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ARTIFICIAL INTELLIGENCE AND TECHNOLOGICAL INNOVATIONS IN HEALTH: POSSIBILITIES AND CHALLENGES

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Avelar Alves da Silva[1], Josimá Lima Oliveira[2], Lícia Gabrielle Gomes de Oliveira[3], Arquimedes Cavalcante Cardoso[4], Luiz Ivando Pires Ferreira Filho[5], Lyudmila Tolstenko Nogueira[6], Noélia Maria de Sousa Leal[7], Kely Centurião[8], Karina do Valle Marques[9] and Jessé de Castro Figueiredo[10].

ABSTRACT

This research aimed to analyze the possibilities and challenges of implementing artificial intelligence (AI) and technological innovations in healthcare, focusing on the perceptions and experiences of healthcare professionals. The methodology adopted was qualitative, field, with semi-structured interviews conducted with 18 professionals from different areas, including physicians, nurses and hospital managers. The results indicated that while AI is seen as a promising tool for improving diagnostic accuracy, optimizing staff time, and increasing process efficiency, it also presents significant technical challenges, such as inadequate infrastructure and lack of staff training. In addition, ethical issues, such as data security and the risk of bias in algorithms, were widely discussed. Professionals, while optimistic about the future of AI, have expressed concerns about the over-reliance on

[1] Professor of the Department of General Practice at the Federal University of Piauí
Federal University of Piauí
E-mail: avelaralves@ufpi.edu.br
[2] Master in Science, Technology and Education
Vale do Cricaré University Center
São Mateus-ES
Email: josima@bol.com.br
[3] Nurse
State University of Rio Grande do Norte
E-mail: liciagabrielle0816@gmail.com
[4] Professor of the Department of Specialized Medicine of the Federal University of Piauí - UFPI Campus Petronio Portela Teresina - PI
Email: srquimedes@ufpi.edu.br
[5] Professor of the Department of General Practice at the Federal University of Piauí - UFPI.
E-mail: luizivando@uol.com.br
[6] Professor of the Department of Morphology at the Federal University of Piauí
E-mail: milatolstenko@hotmail.com
[7] Professor of the Department of Morphology at the Federal University of Piauí
Federal University of Piauí
E-mail: noeliamsleal@gmail.com
[8] Specialist in Occupational Health
University of Mato Grosso do Sul Foundation (UFMS)
Email: rnkc15@icloud.com
[9] Federal University of Uberlândia
Uberlândia, Brazil
[10] Undergraduate student
Federal University of Sergipe (UFS) campus Professor Antônio Garcia filho
E-mail: jessecastro001@gmail.com

technology and the potential dehumanization of medical care. The conclusion points out that, for the successful adoption of AI in healthcare, it is necessary to overcome technical and ethical barriers, ensuring that the technology is implemented in an ethical, transparent, and accessible way, with the proper training of professionals and the creation of a safe regulatory environment.

Keywords: Artificial intelligence. Technological innovations. Health.

INTRODUCTION

Artificial intelligence (AI) has stood out as one of the most transformative technological innovations of recent times, and its application in healthcare has generated both enthusiasm and concern. With the advancement of machine learning techniques, neural networks, and processing large volumes of data, AI-based tools have the potential to revolutionize medical diagnosis, disease treatment, and even healthcare management. AI offers new possibilities for personalizing care, optimizing processes, and more accurate and efficient solutions, often with the promise of reducing costs and increasing accessibility to health services (Casas et al., 2020).

In the field of medicine, AI is already being applied in a variety of ways, from analyzing medical images such as X-rays and MRIs to developing clinical decision support systems that help doctors determine the best treatments for patients. AI's ability to process and analyze large volumes of data in real-time also allows it to identify patterns and trends that may go unnoticed by human professionals, contributing to faster and more accurate diagnoses. In addition, AI can be used in the creation of predictive models, capable of anticipating the development of diseases and even suggesting preventive interventions (Dourado; Aith, 2022; Baldissarelli; Gomes; Hahn, 2024).

Another promising field of AI in healthcare is that of personalized therapies. Genetic analysis, in conjunction with AI, allows for a more targeted and effective approach to treating diseases such as cancer, for example. The use of algorithms to correlate genetic and clinical information can lead to more specific treatments, with fewer side effects and a higher success rate. AI is being used in the development of new drugs, accelerating the process of discovering therapeutic compounds and enabling faster and more accurate tests for new treatments (Lemes; Lemos, 2020).

However, despite the promises of AI, its implementation in the healthcare industry also faces a number of challenges. The complexity of health systems, which involve a wide network of professionals, technologies, and policies, can hinder the widespread adoption of AI-based innovations. Additionally, ethical and legal issues related to data privacy, accountability for decisions made by automated systems, and the misuse of sensitive information are concerns that need to be carefully addressed. There is also the issue of the acceptance of health professionals and patients in relation to these new technologies, which can be seen as a threat to human labor or an invasion of privacy (Neto et al., 2020).

In terms of infrastructure, the adoption of AI in healthcare requires significant investments in technology and training. AI systems rely on large volumes of high-quality data, and not all hospitals or clinics have the ability to collect, process, and store this data

efficiently. In addition, health professionals need to be trained to use these new tools effectively, which implies a constant updating of their skills. The lack of financial and human resources can thus be a major obstacle to the expansion of AI in the sector (Novaes; Soárez, 2020).

In addition, one of the biggest challenges of artificial intelligence in healthcare is related to the risk of bias in algorithms. Health data can reflect social, economic, and racial inequalities, which can result in systems that perpetuate or even widen these inequalities. The use of AI should be done with caution to ensure that it is inclusive and does not harm certain population groups. Transparency in algorithm development processes, as well as the participation of a diversity of professionals and experts, is essential to mitigate these risks (Schmidt; Souza; Silva, 2022).

The objective of the research was to analyze the possibilities and challenges of implementing artificial intelligence and technological innovations in the health area. Through this analysis, we sought to identify the main areas of application of AI, the impacts that this technology can have on the improvement of medical care and the management of health services, as well as the obstacles that still need to be overcome to ensure an effective and ethical adoption of these innovations. The research also sought to explore the benefits, limitations, and ethical implications associated with introducing these technologies in the healthcare context, with a view to understanding the future of medicine in an increasingly digitized world.

METHODOLOGY

The research was carried out in a qualitative and field way, with the aim of deeply exploring the perceptions, experiences and challenges experienced by health professionals in relation to the implementation of artificial intelligence (AI) and other technological innovations in the hospital and clinical context. The qualitative focus allowed us to understand the subjective nuances and different perspectives of these professionals, in addition to enabling a more detailed analysis of the practical and ethical implications of the use of these technologies (Lima; Domingues Junior; Gomes, 2023; File; Domingues Junior; Silva, 2024; File; Silva; Domingues Júnior, 2024).

The research sample was composed of 18 health professionals, intentionally selected, with the objective of covering different professional profiles and experiences in the health field. Participants were chosen according to their direct experience with health technologies, such as doctors, nurses, health technicians, hospital managers, and other experts working with AI or technological innovations in their respective fields. This diversity

in the profile of the interviewees made it possible to have a more comprehensive and multifaceted view of the subject.

Data collection was carried out through semi-structured interviews, which allowed the flexible exploration of the professionals' points of view, while providing a certain uniformity in the issues addressed. The interviews were conducted individually, with an average duration of 45 minutes, and the questions addressed topics such as professionals' knowledge of AI, their practical experiences with the use of new technologies, the barriers encountered in the implementation of these innovations, and expectations about the future of technology in health. The interviews were recorded with the permission of the participants and transcribed in full to facilitate later analysis.

Data analysis was carried out based on the content analysis technique, which enables the organization and interpretation of qualitative information in a systematic way. The process involved the careful reading of the transcripts of the interviews, followed by the identification of thematic categories and subcategories that emerged from the participants' statements. These categories were grouped around central axes, such as "perceptions about the usefulness of AI", "technical and ethical challenges", "impacts on professional practice" and "expectations for the future of digital health". The analysis sought to identify patterns, divergences, and relationships between the different reports in order to gain a deeper understanding of the factors influencing the adoption of AI-based technologies in healthcare.

RESULTS AND DATA ANALYSIS

The results of the survey indicated a diversity of perceptions about the possibilities, challenges, and impacts of artificial intelligence (AI) on health, based on interviews conducted with the 18 health professionals. The qualitative analysis of the responses revealed both the optimism and the concerns of these professionals in relation to the adoption of technological innovations in the sector. The data was organized into four main categories: perceptions about the usefulness of AI, technical and ethical challenges, impacts on professional practice, and expectations for the future of digital health.

Regarding the usefulness of AI, the vast majority of respondents highlighted the potential of this technology to improve the accuracy of medical diagnoses. Respondent E03, a radiologist, stated that "AI can be a powerful ally in the analysis of medical images, helping to identify patterns that could otherwise go unnoticed". E11, also a doctor, shared a similar view, saying that "AI algorithms are able to suggest diagnoses that we can confirm or review, making the process more agile and safer."

However, not everyone shared the same enthusiasm. E06, a rare disease expert, expressed caution, mentioning that "over-reliance on AI can be risky, as the technology is not yet completely free of flaws, especially in more complex contexts." Another positive point raised was the optimization of the time of health professionals, especially in hospitals and emergency units. E08, a general practitioner, pointed out that "AI can speed up administrative processes, such as scheduling appointments and analyzing patient histories," while E07, an emergency care professional, highlighted that "AI could help prioritize care based on symptoms and vital signs, allowing doctors to focus on the most urgent cases." These reports reinforce the idea that AI can help reduce administrative workload, allowing professionals to spend more time on direct patient care.

However, the implementation of AI is not without its challenges, and many respondents pointed to technical and structural problems as significant barriers. E12, working in a medium-sized hospital, mentioned that "most healthcare institutions lack adequate IT infrastructure to adopt AI effectively, facing difficulties with data quality and a lack of specialized training." E09, who works in a larger hospital, confirmed that "even in large hospitals, the integration of AI into existing systems is a challenge, mainly due to the lack of interoperability between the various IT systems".

In addition to the technical obstacles, ethical and legal issues were also widely discussed. The security and privacy of patient data were recurring themes in the interviews. E05, a bioethics expert, stated that "one of the biggest challenges is ensuring the protection of sensitive patient data, especially when AI solutions operate in the cloud." E10, who is responsible for IT management at a public hospital, emphasized the risk of bias in AI algorithms, stating that "if the data used to train the systems is not representative of the entire population, we may end up creating models that favor certain groups and discriminate against others." This concern was shared by several professionals, who highlighted the need for transparency and accountability in the implementation of these technologies.

Another critical point discussed was the issue of legal liability. E14, a lawyer specializing in health, mentioned that "the lack of clarity about who is responsible in cases of diagnostic or treatment error involving AI generates insecurity among health professionals, who fear being held responsible for failures of AI systems that they do not completely control". E04, a surgeon, also raised concerns about assigning blame in the event of AI error, noting that "it will be difficult to determine the extent to which responsibility falls on the physician, especially when AI interferes with treatment decisions."

As for the impacts of AI on professional practice, participants were divided. Many doctors and nurses see AI as a complementary tool, capable of improving the quality of care, but not replacing it. E01, a clinical physician, stated that "AI can help make quick, data-driven decisions, but it should not replace clinical judgment. It should be seen as a support tool, not as a replacement for the professional." E13, a nurse, agreed, saying that "AI can help optimize our practice, making it more efficient, but there should always be room for humanized care and personal judgment."

On the other hand, some professionals have shown greater enthusiasm for the integration of AI into everyday life. E02, a general practitioner, stated that "AI can free healthcare professionals from repetitive and administrative tasks, allowing them to focus more on direct patient care, which is a major advantage." This vision was shared by several participants, who believe that with the implementation of AI, professionals will be able to focus more on personalized care and comprehensive patient follow-up, while benefiting from the agility and accuracy of technological tools.

With regard to expectations for the future of digital health, most respondents were optimistic, although with reservations. E15, a doctor in a large hospital network, stated that "in the near future, AI will be an integral part of the health system, from primary care to the most specialized treatments. However, this will only be possible if there are continuous investments in infrastructure and training." E16, a health technology expert, was even more emphatic, saying that "AI has the potential to revolutionize medicine, but we need more evidence on its efficacy and safety before adopting it on a large scale."

Improving access to technology and equity in the implementation of AI were key points in the interviews. E17, a hospital manager, pointed out that "without proper planning, AI can be more of a cost than a real solution. For it to be truly effective, we need to ensure that institutions have the necessary infrastructure and that professionals are prepared to use it ethically and competently." This observation was echoed by other respondents, who emphasized that the adoption of AI must be accompanied by an effort to ensure that all professionals, regardless of their field or specialization, have access to the necessary training.

The topic of ethics and transparency was also central to discussions about the future of AI in healthcare. E18, a psychologist specializing in medical ethics, highlighted that "for AI to be successful, it needs to be transparent, both in relation to decision-making processes and the use of patient data." E18 added that "patients need to trust the use of their information, and providers need to understand how systems make decisions so they can use them ethically and responsibly." This point was widely supported by other

respondents, who see transparency as an essential factor for the acceptance and success of AI in the healthcare industry.

In summary, the results of the research show that, although artificial intelligence has great potential to transform the practice of health, there are technical, ethical, and cultural challenges that need to be overcome. Most of the professionals interviewed believe that AI will be a powerful tool to improve the quality of care, but it must be implemented carefully, with proper planning and a focus on the continuous training of professionals. Additionally, transparency, data security, and mitigating algorithmic bias are crucial elements in ensuring that AI adoption is successful and benefits everyone in an equitable manner.

FINAL CONSIDERATIONS

Research on the application of artificial intelligence (AI) and technological innovations in healthcare has revealed a complex and multifaceted picture of the perceptions, challenges, and opportunities surrounding these technologies. Through semi-structured interviews with 18 health professionals, it was possible to identify both the significant benefits and difficulties associated with the implementation of AI in the various contexts of medical care, hospital management, and clinical practices. The analysis of the data highlighted that, although there is a strong acceptance of AI as a support tool, its use in medical practice still faces technical, ethical, and structural barriers that need to be carefully overcome to ensure its effectiveness and widespread adoption.

One of the main findings of the survey was the positive perception of many professionals regarding the impact of AI in improving diagnostic accuracy and increasing the efficiency of clinical processes. AI's ability to analyze large volumes of data, identify complex patterns, and suggest faster and more accurate diagnoses has been widely valued, especially in the fields of radiology, pathology, and diagnostic imaging. However, despite the enthusiasm, a recurring concern among respondents was the over-reliance on technology, which can compromise the autonomy of professionals and generate insecurity regarding responsibility for the mistakes made by AI systems.

In terms of technical challenges, it has become clear that the infrastructure of healthcare institutions, especially smaller ones, is not sufficiently prepared to implement AI-based solutions effectively. The lack of interoperability between different health systems, the insufficiency of quality data, and the need for investments in training for professionals were highlighted as significant barriers to the adoption of these technologies. Healthcare professionals indicated that without a proper upgrade of IT systems and without strategic

planning to integrate AI into existing processes, the promise of digital transformation in healthcare may not materialize satisfactorily.

From an ethical standpoint, the research brought to light crucial questions about patient data privacy and the risk of bias in AI algorithms. The use of large amounts of sensitive data and the possibility of algorithmic discrimination were identified as concerns that require stricter regulation and a transparent approach in the development and implementation of these systems. Patients' and healthcare providers' trust in AI solutions will largely depend on clarity about how their data is collected, stored, and utilized, as well as an ongoing effort to ensure that the technology is accessible and fair to all social groups.

Another relevant point was the division of opinions regarding the impact of AI on professional practice. While a portion of respondents see AI as a tool that can improve efficiency and free professionals from repetitive tasks, allowing them to focus on more personalized care, another group expressed concern about the possible dehumanization of medical care and the replacement of human clinical judgment with automated decisions. This division reflects the need for a balance between technological innovation and the maintenance of human care in the treatment process, which is essential to ensure the quality of care.

Finally, expectations for the future of digital health point to a promising horizon, with the majority of respondents trusting in the potential of AI to transform medicine in the coming years. However, for this transformation to be successful, it will require a concerted effort between governments, healthcare institutions, technology companies, and healthcare professionals. The widespread adoption of AI will depend on investments in technological infrastructure, the continuous training of professionals, and the creation of a regulatory environment that ensures transparency, safety, and ethics in the use of these technologies.

In short, the survey results indicate that AI has the potential to revolutionize healthcare, but its full integration into the healthcare system requires a careful and planned approach. AI technologies should be seen as supporting tools, capable of increasing the accuracy and efficiency of processes, but always with human supervision and judgment. The challenges identified — such as ethical issues, infrastructure issues, and the need for proper training — must be overcome if AI is to truly deliver on its promise of improving the quality of medical care and transforming the patient experience positively and safely.

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