

## Research Article

# Perception of the Impact of Artificial Intelligence in the Decision-Making Processes of Public Healthcare Professionals

**Yousif Saleh Ibrahim** <sup>1</sup>, **Waleed Khalid Al-Azzawi**,<sup>2</sup> **A. Abdullah Hamad Mohamad** <sup>3,4</sup>,  
**Ahmed Nouri Hassan**,<sup>3</sup> and **Zelalem Meraf** <sup>5</sup>

<sup>1</sup>Department of Medical Laboratory Techniques, Al-maarif University College, Ramadi, Al-Anbar, Iraq

<sup>2</sup>Department of Medical Instruments Engineering Techniques, Al-Farahidi University, Baghdad 10021, Iraq

<sup>3</sup>The University of Mashreq, Research Center, Baghdad, Iraq

<sup>4</sup>Department of Medical Laboratory Techniques, Dijlah University College, Baghdad 10021, Iraq

<sup>5</sup>Department of Statistics, Injibara University, Injibara, Ethiopia

Correspondence should be addressed to Zelalem Meraf; [zelalemmeraf@inu.edu.et](mailto:zelalemmeraf@inu.edu.et)

Received 12 May 2022; Revised 24 June 2022; Accepted 27 June 2022; Published 13 July 2022

Academic Editor: Sivakumar Pandian

Copyright © 2022 Yousif Saleh Ibrahim et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Technologies are increasingly independent and play important roles in society. Artificial intelligence (AI) is a branch of science that can improve various environments and processes. The health sector stands out among these contexts, especially ophthalmology and dentistry. Studies evaluating the impact of using these technologies in these contexts are still developing. There are still few studies that assess how AI can impact the decision-making process of health professionals and how it can improve the quality of care provided to these professionals. In this sense, this study aims to evaluate the perception of the impact of AI on the decision-making process of health professionals and the quality of patient care from the perspective of ophthalmologists and dentists. The methodological strategy used was the application of an online questionnaire with eighteen professionals in these areas. Based on the respondents' opinions, we sought to assess how these decision-making processes are affected by the use of technologies and how they impact the quality of patient care. As a result, it was observed that AI has become essential and a facilitator of the diagnostic processes. However, it presents some challenges related to cost, accessibility, AI x professional responsibility, and incentive of agreements.

## 1. Introduction

According to Khanam, et al. [1], AI is the science and engineering of creating machines that have functions performed by the brains of animals, referring to a field of knowledge associated with language and intelligence, reasoning, learning, and problem-solving. Several functions make AI so useful, such as recognizing patterns and images, understanding all types of language, perceiving relationships and connections, following decision algorithms proposed by experts, being able to understand concepts and not just process data, acquiring reasoning through the ability to integrate new experiences, and, with that, self-improvement by solving problems or performing tasks. AI processes the stored data through algorithms, improves itself through its

operation, and proposes increasingly accurate diagnostic hypotheses [2].

It is clear that technological advances increasingly interfere in people's daily lives, whether facilitating existing processes or creating new methods for solving problems. Artificial intelligence (AI) is seen as a technology revolutionizing different processes in different organizational contexts [2]. The times of great technological systems are advancing faster and faster. The era of AI systems has progressed and is still progressing by leaps and bounds in diverse applications such as autonomous vehicles, autonomous planning and programming, games, and translation and even medical diagnosis can be performed through AI [3].

One of the first times that the term AI was used was in 1950, by Alan Turing, using tests to compare the

performances of man and machine [4]. In 1955, this term was used again by John McCarthy to describe AI as the science of creating intelligent machines that reproduce the behaviour of a human being. As it is something contemporary, AI can be defined in different ways, such as the great capacity of machines to perform functions that are currently performed by humans [3] or even as the creation of computing systems that work intelligently, that is without the need for human instructions.

The application of AI in the health area has been growing in several specialties, offering new and beneficial solutions to diagnose diseases [5]. AI impacts both the decision-making process of the health professional, presenting high rates of diagnostic efficiency, support for decision-making, reduced incidence of errors and improved outcomes, and the quality of patient care. In addition to AI assisting in more accurate and sensitive diagnoses, it reduces the time of disease discovery and increases physician confidence.

According to Zhang, et al. [5], publications on AI in the health area are still incipient. However, it is noted that technology can promote safety and improvements in the quality of care. One of the major discussions is whether the machine will replace a human specialist in the medical field and to what extent it will interfere with the health professional's decision-making process. It is still necessary to discuss the extent to which technological advances will improve people's quality of life, their limits, evaluation criteria, and possible benefits and challenges. In ophthalmology [6], AI programs have great potential to improve medical care for patients. Together with ophthalmologists, these technologies can contribute by showing diagnostic efficiency and remote medical evaluations in places where the specialist is not available, for example preventing the aggravation of the disease. Such AI systems work, for the most part, independently, but to do so, they must first be fed by data to generate patterns. These systems are designed to continually adapt and improve over time as they receive and train with new data input. This research focuses on two dilemmas: how can AI impact the decision-making process of healthcare professionals and the quality of patient care from the perspective of ophthalmologists and dentists?

To answer this problem, the present research aims to evaluate the perception of the impact of AI on the health professional's decision-making process and the quality of patient care from the perspective of ophthalmologists and dentists.

The specific objectives are as follows:

- (i) Identify the AI technologies used by ophthalmologists and dentists;
- (ii) Identify the benefits and challenges of using these technologies;
- (iii) Compare the results obtained in the field of ophthalmology and dentistry.

As seen, AI can bring some benefits when used in healthcare. It can help with office organization, schedules, data, advanced diagnostics, exam optimization, and clinical data triage. It can also use complex data screening as risk

factors and develop a system with predictive algorithms that can outperform humans. That is why it is so important to find out how to successfully insert AI into health processes, as there is a chance of discovering future consequences and problems to treat and/or prepare the patient for such an event. Thus, it is important to develop studies that seek to understand the impact of AI on the decision-making process of health professionals in the ophthalmic and dental areas and how this impacts patient care. In this work, a comparison of the literature with the results of the respondents will be presented concerning existing AI technologies in ophthalmology and dentistry and their benefits and challenges.

## 2. Methodology

The methodology concerns the ways to obtain information from an organization to be studied so that research is carried out using instruments. Through it, we seek to organize and describe how the research data in question will be collected and later evaluated and illustrate the paths whose work will be conducted [7].

*2.1. Search Classification.* This research is classified as descriptive. According to Gil [8], descriptive research describes the characteristics of a given population, phenomenon, or the establishment of relationships between variables. Furthermore, it is characterized by standardized data collection techniques, such as the questionnaire.

Data collection sought to relate different variables, generating thorough research on a given phenomenon without any intervention in it. There was investment and treatment of qualitative data. Although there is an inclination towards exploratory research methods, which consists of investigating a less well-known topic for familiarity with it [8], the focus was to synthesize stratified data to analyze trends within a given semantics. The approach used, as previously mentioned, was qualitative, focusing on the opinions of ophthalmologists and dentists on the impact of AI on the decision-making process and the quality of care. The defined scenario is the AI market in ophthalmology and dentistry. The context is the insertion of AI for ophthalmologists and dentists. The object, then, is not limited to AI; it also extends to professionals as subjects. As a result, it impacts the decision-making process of these professionals and the quality of care provided to the patient.

As it is an extremely current topic, several more recent articles on the topic were used, such as Zhang, et al. among others who came to add knowledge to enrich the article.

*2.2. Data Collection and Organization.* For data collection, a questionnaire was used that was sent through a link on Google Forms, due to the location of some respondents in addition to the pandemic itself. The responses were obtained from March 21 to April 22, 2021. It was divided into four sections. The first concerns the characterization of the respondent, evaluating the time in the profession and the type of professional care: whether it is through an agreement or

private. The second refers to the AI technologies used, whether there are incentives on the part of the agreements or the benefits and challenges of using them. The third is related to the quality of care. Finally, the fourth section evaluates decision-making issues such as the responsibility of the professional and AI and the level of trust in technologies. The complete questionnaire contains 16 questions according to Phillips-Wren and Jain [9]. The questionnaire was applied to 18 professionals from the respective areas. Of these professionals, 10 were ophthalmologists who work in the cities of Baghdad and Mosul, including in health insurance and private networks in addition to Baghdad Teaching Hospital, Iraq (BTHI). The remaining 8 were dental surgeons who work in the cities of Baghdad, Mosul, and Basrah, as shown in Table 1.

**2.3. Data Analysis.** Respondents' responses were manually analyzed and coded to identify the standards of the technologies used and their benefits and challenges, in addition to the impacts on decision-making processes and on the quality of care. The main form used for stratification, arrangement, and data analysis was the Microsoft Office package, mainly Word and Excel.

### 3. Results

This section presents the perception of professionals, ophthalmologists, and dental surgeons who answered the questionnaire regarding the impact of AI on the decision-making process of the health professional and on the quality of patient care. This section also discusses existing technologies and their benefits and perceived challenges. Below are the answers to the questionnaire, and the average of the answers given by health professionals is always used.

**3.1. Existing Technologies, Benefits, and Challenges.** The AI technologies used in ophthalmology were "optical coherence tomography (OCT)" and "fundus photography." In dentistry, it was the "intraoral scanner." Regarding the reported benefits, the benefit in relation to the decision-making process of physicians was emphasized. By analyzing the answers, it was found that one of the greatest benefits concerns the aid in the diagnosis, being in the increased assertiveness, the reduction of the time of detection of the disease, and presenting results that are not possible to verify in the routine examinations, the monitoring of the disease, and monitoring the evolution of her treatment. According to respondent 03.

"[...] it reduces the time to detect the disease because if they were performed manually, they would take longer, they show us changes that are not detected in the routine exam, they help us to confirm a diagnostic suspicion, and also in the follow-up of the diagnosis. Disease and monitoring her treatment [...]."

Another reported benefit was the quality of care, allowing for a longer interaction time with the patient since

the examination and detection time is optimized. The greater reliability delivered to the patient was also reported:

"[...] with the optimization of the time of the exam, I can dedicate more time to the conversation with the patient, being conversations that help to complement the diagnosis or even about life, making the patient more comfortable and strengthening the doctor-patient relationship [...]" (Respondent 10).

"[...] I've already noticed how some patients are more satisfied with the combination of the diagnosis that the AI offers and with my clinical examination, feeling greater reliability in the result delivered [...]" (Respondent 15).

The implementation of telemedicine was also a reported benefit, especially during the pandemic, in addition to allowing care in remote locations and helping to diagnose diseases in the initial stage. Respondent 01 reported:

"[...] allowing telemedicine improves long-term follow-up, speed in data processing, greater flexibility of time and place to perform, making it possible to consult in remote places [...]."

Regarding the challenges, challenges related to cost, system reliability, accessibility, and IA x professional responsibility were identified. Regarding cost, it was observed that AI technologies have a high cost, making their adoption difficult by professionals. Concerning reliability, some respondents say that they do not fully trust recent technologies and expect a period for improvements. Respondent 06 states:

"[...] usually a new technology undergoes improvements every year, especially those related to software. At first, they are not completely reliable or are not reproducible in their results. In addition to reliability, there are also financial issues, as new equipment is more expensive and not always covered by agreements or available on the public network. In some cases, the patient cannot pay for the exam, making us rethink the investment in acquiring the technology [...]."

The lack of accessibility for some is also related to the high cost of equipment. It adds little to the area of activity of these professionals, as said by respondent 02:

"[...] OCT equipment, in which each one is entitled to one day of the week for use. That way, it became more accessible, because if not, it would not be worth the cost-benefit of acquiring this technology alone [...]."

"[...] For my area of expertise, I still do not see the need to use AI and, depending on the case; I refer the patient only for the examination to be carried out with another professional who already has the technology [...]" (Respondent 17).

Regarding the discrepancy between the diagnoses provided by the AI vs. Specialist, respondent 13 states that:

TABLE 1: Characterization of the respondent.

Item/professional	Ophthalmologist	Dental surgeon
The amount	10	8
Average time of profession	16 and a half years	12 and a half years
Service provided	Carried out by agreement and private	Carried out in private

“[...] even with this difference, some studies show that the clinical diagnosis is very similar to that provided by the AI [...]”

Considering that the diagnosis may contain faults, it is important to understand those responsible for them. Thus, most respondents agree that the responsibility lies solely with the professional in the face of these diagnostic or conduct failures. The medical conduct directs to the analysis of the specialist's attitude, whether he has performed the results correctly or just acted with negligence. The AI will only be held responsible if there is evidence that the diagnosis was only possible through the examination.

“[...] The professional should not limit himself exclusively to AI data, as clinical evidence should not be neglected [...]” (Respondent 16).

“[...] The AI helps in the conduct, but the diagnosis and treatment decision is up to the specialist [...]” (Respondent 04).

“[...] Since these systems have been carried out within the quality standards, the responsibility would only be the professional [...]” (Respondent 02).

The rest stated that the responsibility could be divided: “[...] Divided, if the requested tests identify wrong diagnoses [...]” (Respondent 14).

The data presented in Table 2 refer to the percentages of variations in the common responses of ophthalmologists and dentists concerning the AI technologies used in each speciality, the benefits and challenges, and whether there is an incentive from the health plans about complementary exams that use AI.

Still on Table 2, most professionals answered that the agreement and the network do not encourage the use of complementary exams to assist in decision-making, even professionals admitting that complementary exams are useful and essential. Respondent 02 stated:

“[...] The health insurance plans and medical cooperatives guide us to try to diagnose with as few complementary exams as possible. In addition, we must follow the existing protocols for that disease so that there is no significant increase in the cost of the number of exams [...]”

*3.2. Perception of the Impact of AI on Decision-Making Processes of Ophthalmologists and Dental Surgeons.* As demonstrated in the literature, AI impacts the decision-making processes of health professionals. It was observed that AI

complements the doctor's diagnosis. However, the clinical examination is still very important, as it is necessary to evaluate the patient's complaints and analyze the test result to confirm the diagnosis.

“[...] Medicine is patient-centred. Even if a particular exam is useful, the clinic is sovereign. Even if the device gives us a normal result, if the signs found by the clinical examination are strongly suggestive of disease, the doctor should either repeat the examination or treat the suspected disease [...]” (Respondent 06).

“[...] The exams complement each other, and, although one is normal, the other may indicate some alteration that may justify an initial disease. For example, retinal disease due to diabetes may appear normal on clinical examination, but on imaging, show internal changes that show the onset of the disease [...]” (Respondent 08).

“[...] It is also necessary to listen to the patients' complaints, being able to compare them with the evidence of the exams [...]” (Respondent 11).

Despite the high level of confidence in the diagnosis offered by AI, attention was paid to the reliability of the result without a clinical examination, as stated by respondent 09:

“[...] keep in mind that the exams still suffer from some interference and we have to take this into account before accepting a diagnosis made by the device [...]”

In addition to reliability, most also agree on the greater credibility of the diagnosis together with AI for the patient:

“[...] In ophthalmology we are very dependent on images to help in the diagnosis, but a good anamnesis, conversation with the patient, is capable of to lead us to the diagnostic suspicion, when done well and calmly [...]” (Respondent 08).

“[...] I believe it is an additional resource to assist in the diagnosis and give more credibility to the patient. The positive reaction of some patients is noticeable when they see the result presented by technology, together with our explanation [...]” (Respondent 18).

Even with AI aiding in the diagnosis, most healthcare professionals believe that the patient cannot define the diagnosis with AI alone.

“[...] It is always necessary to have a professional to evaluate and close the diagnosis with all the complementary exams and clinical evaluations [...]” (Respondent 15).



TABLE 2: Existing technologies, benefits and challenges.

Item/ Professional	Classification	Ophthalmologist	Dental surgeon
AI technologies used	Existing technologies	90% of professionals use, among them OCT and fundus photography.	60% of dentists use the intraoral scanner.
Benefits	Decision-making process; telemedicine; quality in service.	80% say AI helps with a more accurate diagnosis. 30% believe that it reduces the time of disease detection and 10% see the possibility of telemedicine as a benefit.	87.5% say that the use of AI contributes to a more accurate and assertive diagnosis. 50% say it helps in planning and predicting treatment.
Challenges	Reliability; cost; accessibility; liability AI x professional.	30% no longer used ram due to low reliability in using recent technologies; 50% due to high cost; 20% because it adds little in the area of activity; 30% lack of accessibility; 70% believe that there may be a discrepancy between the AI diagnosis and the clinical one, as in some cases it is only possible to identify the disease through AI imaging tests; 100% agree that the interpretation and guidance of the correct treatment is the health professional's role; 60% of the respondents stated that in case of diagnostic errors, the responsibility lies solely with the professional, and the other 40% claim that the responsibility should be shared.	75% no longer used AI due to the high cost, 12.5% because of the difficulty of using it in children, and 12.5% because they preferred a clinical examination. 62.5% said there might be discrepancies between diagnoses; 100% agree that the professional is fully responsible for the diagnosis as it legitimizes the most appropriate diagnosis and treatment; 75% agree that the professional is responsible for the error. The other 25% say it could be shared with AI.
Incentive agreements	Incentive to use	90% are not encouraged.	100% are not encouraged

"[...] The patient can identify the disease through the test result and applications, for example, but searching for a specialist to confirm the diagnosis and continue the treatment is essential to avoid the risk of a misdiagnosis [...]" (Respondent 10).

The percentages of responses organized in Table 3 relate to the impacts caused on decision-making processes by AI.

**3.3. Perception of the Impact of AI on the Quality of Patient Care.** In addition to the impact of AI on healthcare professionals' decision-making processes, it also impacts the quality of patient care. Through the answers to the questionnaire, as in the literature, it was noticed that AI impacts the aspects of interoperability, quality, and safety. Regarding interoperability, there is an increase in the time in the doctor-patient, either to talk or to go deeper into the complaints, as the time to perform the exam itself with the AI decreases, as mentioned by respondent 01:

"[...] effective and comfortable both for us and for the patient [...]", and also by respondent 08: "[...] the examination and diagnosis is performed faster than without the use of AI, allowing for a longer time of anamnesis and conversation with the patient [...]" Some of the respondents did not agree with the increase in the time of this relationship with the following explanation: "[...] the time decreases due to a more accurate diagnosis, providing more security to the patient, without the need for excessive examinations and returns[...]" (Respondent 09).

As for quality and safety, there is a transformation of the patient's experience, in which 100% of the respondents stated that the use of AI transformed this experience for the better:

"[...] in remote places without the presence of a specialist doctor, who may be assisted by a general practitioner, as the interpretation of the problem is facilitated [...]" (Respondent 03). The following are more positive opinions regarding this transformation: "[...] Greater security in the diagnosis, in addition to offering more agility [...]" (Respondent 05), "[...] You can feel better evaluated and help with treatment adherence [...]" (Respondent 13) and "[...] Patients can visualize and understand what is not tangible, in addition to having a prediction of results [...]" (Respondent 18).

The data available in Table 4 are about the impact of AI on the quality of patient care.

## 4. Discussion

This section was structured based on the research pillars: technologies explored by the two areas of health, the benefits and challenges experienced by professionals about the implementation of technologies, in addition to the perception of professionals about the impact of AI on the process of decision-making and the quality of care.

**4.1. Existing Technologies.** The literature shows that the existing technologies in ophthalmology are: Fundus photography and Optical Coherence Tomography (OCT) [10].

TABLE 3: Impact on decision-making processes by AI.

Classification		Ophthalmologist	Dental surgeon
	AI replaces or complements the diagnosis.	100% believe they should be correlated and complementary.	100% of respondents agree on the association between AI and the clinical method.
Diagnostic aid	Confidence level in the diagnosis offered by the system.	70% reported having a high level of confidence. 50% of these relate this confidence level to the patient's health condition.	100% of respondents trust the diagnosis offered by AI. In this parameter, 50% believe that the patient's health does not interfere with the confidence level, and the other half think it is important to assess the patient's general health status.
Assistance in doctor-patient interaction	Health diagnosis by the patient himself from AI.	80% do not believe that the patient can define his diagnosis with AI.	100% do not believe that with only the use of AI, the patient can define the diagnosis.
	Credibility in diagnosis through AI.	100% believe that credibility increases with the use of AI.	87.5% believe so, being an additional resource to aid the diagnosis, while 12.5% say that yes in most cases.

TABLE 4: Impact on the quality of care by AI.

Classification	Subclassification	Ophthalmologist	Dental surgeon
Interoperability	Increased time in the doctor-patient relationship.	80% of ophthalmologists stated that AI allows more time in this relationship, 10% said that the time of interactions is reduced, while the other 10% say that it does not necessarily change the time.	90% believe they allow more time in the doctor-patient relationship. 10% already say that the time is shorter and that the patient is loyal.
Quality/Safety	Transforming the experience of the patient.	100% of ophthalmologists stated that AI transforms the patient experience for the better.	100% stated that AI makes treatment faster and more comfortable.

The survey results show that 90% of ophthalmologists who participated in the survey use these technologies and the other 10% say they still do not use any. In the field of dentistry, the literature addresses the technologies, namely confocal laser endomicroscopy, CAD/CAM technology, and intraoral scanner, however, it was observed that only the intraoral scanner technology is used by 60% of the respondents. As demonstrated in the literature, AI technologies in these two healthcare areas are very focused on helping diagnosis rather than treatment.

**4.2. Benefits.** The literature identifies 3 benefits of using AI: (1) decision-making process, (2) quality of service, and (3) telemedicine. Respondent's judge the 3, and the most commented was in relation to support for the decision of the diagnosis, being in the increase of assertiveness, in the reduction of the time of detection of the disease, and in the follow-up of it [11].

The quality of care was also presented as a positive point since the use of technologies increased the length of the doctor-patient relationship. Greater patient satisfaction was also observed with the combination of the diagnosis offered by the AI and the health professional, as they claim greater reliability in the diagnosis presented. As for telemedicine, professionals justify its importance insofar as it allows care in remote locations, helping in an early diagnosis of any disease that could quickly worsen without any action.

**4.3. Challenges.** The literature presents 4 challenges with the use of AI: (1) interaction with the patient, (2) cost, (3) AI x professional responsibility, and (4) reliability. In the

questionnaire results, the 4 classifications of the challenges were observed, but with some extra information not mentioned in the literature, such as the issue of support from the agreements. In ophthalmology, many doctors are insured, but the insurance companies ask professionals to carry out diagnoses with the least number of exams due to the cost. Therefore, convincing the use of AI for health insurance is an important point about the importance of AI technologies, as it will often influence the use by health professionals [12].

Regarding reliability, for the physician, companies developing these systems have to convince physicians that the system is effective and brings quality benefits. As for the agreements, it will be in relation to the cost, which will reduce in other aspects and exams, because, thus, they will encourage health professionals to use according to the need, without restrictions. Some ophthalmologists responded that it was necessary to work with resource sharing to manage the cost challenge. In Baghdad, 5 of them bought the equipment in partnership, which is available to each one, once a week.

In dentistry, many of the professionals are not covered by an agreement, further impacting the cost challenge, as sometimes the patient is not willing to pay for the private exam. Some respondents reported that the cost-benefit is not valid for the area of operation. Depending on the case, they refer the patient only for the examination to be carried out with another professional who has the technology [12].

**4.4. Perception of the Impact of AI on the Decision-Making Process.** Two impacts caused within the decision-making process by the use of AI were presented in the literature: (1)

assistance in diagnosis and (2) assistance in doctor × patient interaction. The respondents' reports showed that the aid in the diagnosis occurs through: (1) complementation of the clinical diagnosis and the (2) level of confidence in the diagnosis offered by the system [13].

The question of AI replacing or complementing clinical diagnosis is still discussed in the literature [12]. From the data collection, it was observed that most professionals who participated in the research consider that the use of AI complements the analyses carried out by them, not replacing the human diagnosis, corroborating the studies by Maz-zochi. Respondents consider clinical analysis an important step in the decision-making process. They also point out that only with the use of AI, the patient cannot define his diagnosis, emphasizing the importance of the physician's role in the diagnostic process as mentioned by Areiqat and Alheet [12]. Most professionals consider clinical analysis paramount. There are also cases where the diagnosis made by clinical examination may appear normal, but when performing the OCT, for example detecting the early stage of the retinal disease due to diabetes. Even in this case, the clinical examination is essential to analyze the patient's health history complaints and requests tests to help confirm the diagnosis.

In relation to the health professional × patient interaction, two questions were observed: (1) diagnosis of health by the patient himself from the AI and (2) credibility in the diagnosis through AI. Respondents point out that only with the use of AI, the patient cannot define his diagnosis with complete safety, requiring a professional evaluation. In addition, only the professional can confirm and proceed with the treatment indicated for the disease. Regarding the credibility of the diagnosis through AI, most point out that it increases and that they perceive the patient's positive reaction when seeing the result presented by the AI, with the confirmation and explanation of the health professional, as they will often help to understand that is not tangible.

**4.5. Perception of the Impact of AI on Service Quality.** The literature [15] presents 3 impacts of AI on the quality of care: (1) quality, (2) interoperability, and (3) security. For the respondents inserted in these 3 impacts, there is an increase in the doctor-patient relationship and the transformation of the patient's experience, as mentioned in the literature by Zhang, et al.

Many of the respondents reported that they had an increase in the time of this relationship and transformed the patient experience for the better, with a diagnosis made more comfortably, quickly, and effectively. As reported by a dentist, through the intraoral scanner, it is possible to make the diagnosis more visible to the patient, showing if any treatment is necessary and the options offered in orthodontics. This visibility increases the patient's safety and confidence in the professional, corroborating the study presented by Naumov [16].

## 5. Conclusions

This research began by contextualizing AI, its impacts, and its uses in ophthalmology and dentistry. To evaluate its impact on the decision-making process of the health

professional and the quality of care, the result for the author is conclusive and satisfactory. Research on such current topics proved to be more complex than expected. Even though it is well disseminated in some areas of knowledge, AI does not have great references to base and deepen, especially when the focus is on the quality of the result it offers, which is one of the great difficulties for applying the technological update. Processing large amounts of data is possible and easily achievable for AI, but at the same time, it is difficult to use them, as a high volume of data is required to find assertive patterns. The need for a professional to always monitor performance and guide AI in health processes is evident that it is necessary. AI can identify/analyze a case in a short period compared to a human being, but it is not possible to replace the professional for personal treatment.

According to Areiqat, et al. [3], "Technology is just a tool, and the degree of success it has depends on how individuals respond to it." In other words, the professional's interaction with the interfaces, and the result through assertiveness, is the report of his success. Suggestions for future research on the topic are: the patient experience impacted by AI and analyzing whether health professionals' perception coincides with that of patients. The perception of professionals to contribute to system developers in improvements in existing technologies or new ones that will continue to assist in decision-making.

## Data Availability

The data underlying the results presented in the study are available within the article.

## Conflicts of Interest

The authors declare that they have no conflicts of interest regarding the publication of this article.

## References

- [1] S. Khanam, S. Tanweer, and S. Khalid, "Artificial intelligence surpassing human intelligence: factual or hoax," *The Computer Journal*, vol. 64, 2020.
- [2] M. Mirbabaie, S. Stieglitz, and N. Möllmann, "Artificial intelligence in disease diagnostics: a critical review and classification on the current state of research guiding future direction," *Health Technology*, vol. 11, 2021.
- [3] Y. K. Dwivedi, L. Hughes, E. Ismagilova et al., "Artificial Intelligence (AI): multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy," *International Journal of Information Management*, vol. 57, Article ID 101994, 2021.
- [4] M. Gams, "Alan turing, turing machines and stronger," *Informatica*, vol. 37, pp. 9–14, 2013.
- [5] J. F. Arinez, Q. Chang, R. X. Gao, C. Xu, and J. Zhang, "Artificial intelligence in advanced manufacturing: current status and future outlook," *Journal of Manufacturing Science and Engineering*, vol. 142, no. 11, pp. 1–53, 2020.
- [6] A. Khadidos, A. Khadidos, O. M. Mirza, T. Hasanin, W. Enbeyle, and A. A. Hamad, "Evaluation of the risk of recurrence in patients with local advanced rectal tumours by

- different radiomic analysis approaches,” *Applied Bionics and Biomechanics*, vol. 2021, Article ID 4520450, 9 pages, 2021.
- [7] A. Belharet, U. Bharathan, B. Dzingina et al., *A Study on the Impact of Artificial Intelligence on Project Management*, Frenxiv, Champs-sur-Marne, France, 2020.
  - [8] A. C. Gil, *How to sort searches. How to design research projects*, vol. 4, pp. 44-45, 2002.
  - [9] G. Phillips-Wren and L. Jain, “Artificial Intelligence for Decision Making,” in *Proceedings of the Lecture Notes in Computer Science*, Bournemouth, UK, October 2006.
  - [10] Ji-P. O. Li, H. Liu, D. S. Ting et al., “Digital technology, telemedicine and artificial intelligence in ophthalmology: a global perspective,” *Progress in Retinal and Eye Research*, vol. 82, Article ID 100900, 2021.
  - [11] A. Abdullah Hamad, M. L. Thivagar, M. Bader Alazzam, F. Alassery, F. Hajjej, and A. A. Shihab, “Applying dynamic systems to social media by using controlling stability,” *Computational Intelligence and Neuroscience*, vol. 2022, pp. 1-7, Article ID 4569879, 2022.
  - [12] A. Areiqat and A. Alheet, “Artificial intelligence and its impact on public management and decision-making,” *The Fourth Industrial Revolution: Implementation of Artificial Intelligence for Growing Business Success*, Springer, Berlin, Germany, 2021.
  - [13] J.-C. Pomerol, “Artificial intelligence and human decision making,” *European Journal of Operational Research*, vol. 99, no. 1, pp. 3-25, 1997.
  - [14] R. Grassia, M. Savarese, T. Staiano et al., *EUS-FNB Diagnostic Accuracy in Not-Referral Center Without a Rapid on Site Cytological Examination Service*, Elsevier Science INC, New York, NY, USA, 2015.
  - [15] C. Prentice, S. Dominique Lopes, and X. Wang, “The impact of artificial intelligence and employee service quality on customer satisfaction and loyalty,” *Journal of Hospitality Marketing & Management*, vol. 29, no. 7, pp. 739-756, 2020.
  - [16] N. Naumov, “The impact of robots, artificial intelligence, and service automation on service quality and service experience in hospitality,” *Robots, Artificial Intelligence, and Service Automation in Travel, Tourism and Hospitality*, Emerald Publishing Limited, Bradford, UK, 2019.