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The Contributions of Information and Communications Technology on the Sustainable Development of Artificial Intelligence in the Medical Field

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Abstract: This review provides an analysis and critique of current research on the uses of artificial intelligence in the medical field (AI). This chapter starts out by providing a definition of artificial intelligence from the perspective of communications research. As a consequence of this, it addresses recent advancements in AI as well as the influence that information and communications technology (ICT) has had on the use of AI in the medical field. In conclusion, it discusses the challenges that are impeding the industry's progress toward more advanced forms of artificial intelligence over the long term. The purpose of this study is to ascertain whether or not the incorporation of innovative information and communication technology (ICT) has a favorable effect on prospective applications of AI in the medical business. As a consequence of this, the review paper provides the conceptual groundwork for conducting an investigation into the ways in which AI and ICT are involved in the medical field.

Keywords: Artificial intelligence; Information and Communications Technology; Healthcare; COVID-19.

1. Artificial Intelligence (AI)

According to research conducted in recent years, the concept of artificial intelligence (AI) has developed through time. According to the academics, the present notion of artificial intelligence can be dated back to the middle of the 1950s. John McCarthy first used the phrase "artificial intelligence" in 1956 to refer to "the science and engineering of producing intelligent machines." In other words, McCarthy was the inventor of the term (Collins et al., 2021, p. 2). Because of this, the conference urged scientists and researchers to examine the ways in which computers may mimic human thought (Hassani et al., 2020). "a wide discipline to develop intelligent computers, as opposed to the innate intelligence displayed by people and animals," was how artificial intelligence (AI) was traditionally defined (Hassani et al., 2020, p. 144). During that time period, artificial intelligence was largely focused on the higher-level cognition of computers rather than the perception and performance of human behaviors. From that point on, the term was steadily broadened to encompass intelligent behaviors and language processing capabilities. According to Hassani et al. (2020), the present definition of artificial intelligence places an emphasis on a machine's ability to think and reason, which gives the computer the ability to comprehend and understand human intellect. In general, the definitions of artificial intelligence have progressed alongside their various applications.

Some scholars contend that there is no agreed-upon concept of artificial intelligence. For instance, Hassani et al. (2020) argue that the term "intelligence" does not have a universally accepted definition since it may refer to such a diverse assortment of concepts and uses. In contrast, Davenport and Kalakota (2019) emphasize that artificial intelligence refers to a group of technologies as opposed to a single invention in the field. The majority of technologies already have applications in the healthcare sector, but recent years have seen a proliferation of artificial intelligence (AI)-based uses in everyday life. In addition, the researcher underlines the fact that AI has been integrated into a variety of technologies used in healthcare, such as machine learning networks, autonomous robotics, diagnostic and therapeutic procedures, patient interaction, and administrative applications (Davenport & Kalakota, 2019). Technology that deals with information and communication is used extensively in these many applications. As a result, several AI technologies have evolved in contemporary culture, and these technologies now have an impact on the results in the health sector.

2. Information and Communication Technology (ICT)

There has been determined that the information and communications technology (ICT) industry is a critical driver of the global health sector to enhance global health outcomes. The term "information and communication technology" (ICT) is defined by Roztocki et al. (2019, page 176) as "a mix of hardware, software, and communication networks that allow electronic information collection, storing, processing, and transmission." This definition emphasizes that information and communications technology (ICT) has several components and may be used to carry out a wide variety of tasks. In addition, the researchers emphasize that information and communications technology (ICT) is an important subfield of information technology. According to Zonneveld et al. (2020), the World Health Organization (WHO) has been stressing the significance of making investments in information and communications technology (ICT) since 2005. The major objective is to use information and communication technology in order to offer patients with health services that are egalitarian, inexpensive, and universal in nature (Zonneveld et al., 2020). ICT has been integrated into a number of healthcare applications, including eHealth, patient electronic health records (EHRs), patient personal health records (PHRs), web-based resources (social networks and sensor-based technologies), and telemonitoring systems,

according to research (Gray et al., 2018). According to the findings of certain experts, there have been tremendous technical advancements in the medical field; nevertheless, there have also been ongoing difficulties in terms of providing optimal healthcare services. As a consequence of this, information and communications technology is an essential tool for managing knowledge (Colnar et al., 2022). As a result, information and communication technology has developed into a technology that is both useful and practical in assisting in the delivery of healthcare.

3. The Relationship between AI and ICT

Within the context of the contemporary community, there is a close connection between AI and ICT. A global objective of empowering at least one billion people with information and communication technology was emphasized in a study on the global policy for accessibility to information and communication technologies (Thakur, 2021). As a result, artificial intelligence has shown tremendous value in the era of Industry 4.0 by fostering the development of intelligent systems that are dependent on computing devices, software, and data transfer networks (Thakur, 2021). In the field of information and communications technology (ICT), artificial intelligence has emerged as a crucial tool for bolstering data security, improving information processes, and automating various operations. Innovative artificial intelligence technologies have been developed, and these technologies have the potential to improve information and communication technologies by making them smarter, more efficient, and less time-consuming (Thakur, 2021). In addition to this, applications of AI are becoming more widespread in the service industry. Self-service options are supported, for instance, by robots designed for use in hospitals, residences, hotels, and restaurants (Huang and Rust, 2020). The use of artificial intelligence with information and communication technology may be seen in the image below. Therefore, the worldwide movement toward artificial intelligence and information and communication technology has had a significant impact on service-oriented industries such as the healthcare sector.

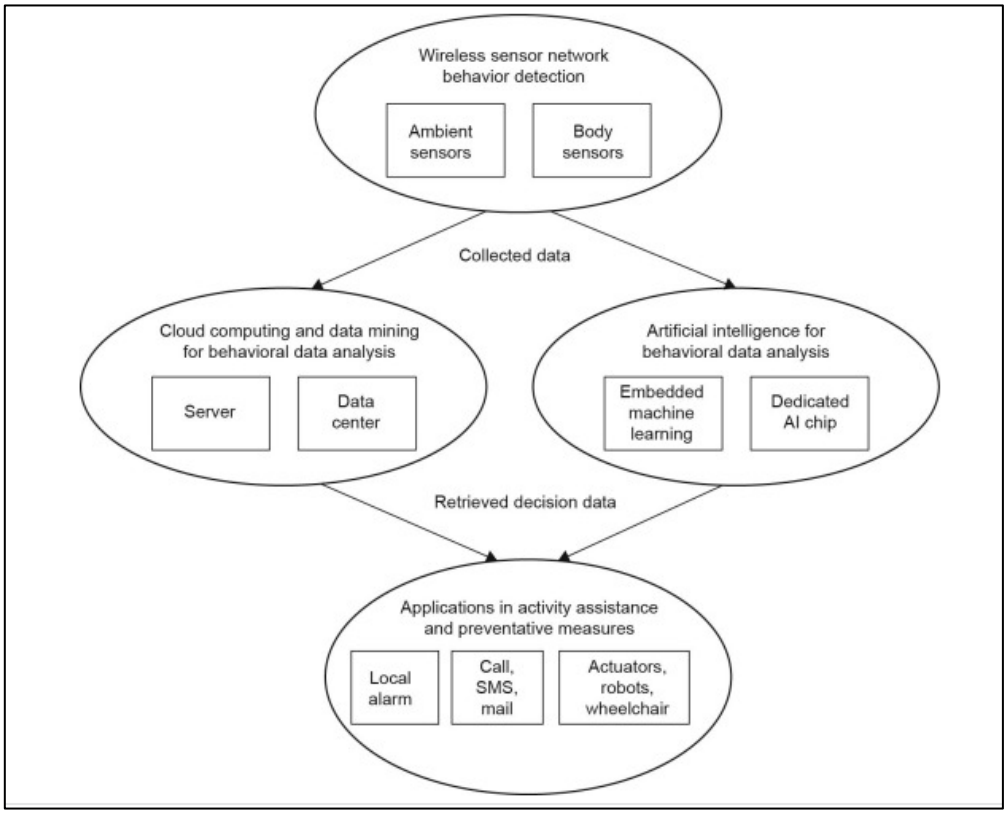


Figure 1. AI and ICT application in medicine (Rong et al., 2019)

There are a number of research organizations that are of the opinion that there are substantial differences between AI and ICT. Guzman and Lewis (2019), for instance, argue that research studies on communication and artificial intelligence have been making progress in multiple directions for more than seventy years. On the one hand, the primary focus of research into artificial intelligence has been on recreating human intellect and the capacity for communication. On the other hand, communication has shifted its emphasis toward enhancing human connections via the use of a variety of media, including information and communication technology. Guzman and Lewis (2019) show that technical progress has steadily closed the gaps over time, which is a positive development. Currently, artificial intelligence (AI) technologies are being developed with an emphasis on information and communication technology (ICT), which makes them more effective and relevant communication devices. AI applications that are able to carry out cognition and communication at the same time, such as SIRI and AlphaGo, have been more popular in recent years. Lu et al. (2017) identify several of these applications. In addition, Huang and Rust (2020) discuss Pepper, a well-known social app that is often used for the purpose of greeting clients. Because of this development, it is becoming clearer that ICT is gradually becoming an essential part of AI.

Over the course of the last several years, AI and ICT have grown more connected with one another. Guzman and Lewis (2019) contend that the majority of today's artificial intelligence technologies are being developed with communication in mind. In the past, artificial intelligence was

developed as a platform for abstract human thought; but, in recent years, this technology has been developed for the aim of facilitating communication. This concept is explained further by Guzman and Lewis (2019, page 4), who state that "early theories of communication purposely gave people the role of communicator while relegating technology to the position of medium." According to the researchers' hypothesis, AI and ICT have grown more reliant on developing patterns of communication. AI has also been applied into a variety of applications within the realm of information and communications technology (ICT), such as social chatbots, language processing software, and virtual agents (Guzman & Lewis, 2019). This line of thinking explains why some experts say that AI technology is increasingly erasing the boundaries between physical and digital space (Huang and Rust, 2020). Therefore, advances in technology have blurred the lines between AI and ICT, making it possible to create gadgets that combine the qualities of both types of technology.

The relationship between AI and ICT differs significantly depending on the sector of the economy. Platforms like as Alexa have been developed with sophisticated voice recognition and language processing capabilities, which enable them to facilitate communication between humans and machines (Nah et al., 2020). Early on in the process of developing AI, researchers identified the potential of AI systems in communication by analyzing the parallels between human-human communication and human communication with machines (Nah et al., 2020). In addition, studies have shown that industries that focus on providing services are very reliant on these technological advancements. According to Mahr and Huh (2020), the progression of front-end and customer-facing technology has been a contributing factor in the development of service communications. This movement toward connection between humans and machines has been increased by recent developments such as smart mobile devices, virtual assistants, smart home appliances, and social robots. In other words, the usage of these gadgets encourages people to switch from channels of communication between humans to channels of communication between humans and machines (Mahr & Huh, 2020). As a consequence of this, they have the ability to redefine the relationships with customers and the delivery of services inside an organization. The development of intelligent communication technology has been one of the contributing factors to the expansion of AI's use in service-oriented industries.

4. The History of Artificial Intelligence in the Medical Field

The rapid progression of current technology has helped contribute to the development of artificial intelligence (AI) technologies for use in both personal and professional endeavors. Since the 1950s, professionals in the healthcare industry have been exploring whether or not computer-aided diagnostic systems may increase the accuracy of medical diagnosis (Secinaro et al., 2021). In addition, Collins et al. (2021) explain that the development of AI technology has been marked by several "summer and winter" cycles ever since it was first conceived. According to the writers, there are a variety of instances in which the general population has either accepted or rejected a particular technological advancement. Since the beginning of the 2010s, the so-called summer periods have been ascribed to the fast growth of computer technology and the availability of data (Collins et al., 2021). The development of intelligent systems has been significantly aided by the creation of complex computational systems, including algorithms, processors, and databases (Collins et al., 2021). In addition, studies have shown that the increasing complexity of today's environment has forced individuals to adjust to new tendencies by developing solutions that are both more effective and more adaptable (Hassani et al., 2020). As a consequence of this, people have been motivated to develop machines that are capable of dealing with abstract notions in order to assist humans in their decision-making and activities. In a nutshell, the ever-increasing need for effective solutions may be credited with contributing to the rise in popularity of AI technology.

Over the last several years, many players in the healthcare industry have begun to recognize the potential advantages of AI applications. According to Davenport and Kalakota (2019), artificial intelligence and other technologies that are similar to it have grown more commonplace in the medical field. The researchers believe that the technology has a great potential to revolutionize the medical industry by improving fundamental procedures including patient care, administration, financial management, and pharmaceutical procedures (Davenport & Kalakota, 2019). In spite of the fact that artificial intelligence technology in medicine has a wide range of applications, its fundamental purposes are to enhance clinical decision-making and to unearth important information hidden in data (He et al., 2019). This notion is supported by Secinaro et al. (2021), who state that AI devices are often utilized to fulfill responsibilities that need human interpretation and decision-making. The phases involved in using AI in medical care are broken down in the following figure. As a result, artificial intelligence (AI) and information and communication technology (ICT) have evolved into indispensable criteria for evaluating the effectiveness of contemporary healthcare organizations.

A large number of nations have put money into developing artificial intelligence-based medical advances in the hopes of bettering their own health systems. According to He et al. (2019), as a consequence of this, countries such as the United States have provided around $1.1 billion to the National Science and Technology Council's Committee on Technology in order to assist the research and development of AI-related technologies. Despite the fact that the majority of the funds were used to automate electronic health record systems, the funding highlights the government's commitment to improving AI-related research in the medical field. According to Ali et al. (2023), the expanding human population will lead to a further rise in the demand for healthcare services all over the globe. As a result, creative AI solutions are necessary to increase the efficacy and efficiency of health services without resulting in new financial burdens (Ali et al., 2023). According to research, healthcare institutions who invest in artificial intelligence technology may be able to enhance the health results of their patients.

In recent years, artificial intelligence (AI) technology has emerged as a potential remedy for a variety of problems that affect the contemporary medical industry. For instance, Bajwa et al. (2021) demonstrate that AI is a useful tool for enhancing the quality of care provided to patients, as well as the overall experience of those who provide care. In addition to that, it may help curb the spiraling expenditures of healthcare (Bajwa et al., 2021). In addition to resolving the issues described, the use of AI is critical to the development of the medical industry on a worldwide scale. It is dynamic and self-sufficient, and it

is able to identify patterns from enormous datasets (Bajwa et al., 2021). As a result of this, players in the healthcare industry have begun to notice the significance of implementing AI that is oriented on people in order to enhance the performance of health systems. Because of this logic, it is quite probable that AI will increase the connectivity and accuracy of medical diagnoses and therapies (Bajwa et al., 2021). In general, the rising patterns provide evidence that artificial intelligence (AI) technology will continue to get support from people all across the world.

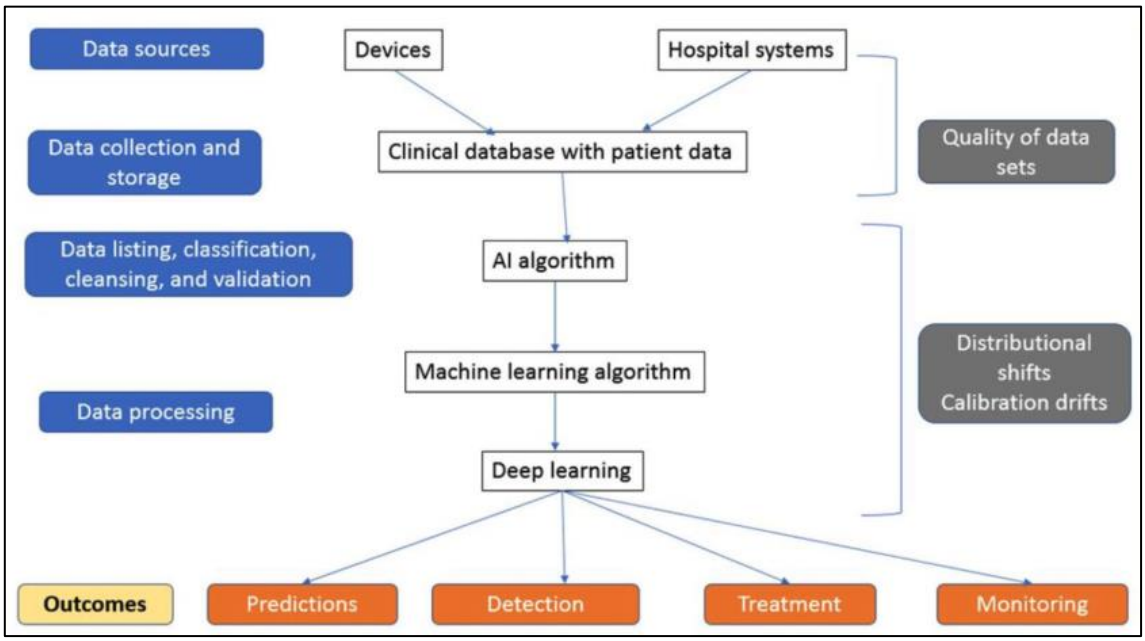


Figure 2. Stages of deployment of artificial intelligence in healthcare

It has been determined that the use of AI technology is a significant factor in driving forward sustainable progress in the field of contemporary medicine. According to Vinuesa et al(2020) .'s hypothesis, artificial intelligence might have immediate and long-term effects in the following domains: global production; inclusion and equality; and environmental results. The researchers demonstrate that the use of AI has the potential to speed up a country's progress toward achieving its sustainable development objectives (SDGs). It is possible to make use of computational models and machine learning in order to facilitate the digital identification and quantification of health problems in a particular country (Alhussain et al., 2022). According to research, there are numerous AI solutions that are specifically built to meet certain difficulties that are faced by global health systems. Chatbots, for instance, may be used in hospitals to improve patient communication, and patients can utilize wearable technology to check their own vital signs (Alhussain et al., 2022). Additionally, issues with staffing may be overcome by keeping accurate health records and using clever pattern recognition procedures (Alhussain et al., 2022). The results demonstrate that artificial intelligence has the potential to speed up the Sustainable Development Goals (SDGs) attainment of a country.

5. Emerging AI and ICT Applications in Healthcare

AI and ICT are crucial for facilitating communication between humans and machines. In today's world, technology has progressed to such a degree that it may act as a user's communication partner. This was unthinkable only a few decades ago (Nah et al., 2020). A wide range of AI and information and communications technology (ICT)-based healthcare applications have been developed. m-Health applications, chatbots, virtual assistants, applications for language processing and speech recognition, applications for self-monitoring and remote monitoring, applications for drug adherence, and administrative applications are a few examples of the types of applications that fall under this category.

5.1. Mobile m-Health Applications

Mobile health is a popular invention that enables users to get information related to medicine, provide treatment to patients, and give primary care that is focused on fitness (Ahmed & Zubair, 2022). mobile health apps that are specifically designed to handle a variety of health concerns, such as preventing cardiac arrest (Ahmed & Zubair, 2022). These technologies make use of machine learning algorithms to effectively forecast potential threats and alert patients to important events in their heath. They provide remote monitoring of the patient's health and enhance communication between the patient and the caregiver, therefore lending assistance to AI and ICT systems. In addition, information may be collected from a variety of sources, which makes it possible to give quick medical aid (Khan & Alotaibi, 2020). These AI models also have a higher level of accuracy when it comes to detecting and reporting false alarms (Ahmed & Zubair, 2022). In addition, Wahl et al. (2018) demonstrate that the technology may be used to supplement conventional health technologies, which is especially useful for establishments that have restricted access to resources. In conclusion, many hospitals and other medical facilities have begun to use m-Health since it improves both the delivery of medical treatment and communication throughout the health continuum.

5.2. Chatbots

The healthcare chatbot is another another well-known use of AI and information and communication technologies. According to Xu et al. (2021), chatbots are good examples of AI applications that depend on machine learning algorithms.

Chatbots are also known as smartbots, chatterbots, conversational agents, and digital assistants. Typically, they will deliver pre-determined replies depending on the input, language, or action provided by the users (Palanica et al., 2019). After then, the chatbots provide the user with the information that was requested. These applications have been included into the procedures of the healthcare industry as a result of the following benefits: more flexibility in communication, improved management of complicated discourse, and decreased financial expenses (Xu et al., 2021). In addition, many professionals in the healthcare industry have shown a favorable attitude toward healthcare chatbots due to the fact that these programs enhance the employees' physical, behavioral, and psychological results (Xu et al., 2021). As a result, the effectiveness of healthcare delivery is improved by using chatbots since they provide pre-determined replies that are tailored to each individual patient's inquiries.

5.3. Language Processing and Speech Recognition

Applications of artificial intelligence that include language processing concentrate on analyzing, understanding, and creating information that is connected to language. According to Davenport and Kalakota (2019), several AI healthcare apps have been built using the capabilities of voice recognition and language processing. According to the findings of the experts, one of the most important challenges facing mankind since the 1950s has been to decipher human language (Davenport & Kalakota, 2019). As a result, programs that include voice recognition, text analysis, and translation have been developed to enable businesses to learn and use a variety of languages. Even though the current medical industry has not yet implemented language processing applications in many areas, there has been a growing tendency toward using the technology in order to record patient encounters and have dialogues with patients (Davenport & Kalakota, 2019). In addition, al-Garadi et al. (2022) provide evidence that language processing technology has been significant in mitigating the negative effects of the COVID-19 pandemic. During this time period, hospitals were struggling under the weight of massive amounts of data that were being shared via EHRs, literature, and social media (Al-Garadi et al., 2022). Because of this, the use of AI systems that process language was absolutely necessary in order to improve the generation and dissemination of COVID-related information across the various stakeholders (Al-Garadi et al., 2022). Therefore, artificial intelligence is necessary for translating and analyzing a variety of languages used in the field of global health.

5.4. Virtual Assistants

Virtual assistants are artificial intelligence (AI) solutions that are mainly intended to improve patient interaction. According to Davenport and Kalakota (2019), patient involvement is referred to as the "final mile" challenge in the field of health care. To put it another way, it is the last obstacle standing in the way of excellent and efficient health care delivery (Davenport & Kalakota, 2019). According to the findings of research, the great majority of patients have a poor level of involvement with their healthcare professionals. If more in-depth patient interaction will enhance health outcomes, then AI might be used to deliver individualized treatment that is tailored to the specific requirements and features of each individual patient. For example, the content of text message alerts is being redesigned such that it encourages recipients to make healthy choices about their medical care (Davenport & Kalakota, 2019). The patient is "nudged" in the direction of a given behavior via the use of information generated from their cellphones, electronic health records (EHR), wearables, and conversational interfaces by these programs (Davenport & Kalakota, 2019). In addition, Richardson et al. (2021) explain that advancements in AI are made in accordance with the requirements, values, and priorities of the patient by capitalizing on access to unprecedented amounts of clinical data. Because of this tendency, there is a greater need for healthcare apps that are concentrated on the patient in the global health industry.

The use of virtual assistants as devices for interacting with patients is becoming more common. Virtual assistants were essential during the COVID-19 crisis, which demanded high levels of digitalization, connection, and patient participation, as stated by van Bussel et al. (2022). As a result of this, it was anticipated that virtual assistants would help to the accomplishment of these objectives by acting as conversational agents (van Bussel et al., 2022). Although chatbots and virtual assistants are comparable in some ways, virtual assistants are meant to carry out a more comprehensive range of tasks, whereas chatbots are more likely to react to direct questions. According to Curtis et al. (2021), the functionality, appearance, and interaction behavior of the virtual assistant have a significant impact on the experience that a patient has. A substantial body of research has been conducted on the most effective techniques for building voice user interfaces, with the goal of improving the conversational results of a subset of patients (Curtis et al., 2021). Patients with impairments and seniors, both of whom often have difficulty using various forms of medical technology, are included among these distinct populations (Corbett et al., 2021). As a result, virtual assistants have gained popularity because of their capacity to mimic the dialogue and advice provided by healthcare practitioners.

5.5. Self-Monitoring and Remote Monitoring Applications

The combination of AI and ICT has also been used to develop useful apps for self-monitoring of one's health. According to Lo et al. (2019), patients who have chronic illnesses such as diabetes, cancer, hypertension, AIDS, obstructive pulmonary diseases, Parkinson, Lupus, obesity, asthma, and various physical limitations might benefit from using self-monitoring equipment. Even though many patients have not yet adopted these technologies, they are very necessary in order to provide patients the ability to monitor their vital signs via the use of automated wireless devices. According to recent research, the use of artificial intelligence technology for self-monitoring of chronic health issues is becoming more common (Li et al., 2021; Lo et al., 2019). Recent developments in the technology of medical sensors and wireless transmission have enabled the creation of devices that permit self-monitoring as well as remote monitoring. These gadgets are equipped with extensive mechanisms for analyzing the surroundings of patients as well as their physiological indicators for a certain amount of time (Li et al., 2021). These applications are very valuable in terms of their contribution to the monitoring and management of chronic health issues.

According to recent findings from research, medical

professionals have enthusiastically embraced remote health monitoring technology since it makes their jobs easier. According to Chew et al. (2022), artificial intelligence devices that are able to carry out duties such as self-monitoring and self-diagnosis are increasingly being used to enhance the performance of employees and reinforce the delivery of sustainable healthcare. The researchers also highlight the significance of knowing the users' points of view in order to improve the productivity of workers when they are using AI technology (Chew et al., 2022). As a result, the development of automated monitoring systems has the potential to enhance the health outcomes of patients and maximize the performance of healthcare practitioners.

5.6. Drug Adherence Applications

Researchers in the modern era have also looked at how artificial intelligence and information and communication technologies may be employed to enhance drug adherence functions. AI solutions, according to Babel et al. (2021), have a great potential to revolutionize patients' adherence to treatment regimens by communicating about optimum drug consumption behaviors. This might be a game-changer for the healthcare industry. The patient's desire to comply with the prescribed medication is what is meant by the term "medical adherence." 76% of patients in the United States do not adhere to medications prescribed for certain conditions, such as diabetes, high cholesterol, and hypertension. Furthermore, research in the United States reveals that 32% of patients do not comply when they are required to consume one or more medication classes (Babel et al., 2021). According to the findings of other studies, the primary reasons for low adherence include patients' lack of literacy and a poor understanding of their own health (Wang et al., 2021). Therefore, good adherence systems should maximize adherence regardless of who is responsible for implementing the technology—a patient or a healthcare practitioner. In addition, researchers such as Roosan et al. (2020) explain that AI apps are intended to help patients grasp confusing information about their prescription. In a nutshell, artificial intelligence (AI) and information and communications technology (ICT) are indispensable tools for supporting patients in comprehending intricate prescription schedules and encouraging them to adhere to prescribed treatment regimens.

5.7. Administrative Applications

In the present day and age, artificial intelligence technology has been integrated into administrative applications. The use of AI has helped to ease many of the issues that are faced by healthcare personnel and that hamper the delivery of care. According to Davenport and Kalakota (2019), artificial intelligence technology has been used to a variety of administrative tasks in the healthcare industry, including clinical documentation, claims processing, revenue cycle management, and maintenance of medical data. These applications, on the other hand, often entail very little communication. Other scholars, such as Sunarti et al. (2021), have proposed the idea that administrative tasks might benefit from the use of AI. For instance, it may be combined with telemedicine in order to facilitate the dissemination of health-related information and services via the use of various forms of communication technology (Sunarti et al., 2021). In contrast, Tursunbayeva and Renkema (2022) describe how AI links physicians, nurses, and patients, making it possible to administer and give treatment remotely. The researchers are certain that artificial intelligence will not replace human labor in the healthcare industry but rather complement it (Tursunbayeva & Renkema, 2021). In light of this, despite the growing prevalence of artificial intelligence (AI) technology in administrative applications, these systems are often used for data processing rather than communication tasks.

6. Impact of the COVID-19 Pandemic on the Adoption of AI and ICT Technology

In spite of the fact that contemporary society was seeing a good trend regarding the use of AI and ICT technology in medical treatment, COVID-19 accelerated this tendency. The epidemic of the virus, which began at the end of December 2019, has expanded throughout almost all of the countries in the globe (Bragazzi et al., 2020). Accordingly, Al-Garadi et al. (2022) indicate that the epidemic has had an unparalleled impact on the lives of billions of people all over the globe. Because the epidemic was putting a significant amount of strain on hospitals and public health systems, healthcare institutions enacted emergency initiatives for improving the quality of healthcare delivery. On the other hand, in comparison to pandemics that have occurred in the past, contemporary civilization has the technology and capacities necessary to deploy countermeasures with the purpose of minimizing the negative effects (Al-Garadi et al., 2022). For example, language processing software was often used to monitor material pertaining to COVID across a variety of channels in order to avoid the spread of disinformation and assist individuals in better comprehending how the virus is spread (Al-Garadi et al., 2022). In addition, Lim et al. (2021) discuss how artificial intelligence technology has been used in the areas of population monitoring, contact tracking, and anticipating transmission trends. As a result, the COVID-19 pandemic presents a significant opening for expanding the use of information and communications technology (ICT) and artificial intelligence (AI) in the field of global health.

Researchers have found that AI and other forms of information and communication technology are necessary in order to address the current shortages in the healthcare sector. According to Sarker et al. (2021), the pandemic was responsible for a significant increase in the demand for healthcare resources and equipment. Because of the large number of patients presenting with a variety of symptoms, several employees were had to work around the clock in order to keep up with patient care (Khan et al., 2021). As a consequence of this, intelligent robot systems have come to be seen as instruments that are capable of carrying out diagnostic and risk evaluations. These duties were necessary in order to lessen the strain of frontline healthcare personnel, who were subjected to the greatest amount of stress as a result of the burden (Sarker et al., 2021). Inside the framework of the conventional health continuum, medical professionals play an essential part in the evaluation of symptoms, the selection of patients for referral, the placement of patients within quarantines, the monitoring of patients, and the retesting of patients (Vaishya et al., 2020). The use of AI technology, on the other hand, made it possible to minimize the employees' workload by facilitating earlier detection and diagnosis, enhanced contact tracking, accurate projection of infection rates, the development of medications, and

increased public awareness (Vaishya et al., 2020). Malik et al. (2020) claim that the effective adoption of AI during the pandemic would enable it to become a prominent participant in the global health industry if their results are correct. This argument is based on the data presented here. As a result, the COVID-19 pandemic has hastened the incorporation of artificial intelligence and information and communication technologies in order to mitigate the negative effects of the COVID-19 epidemic.

7. Challenges Hindering the Advancement of Artificial Intelligence in the Medical Field

Despite the many advantages, there are a number of serious downsides associated with the use of AI technology. For instance, Bohr and Memarzadeh (2020) argue that a growing corpus of research has revealed that AI algorithms may perform similarly to or better than humans in a variety of jobs. They cite a number of studies that support this finding. The evaluation of medical imaging, the determination of connections between patient symptoms, and the formulation of prognoses for patients' illnesses are examples of aspects of patient care that were once performed by humans but have since been automated (Bohr and Memarzadeh, 2020). Concerns have been expressed over the possibility that AI applications would one day replace people working in healthcare. AI applications have become new solutions for tackling the staffing challenges that have been observed in many health sectors throughout the globe. This is due to the fact that many countries have been suffering shortages of healthcare employees (Bohr and Memarzadeh, 2020). Additionally, Huang and Rust (2020) highlight the fact that the advent of AI technology poses a danger to job possibilities, particularly in the areas of manufacturing and service. The advent of modern technology has made it possible for businesses to automate tasks that need a minimal level of competence; yet, this trend presents a huge danger to the employment of a large number of people all over the globe (Huang and Rust, 2020). Therefore, the development of artificial intelligence might have a detrimental impact on employees in service-oriented industries such as the healthcare business.

In addition, those involved in healthcare have a responsibility to analyze a number of ethical factors that have an impact on communication. For example, transparency has become an important concern in the development of contemporary AI systems. The ability to evaluate the methodology used by the system to produce results and the procedures used to interpret those outcomes is one of the primary reasons why transparency is so important. In addition, some algorithms used by AI need to be educated so that they can remove prejudice and bigotry (He et al., 2019). Transparency is very necessary in the medical field since the system has to be able to present a sound reason for a certain diagnosis, course of treatment, or advice. According to Stahl and Stahl (2021), machine learning systems are not transparent in general, especially when the algorithms are regarded as private assets. This issue raises questions about the responsibility of artificial intelligence technology as well as their resistance to prejudice and bias (Stahl & Stahl, 2021). In a nutshell, the absence of transparency is a significant ethical problem that has the potential to slow down the use of artificial intelligence technologies in the medical field.

Another important ethical problem in the medical industry that has contributed to a decrease in public confidence in healthcare AI is patients' right to privacy. In the most fundamental sense, patients and the general public have the right to privacy, which enables them to choose the information that they should make available to businesses. According to Basu et al. (2020), patient privacy has emerged as a contentious problem in the medical industry as a direct result of the widespread violation of user rights. According to Murdoch (2021), companies do not get enough financial incentives to maintain adequate privacy protection owing to the financial advantages that they often gain from patient information. As a direct consequence of this, a significant number of patients are hesitant to share their medical information to businesses. 11% of persons in the United States are hesitant to share their health data with technology businesses, while 72% of adults are unwilling to share their health data with healthcare professionals and health organizations, according to a poll that was carried out in the United States (Murdoch, 2021). These results demonstrate the public's lack of confidence in healthcare uses of artificial intelligence.

Furthermore, the development of technology has presented businesses with new options to take use of users and the data they provide. According to the findings presented in Murdoch (2021), a significant amount of the already available AI technology is held by huge technological businesses like IBM, Google, Apple, and Microsoft. Despite this, there have been a number of instances in which these firms have had problems with maintaining their privacy when collaborating with healthcare groups. For instance, Google and the Royal Free London NHS Foundation collaborated on the development of a program for the diagnosis of patients called DeepMind (Murdoch, 2021). On the other hand, they ran into a privacy conflict about material that had been obtained unlawfully (Murdoch, 2021). The software collected extensive amounts of personal information from patients in the United States and the United Kingdom (Murdoch, 2021). According to these data, the capacity of contemporary AI apps to annex vast volumes of patient information has contributed to a rise in the number of privacy infractions. In addition to this, the scenario results in an imbalance of power since organizations are too reliant on the applications of health technology. As a result, the development of ICT and AI technologies has opened the door for businesses to gather patient data without first obtaining permission from those patients.

Myths, generalizations, and unreasonable fears have been cited by several researchers as reasons to be skeptical about artificial intelligence. For instance, a significant number of people all across the globe are concerned that computers will soon control human decision-making. Stephen Hawking is credited as saying that "the achievement of complete artificial intelligence might mean the end of the human race." [Citation needed] (Duan et al., 2019, p. 1). This illogical dread of machines has been brought to light by a great number of academics and experts, despite the fact that there is no scientific evidence to support this phobia. Others are afraid of the technology since it is novel and has not yet been validated (Duan et al., 2019). Despite the fact that many businesses and people have welcomed AI technologies, there are detractors who have rejected them due to the high level of uncertainty associated with them. In addition, Basu et al. (2020) discuss a number of additional urban legends that are still prevalent in today's culture. For instance, the role of the physician will be

taken over by AI over time, and proficiency in computer programming is essential for using AI (Basu et al., 2020). The first myth has been debunked due to the great possibility that employees would benefit professionally from the use of AI technology in the near future (Ciecierski-Holmes et al., 2022). The second hypothesis, on the other hand, has been disproven due to the fact that personnel working in healthcare must have a fundamental comprehension of the application's functionalities in order to use it effectively (Lai et a;., 2020). To put it another way, workers do not need knowledge of programming in order to use AI apps. Many people all around the globe are unsure of the repercussions and advantages brought about by the technology due to the fact that it is still in the process of developing. As a result, the irrational fear of artificial intelligence technology impedes its use in real-world contexts.

Despite the fact that AI healthcare is often developed with extensive functionalities, its effectiveness might be hampered by a wide variety of technical challenges, such as a lack of data and bias. In the first place, artificially intelligent systems in the area of medicine are sometimes impeded by a lack of data. Data collecting is emphasized as the initial stage in the construction of artificial intelligence systems by Basu et al. (2020). If the system is provided with correct data, it will acquire the potential to make judgments and predictions that can be relied upon. However, there is often a significant obstacle to overcome in terms of the procurement of data for the purpose of developing high-performing models. Critics who assert that gathering user data without their permission would breach the users' privacy rights have made this an even more pressing concern (Basu et al., 2020). In addition, Chen et al. (2021) contend that several applications of AI in healthcare remain shrouded in a significant amount of ambiguity. For example, the results of simulations are often inaccurate because they do not accurately represent the circumstances that really occur in real life (Chen et al., 2021). If these applications were used in real-world contexts, catastrophic results may be seen as a result. As a result, the use of AI technology in the medical field is being hampered by a number of challenges, both ethical and technological in nature.

Moreover, artificially intelligent systems have been questioned because to the fact that they are prone to being biased. The success of these devices is heavily reliant on the information that was used in the process of training the algorithm (Basu et al., 2020). As a consequence of this, these devices may be programmed to carry out certain communication tasks whenever they come into contact with individuals who satisfy a given set of criteria or traits. If there are inaccuracies in the raw data, then the models will perform badly in the relevant conditions that they are given (Basu et al., 2020). This line of reasoning is supported by Murdoch (2021). The researcher asserts that conventional medical technologies are more prone to mistakes and biases than AI technology is, and that this is one of the distinguishing qualities of the former over the latter. Because their procedures are often obscure to human observers, human doctors and other medical professionals are unable to readily monitor them (Murdoch, 2021). This difficulty, which has been given the moniker of the "black box problem," refers to a circumstance in which people are unable to comprehend how the conclusions reached by computers are reached (Murdoch, 2021). As a result, artificial intelligence systems should be integrated into essential medical applications with a great deal of caution since doing so may result in prejudice and discrimination.

8. Conclusion

In accordance with the findings of the study, artificial intelligence is in an excellent position to disrupt the field of contemporary medicine. The technology has been implemented into a wide variety of different applications; nevertheless, the combination of AI and ICT has made significant contributions to the development of essential medical procedures. m-Health, chatbots, applications that process language and recognize speech, language processing and speech recognition applications, virtual assistants, self-monitoring and remote monitoring applications, drug adherence applications, and administrative applications are currently the most common applications that rely on AI and ICT. In these applications, artificial intelligence (AI) and information and communications technology (ICT) are aimed to improve the delivery of services to patients while concurrently enhancing the performance of medical professionals. In addition, research shows that the COVID-19 pandemic hastened the adoption of AI and ICT applications in order to cope with personnel shortages and increased infection rates all across the globe. Nevertheless, in spite of this trend, there are a number of obstacles that prevent the implementation of ICT and AI technology in the healthcare industry. These include the worry that it will replace human workers, the security of data, the presence of bias and a lack of data, the presence of ethical issues (such as transparency and privacy), and the existence of illogical myths and assumptions. The data indicate that the development and use of AI in the medical industry are strongly reliant on new applications of ICT; nevertheless, the COVID-19 pandemic accelerated this tendency.

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