

ARTIFICIAL INTELLIGENCE AND HEALTHCARE SYSTEM OF GEORGIA

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აბსტრაქტი

ხელოვნურმა ინტელექტმა (ხი) განვითარების საწყის ეტაპზე გამოავლინა რევოლუციის მოხდენის წარმოდგენილი პოტენციალი წარმოებაში, ფინანსებში, ლოჯისტიკაში, სოფლის მეურნეობაში, მეცნიერებაში, მედიცინაში, განათლებაში და ჩვენი ცხოვრების თითქმის ყველა სფეროში. მსოფლიოს წამყვან ქვეყნებში მისი დანერგვის პირველი შედეგები გვიჩვენებენ, რომ იგი დიდ დახმარებას გაუწევს მათი ჯანდაცვის სისტემებს არსებული პრობლემების გადაჭრაში და მნიშვნელოვნად გააუმჯობესებს მათ ეფექტურობას და ხარისხს. რაც, თავის მხრივ, გაზრდის ეკონომიკის მაჩვენებლებსაც. საინტერესოა წინასწარ განვსაზღვროთ საქართველოს ჯანდაცვის სისტემის ბენეფიტები ხელოვნური ინტელექტის ახალი აპლიკაციების გენერირებით და იმპლემენტაციით. რაც ჯანდაცვის სხვადასხვა რგოლის მუშაკების მზადყოფნის გარეშე შეუძლებელია.

სწორედ ამ მოსაზრებებმა განაპირობეს ჩვენი **კვლევის მიზანი**: შეგვესწავლა რამდენად ინფორმირებულია ჯანდაცვის სფეროს დღევანდელი და მომავალი თაობები ხელოვნური ინტელექტის შესახებ და როგორია მათი მოლოდინები. ამ მიზნის განსახორციელებლად ჩვენს მიერ სპეციალური ანკეტებით Moodle სისტემით გამოკითხული იქნა 402 სამედიცინო დარგისა და უმაღლესი სამედიცინო განათლების წარმომადგენელი, კერძოდ, ანსუ-ის 69 ექიმი პედაგოგი (G1), 38 ექიმი (G2), 29 სამედიცინო დანესებულების ადმინისტრაციის თანამშრომლები (G3) და 266 „მედიცინის“ პროგრამის სტუდენტი (G4).

კვლევის შედეგებით დადგინდა, რომ ინტერვიუერთა უდიდესი უმრავლესობა (98-99%) ინფორმირებულია, უპირატესად, საინფორმაციო საშუალებებით ხელოვნური ინტელექტის შესახებ. მასთან ერთხელ მაინც ინტერაქციაში შესულია ნახევარზე მეტი, მაგრამ მრავალჯერადი გამოყენების ციფრები უკიდურესად დაბალია. თანაც ისინი ხი მხოლოდ ინფორმაციის მისაღებად იყენებენ და მისი დანერგვიდან მიღებული სარგებლის მოლოდინიც შესაბამის აქვთ, ცოდნისა და ინფორმაციული ტექნოლოგიების მოხმარების უნარების ზრდა. საქართველოს ჯანდაცვის სისტემის ბენეფიტებიდან კი მხოლოდ დიაგნოზის დასმაში დახმარებას მოელოდნენ, რაც საბოლოოდ ჯანდაცვის ხარისხის გაუმჯობესებაში უნდა ტრანსფორმირდეს.

მიღებული შედეგები საკმაოდ მწირია რეალურ გენეფიტებთან შედარებით, მაგრამ ძალიან სასიამოვნოდ გამოიყურება ის ციფრები (79-100%), რომლებიც ჩვენი ინტერვიუერთა მზადყოფნას გამოხატავს ხელოვნური ინტელექტის იმპლემენტაციაში მონაწილეობაზე.

საკვანძო სიტყვები: აკაკი წერეთლის სახელმწიფო უნივერსიტეტი, ხელოვნური ინტელექტი, ექიმი, ჯანდაცვის სისტემა, მედიცინა, იმპლემენტაცია

ABSTRACT

Artificial intelligence at the initial stage of development has shown incredible potential to revolutionize all areas of life, including healthcare. The first results of its implementation in the world's leading countries show us that it will greatly help their health systems to solve existing problems and significantly improve their efficiency and quality. Which, in turn, will increase the indicators of economics. It is interesting to predetermine the benefits of the Georgian healthcare system by generating and implementing new applications of artificial intelligence. Which is impossible without the readiness of the workers of various sectors of health care.

It is these considerations that led to the **goal of our research**: to explore how informed the current and future generations of healthcare are about artificial intelligence and what their expectations are. In order to achieve this goal, 402 representatives of the medical field and higher medical education were interviewed by us with special questionnaires using the Moodle system, namely, 69 doctors and teachers (G1), 38 doctors (G2), 29 medical institution administration employees (G3) and 266 “medical Student of the program (G4).

According to the **results** of the research, it was determined that the vast majority of interviewees (98-99%) are informed about artificial intelligence, mainly through news media. More than half have interacted with it at least once, but the multiple use numbers are extremely low. Moreover, they only use the tree to get information and expect the benefits from its implementation, the increase in knowledge and skills of using information technologies. From the benefits of the health care system of Georgia, they only expect help in making a diagnosis, which should eventually transform into the improvement of the quality of health care.

The obtained results are rather meager compared to the actual benefits, but the numbers (79-100%) that express the willingness of our interviewees to participate in the implementation of artificial intelligence look very pleasant.

Keywords: Akaki Tsereteli State University, Artificial Intelligence, Healthcare system, Doctor, Medicine, Implementation.

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We are living in the era of the fourth industrial revolution, the first was related to the creation of steam power, the second - machines, the third - computers, and the fourth is the use of Artificial Intelligence (AI). Artificial intelligence is the ability of computer systems to simulate the processes of human intelligence, such as learning, reasoning, problem solving, independent action... and thus artificial intelligence claims to at least assist, if not replace, humans as thinking beings /2,4,5,8 /.

Although artificial intelligence is still in the early stages of development, it has shown incredible potential to revolutionize manufacturing, finance, logistics, agriculture, science, medicine, education and almost all areas of our lives in the next few years /2,4,8/.

With the first results of the implementation of artificial intelligence systems in the field of healthcare, we can safely say that artificial intelligence will greatly help doctors in diagnosis, in particular, it can be used to analyze medical images, such as X-rays, MRI scans and computed tomography, ECG, to identify diseases and injuries. For example, artificial intelligence systems today detect cancer, heart and other organ diseases faster and more accurately than doctors.

It can be used to develop personalized treatment plans for patients based on their individual medical history and characteristics. For example, artificial intelligence systems are now being used to design chemotherapy regimens and optimize surgical procedures. At the same time, robots equipped with artificial intelligence are distinguished by their ability to perform delicate operations. It can be used to identify genetic markers and other risk factors that can be used to predict the future of patients, that is, to assess the risk of developing a certain disease, to implement preventive and early measures in time /5,6,7/.

Artificial intelligence systems can be used to screen millions of potential drug compounds and identify new drugs that are more effective and have fewer side effects. Artificial intelligence systems (telemedicine platforms) can be used to provide remote medical care to patients in rural areas or areas with a shortage of medical personnel. Not to mention such benefits as the

ability to create and store digital records in the medical field, perform the most accurate statistical calculation, create a system of voice assistants for patient care, help in cost optimization, 3D printing of tissues and organs, etc. Many things from this list have already been implemented, many are currently undergoing testing, and many are at the idea level. Their successful implementation requires solving a number of challenges. Of which the accuracy of data provided to artificial intelligence is important, which depends on the quality and availability of records. Healthcare data are often incomplete, inconsistent and inaccurate. This may cause artificial intelligence systems to make inaccurate predictions or recommendations.

In order for us to have high reliability of artificial intelligence recommendations, we should be able to make the algorithm of its work transparent and explainable. For this, it is important to understand how AI systems make decisions. This is especially valuable in healthcare, where patients need to trust that AI systems are making decisions that are in their best interests. At the same time, we must exclude the moment of partiality.

AI systems are expensive to develop and implement at this stage, which can be a barrier for healthcare organizations with tight budgets. There are currently no clear regulations governing the use of AI in healthcare either. This can make it difficult for healthcare organizations to know how to safely and ethically use AI technologies.

The same and even more problems exist in the healthcare system of Georgia. Georgia has a relatively young health care system and its electronic record systems (EHR) are not as reliable as some other countries. This means that the data available for training AI systems can be of low quality and less comprehensive. AI systems trained on Georgian data may be biased, reflecting the social and economic inequality in Georgia. This may result in making unfair or inaccurate predictions or recommendations for Georgian patients. In many cases, the cost of these systems will be unaffordable for Georgian healthcare organizations. Georgia healthcare providers may be less familiar with AI and may have concerns about how transparent and explainable AI systems are. This can make it difficult to gain trust and acceptance of AI systems in the Georgian healthcare system. Currently, there are no regulations governing the use of AI in the healthcare field in Georgia. This can make it difficult for healthcare organizations to know how to safely and ethically use AI technologies /1,3/.

Georgian patients may be less aware of artificial intelligence and how it is used in healthcare. This can raise concerns about privacy, security, and efficiency. Georgia has a shortage of skilled workers with experience in developing, implementing and managing arti-

TABLE 1. Baseline characteristics of study interviewees.

Groups	Quantity	Age	Man	Woman
G1-ATSU Doctor lecturers	69	25-70	12	57
G2-Doctors	38	30-78	11	27
G3-Administration staff	29	28-56	14	15
G4-Student	266	18-24	101	165

cial intelligence systems in healthcare.

To overcome these problems, there is a need for greater cooperation between the various stakeholders of the Georgian healthcare system, such as government agencies, healthcare providers and training academies, to develop and implement artificial intelligence systems effectively.

Despite these challenges, a number of initiatives are underway in Georgia to promote the use of artificial intelligence in healthcare. For example, the Government of Georgia has launched a number of programs to support the development and implementation of artificial intelligence in the healthcare sector. In addition, a number of Georgian universities and research institutes are working on the development of AI-powered healthcare solutions.

As AI technology continues to develop and become more accessible, it is likely that we will see more and more AI systems being used in Georgia's healthcare system. However, it is important to consider the challenges listed above to ensure the safe and ethical use of artificial intelligence in Georgia.

It is these considerations that determined the purpose of our small survey: to find out how informed the current and future generations of healthcare are about artificial intelligence and what their expectations are. In order to achieve this goal, we interviewed 402 representatives of the medical field and higher medical education with special questionnaires using the Moodle system, namely, 69 doctors and teachers (G1), 38 doctors (G2), 29 medical institution administration employees (G3) and 266 "medical Student of the program (G4). Their data are described in Table 1.

As a result of the research, it was determined that the vast majority of the surveyed (from 76% of doctors to 99% of medical students) have information about "artificial intelligence".

They have received information about AI mainly from news media, but they do not actively use it (Figure 2).

We think that the results are interesting, because the vast majority of the representatives of the medical field have information about the tree, however, a full representation of the possibilities of the tree is lacking.

According to the information we have today, the rate of use of artificial intelligence in the healthcare system

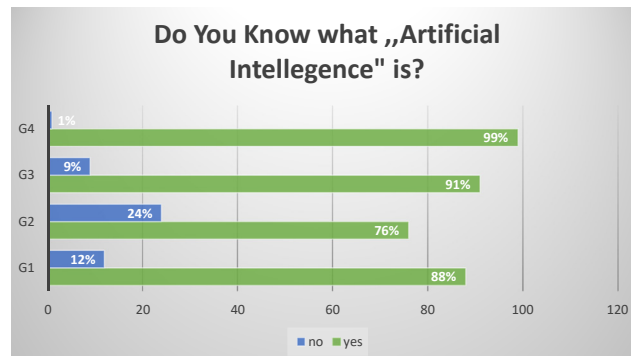


Figure 1. Have you heard of "Artificial Intelligence"?

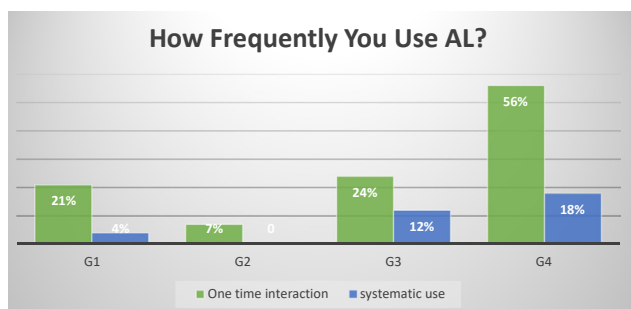
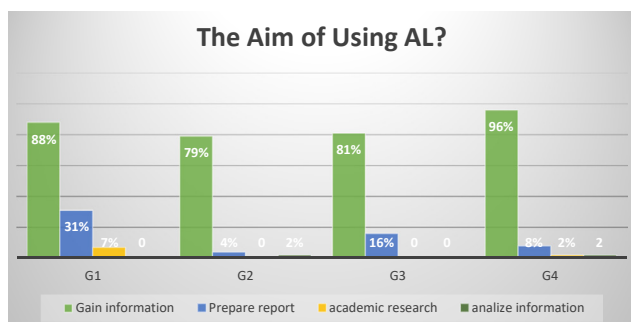


Figure 2. Single and multiple use cases of artificial intelligence are described here.



The figures given in **Figure 3** show that our interviewers use artificial intelligence mainly (79-96%) to obtain information.

of Georgia is at a minimum, but quite a lot of data has been accumulated about its use by the world's leading countries, because there is already medicine development, disease diagnosis, patient care, medical imaging, medical research, personalized treatment plans, medical simulation, digital production of clinical documen-

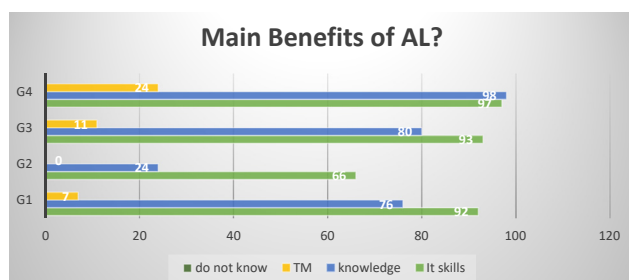


Figure 4 shows the expectations of the interviewees towards artificial intelligence, in particular, they have made a choice on the growth of knowledge and digital technologies.

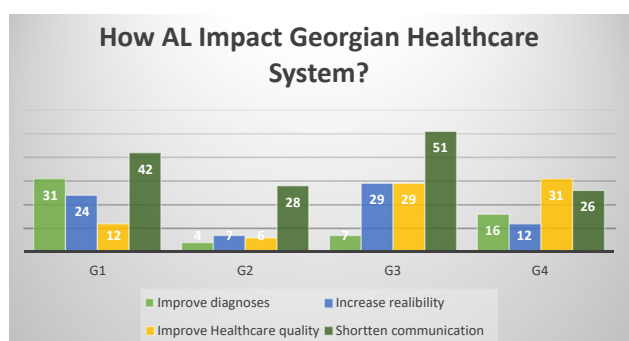


Figure 5 The expected benefits brought by the implementation of artificial intelligence for the Georgian healthcare system are described. The choice was made to increase the accuracy of diagnosis, increase the number of cases of recovery, improve the quality of health care, and reduce the communication between the doctor and the patient. The lead came to poor doctor-patient communication, and the rest of the choices were more or less different.

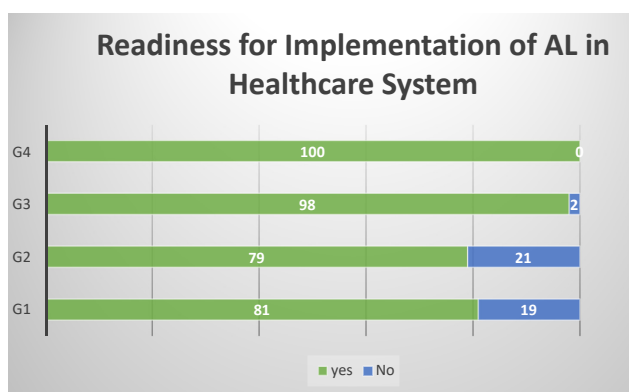


Figure 6. The figures for the willingness of interviewers to actively engage in the implementation of artificial intelligence, shown in Figure 6, look pleasantly hopeful.

tation, statistical studies/1,2,3,5,6,7/. These are just some of the possible applications of generative AI in the healthcare industry. We expect to see more generative AI applications in healthcare that will revolutionize patient care and improve health outcomes. All of this, in the end, will have a direct proportional impact on the indicators of the country's economy and will significantly increase it /9/.

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