанның ең басты мәселесі – соңғы технологияларға дайын еместігі. Жасанды интеллектті Қазақстанда медицинаға енгізудің оң және теріс жақтары осы санатқа жатады. Олармен жұмысты бастау үшін азаматтардың оларға деген көзқарасын анықтау қажет, әсіресе бұл қоғамдық қызметке қатысты болса. Жұмыстың әлеуметтік және ғылыми мәні бар. Мақалада жұмыс орнындағы жүктемені азайтудың негізгі оң аспектілері, сондай-ақ басқа елдерде жасанды интеллектті белсенді қолданудың оң нәтижелері көрсетілген.

Егжей-тегжейлі талдау үшін үш әдіс қолданылды: сұхбат, мазмұнды талдау және сауалнама. Мәселені одан әрі талдау және нәтижелерді анықтау кезінде ақпарат алудың барлық әдістері қолданылды.

Зерттеудің негізгі мақсаты – Қазақстанда АИ қолдану тәжірибесін анықтау. Сонымен қатар, медицинада АИ енгізудің ықтимал даму мүмкіндіктері және оның медицина саласындағы ішкі процедураларды қалай модернизациялауы мүмкін. Нәтижелер және олардың маңыздылығы: Мақаланың соңында күн сайын AI технологиясына көбірек адамдар ұшырайтыны анық байқалады, бірақ оны Қазақстанда қолдану салыстырмалы түрде төмен деңгейде қалып отыр, бұл Қазақстанның басқа елдерден артта қалғанын және адамдардың АИ-нің барлық артықшылықтарын білмейтінін көрсетеді. Сондай-ақ, медицинада AI енгізу пациенттердің деректерін беруде шалғай аймақтарға көмектесетінін атап өтуге болады.

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