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How AI Improves Telemedicine through Improving Data Management in Healthcare

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Abstract

The ability of artificial intelligence (AI) to greatly increase the efficacy and efficiency of any task carried out has contributed to its rise in popularity in recent years. These days, the healthcare industry uses AI more often because of the growth in data and complexity. This study, which examined artificial intelligence (AI) in the healthcare industry, sought to fully grasp how AI enhances telemedicine by optimising data management. The results indicate that AI has helped to improve fragmented data organisation and data management. This enhancement really helped to increase the efficacy and efficiency of every process. The results also show that the use of artificial intelligence affected record accessibility, promoting telemedicine and enhancing precision and care quality. This study adds significant insights to inform the direction of healthcare technology advancement by demonstrating AI's enormous potential to optimise information management and care supply.

Keywords: *Artificial intelligence (AI)*, *Data management*, *Healthcare*, Telemedicine.

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Introduction

"Due to the growing availability of healthcare data and the quick advancement of analytics techniques, artificial intelligence seeks to mimic human cognitive functions, bringing about a paradigm shift in healthcare" (Jiang, et al., 2017).

Technology has evolved remarkably during the last few decades, advancing fields and revolutionising industries. Technology is used in many different industries to provide numerous benefits, including increased productivity, decision support, efficient cost reduction, time savings, and competitive advantage. The study of building robots with increased human-like traits, such as processing massive amounts of data, identifying patterns, making decisions, machine learning, and much more, is known as artificial intelligence (AI).

AI became more widely used in healthcare because of how well it managed operations and patients. Sifting through

enormous amounts of data from clinical research, patient information, health records, and much more has been made easier with the use of cutting-edge technologies. The healthcare business benefited from the use of AI by seeing improvements in administrative flow, fewer prescription errors, less invasive operations, and fraud detection, to mention a few. In a recent publication, Amjad (2023) asserted that the use of AI in healthcare is essential to enhancing procedures, identifying errors, evaluating patient records, and helping to propose therapies based on available data and patterns (Amjad, Kordel, & Fernandes, 2023).

Hypothesis

Due to enormous data in healthcare, proper data management is crucial to handle overwhelming amounts of information and fragmented data. Data management is one of the challenges faced in healthcare sector where it is vital to collect patient data, organize records, and analyze data. Collecting numbers is useless if it cannot be used to improve performance in managing patients.

With this problem, our first hypothesis is:

H1: How AI improves data management in health care

On the other hand, telemedicine progressed in recent years and gained popularity among patients and medical practitioners. Telemedicine will not be effective or efficient if fragmented data was used to perform telemedicine. This problem leads to the second hypothesis:

H2: How telemedicine can benefit from improved data through AI

Literature review

This section deconstructs the complex relationship between telemedicine, artificial intelligence (AI), and the healthcare system as a whole, providing a thorough contextual framework. Due to its inherent ease, telemedicine has becoming increasingly popular. It can bring about a transformative shift by reducing the need for in-person visits to medical facilities (P.H., Abdullayev, Ragimova, & Alyar, 2022). Similar to replicating human cognitive capabilities, the integration of AI into the healthcare domain is described as a paradigmatic transition (Li, et al., 2021). The company is positioned as a progressive force and a new era is introduced with this review. The focus of the paper is on how artificial intelligence could upset dynamic cycles, expedite procedures, and raise overall medical treatment costs.

Concerns about privacy and technological obstacles are two issues facing telemedicine. Even while telemedicine is convenient, there are drawbacks that should be carefully considered. This contextual backdrop establishes the framework for comprehending the complex environment that telemedicine and artificial intelligence interact in (Senbekov, et al., 2020). The body of research emphasises how important data management is to the healthcare industry and pushes it to the top of the list of priorities. In this domain, artificial intelligence (AI) becomes a critical facilitator, helping to organise and use patient data efficiently. The paper highlights the need for artificial intelligence to have a bigger impact on changing medical practice, especially in the fields of telemedicine and information governance, and it backs up the review's hypotheses.

Telemedicine& AI

The delivery of medical diagnostics and treatments remotely through the use of technology is referred to as telemedicine. According to Pacis (2018), the convenience that telemedicine provides by eliminating the need for a patient to physically attend a medical facility for treatment is what has made it more and more popular. Healthcare information technology, patient monitoring, information analysis cooperation, and intelligent assistance diagnosis are the four categories into which Pacis (2018) divided trends in the development of AI and telemedicine (D.M.M.,

E.D, & Bugtai, 2018). Medical professionals can engage with patients while they are at the same site where they receive medical care by using a desktop computer equipped with a specialised video card for secure data storage and high-speed connectivity. This is known as telemedicine. (Kaushik, Sharma, Shakyawar, & Dash, 2019). The advantages of telemedicine include cost savings, efficiency, accessibility, and convenience.

By attending their visits from home, patients reduce the risk of infection transmission to others and avoid having to take time off from work or travel to their appointments. By offering patients fewer excuses for missing appointments and lowering the possibility that traffic delays would cause them to arrive at hospitals late, telemedicine lowers the number of cancelled visits. Furthermore, compared to a traditional medical consultation, the cost of an online consultation is lower.

Telemedicine's drawbacks include difficulties with technology, diagnostic limitations, security issues, and privacy worries. Not everyone has access to technology or a reliable internal connection, thus not everyone can use telemedicine. Physical examinations are necessary for certain medical disorders and cannot be performed remotely. Patients are also worried about patient privacy and the privacy of their health information.

Data Management & AI

The process of collecting data from various sources to be categorised, kept, examined, and used as needed is called data management. In the medical field, patient data management is essential to establishing a comprehensive understanding of records, history, diagnosis, and therapies. As a result, integrating artificial intelligence into data management will facilitate the collection of dispersed data for better organisation and use (Dash, Shakyawar, Sharma, & Kaushik, 2019). Healthcare artificial intelligence was estimated to be worth $11 billion in 2021 and $187 billion in 2030 (Stewart, 2023). Given the predicted enormous rise in AI value, there is a greater chance that AI will have a beneficial impact on healthcare industry operations and lead to significant changes in the way medical services operate.

AI, machine learning, data access, hardware availability, and network availability have all significantly sped progress and helped to enhance the usage of AI in the healthcare sector. AI will improve the patient experience because, according to a survey, 83% of responding patients said that the worst aspect of their experience was the lack of communication (Simbo.ai, n.d.). Predictive analytics, natural language processing, and speech recognition are examples of AI technologies that may improve communication and raise satisfaction levels.

Research method

Gathering information through research methods in order to learn more about a certain subject and to analyse the material gathered. We gathered data using a qualitative study approach by speaking with AI and healthcare professionals.

By posing questions via email to local healthcare experts, we can collect information about their experiences with AI's potential to improve telemedicine by streamlining data management in the medical field.

The objective is to collect data through conducting interviews with over three healthcare professionals from different institutions. In order to gain insight into the interviewer's perspective and level of knowledge, the questions were mostly focused on data management and telemedicine.

Data gathering

The process of compiling facts and information is called data collection. Primary and secondary procedures are the two basic categories of data collection techniques. The original way, which is obtained straight from the person, is the main approach. Conversely, secondary methods use data that has already been gathered by another party. Interviews and international case studies can be used in combination with other data collection methods.

The interviewers included Khaled, Dr. Maha, a nurse at Amana Healthcare Hospital, Dr. Najlaa, a psychiatrist at Dubai Academic Health Corporation, a general practitioner at Emirates Health Services, and Dr. Kadhim from Emirates Health Services. The interviews took place across a range of healthcare specialties. Drs. Alanood, Amna, and Hamda also conducted interviews with specialists in the ministry of health and prevention. In order to learn more about the technical side of artificial intelligence in healthcare, an interview with AI expert Eng. Ahmad was conducted. The doctors in question were contacted via email with questions, and they were asked to respond based on their knowledge and judgement.

According to their personal experiences, AI plays a significant role in proper diagnosis and treatment. Khalid also mentioned that AI provides medical teams and doctors with additional data. Dr. Najlaa AI claims that video

consultations may be used to accurately diagnose patients.
A doctor-patient relationship is a significant and meaningful one in which the patient grants the doctor their trust and the doctor acknowledges the patient as a patient. Dr. Maha expressed, "I would imagine that it can certainly make things easier for both the doctor and the patient," when discussing the impact of AI on the doctor-patient relationship. On the other hand, communication quality shouldn't be sacrificed. Furthermore, Dr. Alanood made the point that by developing the most effective therapeutic approaches, remote healthcare can enhance patient services.
Dr. Najla stated that artificial intelligence (AI) can be utilised in telemedicine to assist in patient monitoring. AI can verify patients' vital signs and support patient assessments. Furthermore, Dr. Maha advised adding a visit link and reminders for the doctor's appointment to the calendar. "It would be great if it could generate auto letters about the attendance of appointments instead of the doctors issuing them," the woman added. Furthermore, Dr. Hamda made the point that patients vary even when they are dealing with the same situation; as a result, greater results can be achieved when AI and physician assessment work together.
Patients frequently have concerns about the safety of telemedicine, thus it is important for the organisation to make sure AI in telemedicine complies with the strictest guidelines for patient care and security. Dr. Maha asserts that adherence to clinical protocols is crucial to ensuring safety, without compromising human interaction or communication. However, Khaled and Dr. Amna felt that in order to provide the best possible patient care, data must be updated and validated on a regular basis. Furthermore, speaking with an AI specialist was essential to comprehending the significance of implementing AI in healthcare. According to Eng. Ahmad, an AI specialist, AI can help detect potential cybersecurity incidents, reduce human error in data entry to ensure accuracy, and minimise the risk of privacy breaches by encrypting data.

Health facilities can use AI to manage patient data and records more effectively by doing the following:
1. Combining elements, such as figuring out cardiovascular risk
2. Handling patient data
3. Chatbots driven by AI
4-Assistant nurse
5. Automate duties
6. Scheduling for appointment management
7. Online patient tracking
8- Simple access to records, analyses, and inquiries
9- Quicker data organisation and documentation
10- Keeps upgrading the documents.
11- Statistics, restricted searches, and archiving
12-Privilege Information

AI in data management can assist in recording and keeping data records as well as conducting decision-making processes. AI has been assisting healthcare practitioners in a number of ways by offering high-quality treatments. The team can focus on health data analysis by using AI to automate patient data extraction, healthcare data curation, and other complicated operations. The technology also helps to extract, organise, normalise, and transform data sources into relevant, analytics-ready data. This is according to Khaled.
Various methods that AI can help and manage patients in hospitals include:

1. It can display an ECG and vital signs that are critically unstable.
2. Tracking health data and implementing preventative measures.
3. Teaching telemedicine to all medical professionals
4-Efficient patient triage
5. Enhance medical care.
Since COVID-19 began, there has been a noticeable surge in telemedicine throughout the world. United States surpassed all other countries in 2020 with a 154% increase in telemedicine visits. SingleCare telehealth sent out a poll to the public; 42% of respondents expressed extreme satisfaction with their experiences, whereas 2% expressed extreme dissatisfaction (Charleson, 2023).
Radiography has been used in the past in telemedicine to diagnose patients based on their symptoms. Because of COVID-19, it has been widely employed in the United Arab Emirates. In 2020, the telemedicine portal "doctor for every citizen," which was introduced in 2019, helped over 88,000 patients. (In 2020 and 2021, about 88,000

consumers benefited from DHA's "Doctor for Every Citizen" service.) Conversely, telemedicine has been shown to benefit 70% of patients in Saudi Arabia, where contact centres (937) and a platform named "Sehhaty" have been introduced (Al Mutair, et al., 2023).

Data analysis

The analysis of information concerning this study includes an exhaustive assessment of how AI saddled inside the medical care area, with a specific spotlight on its effect on data information and management and its implications towards telemedicine (Dash, Shakyawar, Sharma, & Kaushik, 2019). To gather and assess information, a blend of subjective and quantitative exploration techniques was utilized.

In-person interviews were led by medical care experts in order to provide valuable insights into the experiences and perceptions of AI in healthcare. AI in data management is still not been widely used in health organizations, 71% of the interviewers does not use AI in data management. However, most experts believed that Artificial Intelligence could help in storing data, examination, and monitoring patient by easy access of the reports and patients' data.

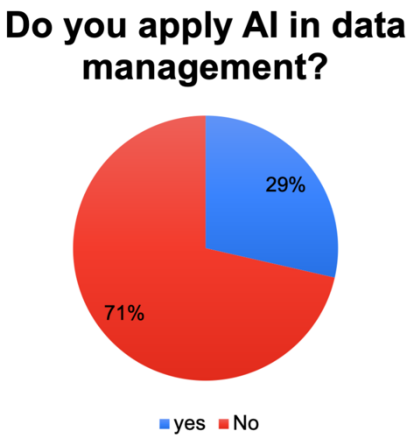
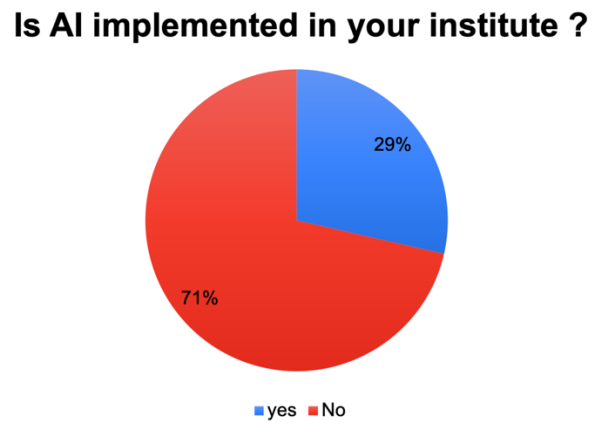


Figure 1

Most of health professional 71% of who has been interviewed does not have AI implemented in their institute. Doctors form Emirates Health Services (EHS) use AI in their career, in 2023 a project called "Care AI" has been launched by EHS and it consider as the first in the region, it works as a self-monitoring, by tracking the behavior of patients and their movements, also help doctors in examinations of patients using AI to analyze and evaluate the conditions of patients (Krishna Kumar, 2023).



Limitations

Limitations of the study were identified such as time constraint, subjectivity, interpretation of data, limited ability to interview more specialists in the field, and resource intensiveness.

Recommendations

The power of using Artificial intelligence in data management and telemedicine amplifies results and positively influence capabilities, workflow, efficiencies, and results. Investing in AI-integrated system will support managing patient data and improve telemedicine performance to be more accurate and organized to be used effectively and efficiently.

The integration of AI in medical services is vital to advance data management and increase the feasibility of telemedicine. The analysis found that advancements in artificial intelligence have improved the administration of medical treatment and streamlined data management. We recommend adopting AI-integrated system based on best practices adopted in health sector focusing on artificial intelligence-driven data management to benefit telemedicine. The sufficiency of distant therapeutic advantages depends on the ongoing availability of effective patient records. The review establishes a foundation for comprehending how telemedicine might benefit from enhanced data administration through artificial intelligence and validates the conjecture that artificial intelligence fundamentally advances data management in medical care.

Furthermore, it became clear from the data analysis that artificial intelligence impact reaches out past data management; it essentially upgrade telemedicine performance. AI guarantees the accessibility of complete and efficient patient records, which is fundamental for the powerful conveyance of distant clinical benefits. The information uncovered that medical care suppliers who use telemedicine stages with incorporated artificial intelligence devices revealed better tolerant results and more effective conferences. Patients valued the accommodation and availability of telemedicine administrations, especially for non-crisis clinical issues and subsequent meet-ups for persistent sicknesses.

As innovation continues, the medical services industry should adjust and embrace these developments to give better and more proficient consideration for patients. The capability of artificial intelligence in medical care is massive, and its part in data management and telemedicine is set to assume a significant part in molding the fate of medical services conveyance. Further examination, advancement, and interest in artificial intelligence applications are critical to completely understand its likely advantages in the medical services area and guarantee that patients get the greatest of care.

Conclusion

All things considered, this analysis sheds light on the remarkable impact of artificial intelligence on medical services training, with a focus on data from management and telemedicine. Based on firsthand accounts medical services specialists and AI, the comprehensive analysis concludes that simulated intelligence significantly improves communication, productivity, and overall medical services operations. The literature review establishes a contextual foundation, showcasing telemedicine ascendancy and positioning AI as a revolutionary force in reshaping the healthcare landscape. The collaborative evidence from qualitative interviews and quantitative surveys underscores the pivotal role of AI in optimizing data management, reducing errors, and enhancing telemedicine outcomes. As technology continues to advance, the integration of AI into healthcare emerges as a cornerstone for delivering

efficient, patient-centric, and transformative medical services. This research advocates for ongoing exploration, development, and investment in AI applications to fully unlock its potential benefits in the dynamic realm of healthcare delivery.

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