AI in Healthcare: Fast Tracking Diagnosis and Treatment

Maria Mazhar[1], Tanzina Afrin Taj[2], Wajeeha Rashid[1], Nazish Abdul Kareem[1], Malaika Sahab[3], Saba Yaseen[4], Mubashara Fazal[5], Eisha Iftikhar[6], Hafiza Haiqa Malik[1] and Saleha Tahir[7,*]

[1]Department of Biotechnology, the University of Faisalabad, Pakistan
[2] MBBS (DU), MSc Respiratory Medicine, University of Chester, United Kingdom
[3]Department of Psychology, University of Central Punjab, Pakistan
[4]Department of Physical Therapy, the University of Faisalabad, Pakistan
[5]Department of Allied Health Sciences, University of Lahore, Pakistan
[6]Department of Emerging Allied Health Technologies, the University of Lahore, Pakistan
[7]Department of Parasitology, University of agriculture Faisalabad
*Corresponding author: salehatahir999@gmail.com

Abstract

Modern healthcare has been transformed and enhanced by Artificial intelligence has transformed and enhanced the allopathic healthcare, from which automation can anticipate, understand, acquire knowledge of it and can take action. Other than this, these can manage robotic surgery or can discover new connections between genetic codes. Furthermore, certain diseases may be relatively simple to identify, while others can be significantly complex. Even though large data sets are approachable, still the technologies which find accurate model and generate prediction are insufficient. Conventional disease identification methods are manual and more likely to have mistaken but when artificial intelligence (AI) predictive methods are used as a substitute of human skills, then AI-based diagnosis come into action and identification mistakes are reduced. It has the potential to find minute trends that humans would totally miss. This chapter discusses a variety of diseases and the applicable automation techniques like automatic learning, neural networks, and doubtful thinking known as fuzzy logic. The purpose of this chapter is to present some essential findings about many AI models which are currently and historically used in the healthcare, mainly in the prediction of several diseases like of heart, brain, prostate, liver and kidney. These AI models offer several directions related to future computer-aided diagnostic framework.

Keywords: Artificial intelligence, Diseases, Medical diagnosis, Robotic surgery

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Introduction

Medical sector is going through a period of change. The main reasons of this transformation are rise in overall medical costs and continuous decrease in skilled workers in healthcare. The medical area is therefore seeking to adopt unique computer-based procedures and solutions which can decrease the costs and represent the growing challenges. Several issues affect healthcare systems globally like limited availability, excessive expenses, rubbish, and an elderly population. Not only this but also corona virus (COVID-19) has strained public health systems making them face issues like incorrect diagnostic testing, overburdened professionals, less information exchange, and insufficient personal protective equipment (Chen, 2024). As present challenges are made worse by healthcare crises, we can re-imagine and implement support health system and system of awareness like: High expenses, a lack of pricing transparency, different translucency availability, and a lack of required medical assistance (Pavli et al., 2021). That's why inventions in models are praised gradually. Because there is so much data to process, doctors are unable to stay up to date on the latest medical developments which shows this weakness among healthcare professionals (Shiwlani et al., 2024). It is significant to recall that these issues are interrelated and provide the appearance that healthcare is challenging while, in fact, it is provided through complex connections. This does not mean to say that providing outstanding healthcare is easy; nevertheless, less complex systems can be design which provide better treatment and a system that benefits all (Rezaei et al., 2023). The development of technologically health advanced machines and the streamlining of medicine must be considerably assisted by AI. The multi-tasking of AI can be seen through the example of COVID-19 which was applied in the tasks like contact mapping, the application of AI-based models, identification and therapy advisory system (van der Schaar et al., 2021). Health professionals rely on the knowledge acquired from several patient care ways, knowledge of numerous clinical investigations, and the collective experience of many doctors, because they are not readily available to them. This highlights the usage of automation, especially AI. The consequences of psychological and social prejudices in AI can be decreased if not eliminated, by providing a technical balance in the clinicians' knowledge bank. Clinicians are susceptible to these biases just like any other human being (Mayorga et al., 2019). So, the AI systems can help medical personnel make well-informed judgments and offer individualized treatment suggestions by employing advanced

procedures and predictive models. Premature disease diagnosis can also be done by AI which is essential for prompt treatment and a better forecasting (Rubinger et al., 2023). Other than this majorly, AI can help in early diagnosis, allowing for proactive management and possibly lowering healthcare expenses by evaluating intricate medical data and seeing minor patterns (Salammagari & Srivastava, 2024). To gain the confidence of patients and healthcare professionals, AI technology must strictly abide by ethical guidelines and legal requirements. Unquestionably, the development of automation has and also in future will have a significant influence in future and implementing this model will be important in intriguing obstacles in twenty-first century. Advancing the administration of patients, personalizing therapy, and enhancing diagnostics all can be done with AI (Abdallah et al., 2023). Benefits of automation in medicine are indisputable, notwithstanding certain obstacles to overcome. AI technologies are expected to become a crucial component of healthcare systems around the world as they develop and advance, which will ultimately enhance patient outcome and streamline healthcare delivery shown in Figure 1 (Zeb et al., 2024).

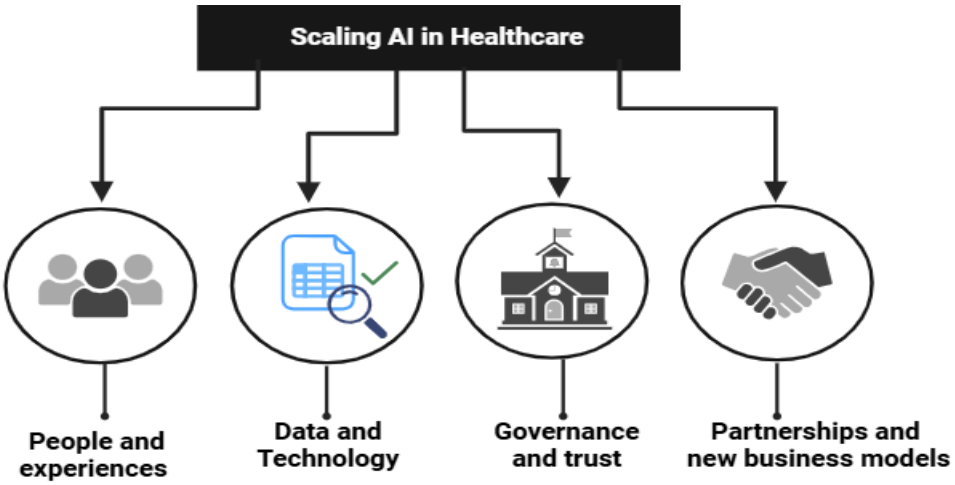

Fig. 1: Scaling Automation in Medicine (Retrieved from Biorender)

Applications of AI in Healthcare

1- AI's Role in Medical Diagnostics

Disease diagnosis is the most difficult procedure at the same time, and it is a crucial event for a medical practitioner to consider before coming to a conclusion. The diagnostic procedure may be quite strenuous and intricate. Due to errors in the diagnosis procedure, the patient may experience major health problems or have their proper treatment postponed or overlooked. Unfortunately, not all medical professionals possess in-depth expertise in every area of the industry. Thus, the necessity for an automated diagnostic system that capitalizes on both human expertise and machine precision arose. The diagnosis process requires a good decision support system in order to get accurate results at a lower cost. Thus, artificial intelligence would assist in identifying and managing such cases. AI-based software senses the disease's signs and can identify it before it manifests (Shukla, 2024). Doctors can use AI systems to categorize various deadly diseases in addition to detecting them. Many AI methods, such as deep learning, neural networks, etc., are currently being employed in the medical sector to precisely diagnose illnesses that are based on learning. Known as a Rule-based intelligent system, some particular AI techniques that are important in the medical area offer a collection of if-then rules that serve as a decision support system in the healthcare industry (Kaur et al., 2020).

A. Using cutting-edge Neural Network Models and Algorithms

AI systems can handle and analyze a wide range of clinical data, AI-based diagnosis depends on advanced procedures and neural network models. To find patterns and traits connected to specific diseases, these models which include neural networks for deep learning are trained on massive amounts of labeled data. These state-of-the-art techniques enable AI systems to accurately and automatically classify diseases (Litjens et al., 2017).

B. Examining Health Record to Improve Precision and Efficacy

AI systems can examine a wide range of clinical data, which includes genetic information, digital health records, and scan findings. These algorithms enable speedier and accurate diagnosis by rapidly and precisely identifying related patterns and elements from the record. AI-based identifications have shown convincing results in several healthcare specialists, including radiology, dermatology, and pathology (Tariq et al., 2024).

C. Errors and Patterns that Human Practitioners Fail to Notice

AI has a significant advantage over human practitioners since it can find fine models and irregularities in the health record. Machine learning models increase the accuracy of diagnosis by spotting minute alterations and variations that the human eye would overlook. In order to enable timely treatment, artificial intelligence (AI) models have quite potential in finding the premature indications of diabetic retinopathy from retinal images (Gargeya & Leng, 2017).

D. Encouraging Prompt Diagnosis and Specialized Care

AI-powered diagnostics enables early sickness identification, which is important for effective therapy and improved medical results. AI

can predict the likelihood of acquiring particular illnesses by examining patient health record and finding risk factors, allowing for proactive measures and preventative monitoring. AI may also support personalized medicine by adjusting treatment plans and diagnostic processes based on individual characteristics such as biological background and health record shown in Figure 2 (Schork, 2019).

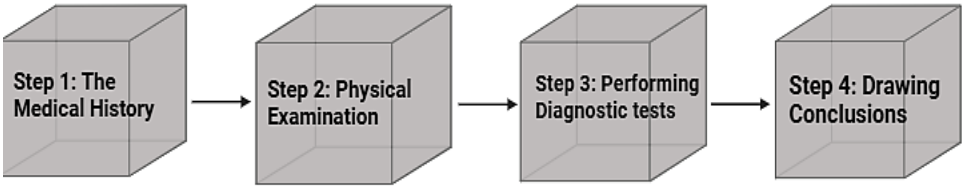

Fig. 2: Block diagram of diagnostic technique (Retrieved from Biorender).

2- AI's role in Radiology

A- In Medical Imaging

In radiology, researchers have effectively used AI to discover results that are either visible to the human eye or not. Radiology is currently evolving into a more logical field rather than an arbitrary perceptual ability. With the rise in popularity of AI and the creation of more medical images than ever before, radiomics has solid cause to advance quickly. These works have shown that AI has the ability which can be used in diagnostic imaging (Ueda et al., 2024). Beginning in the 1980s, neural network model was employed in diagnostic imaging. Twelve Users first specify the features and characteristics of the imagery based on expertise from experts (Pushadapu, 2024). For example, the shapes, regions, the image pixel histogram of the desired parts (i.e. tumor areas) are extractable. Typically, a portion of the available data items are used for training, while the remainder are used for testing. To comprehend the features, a specific neural network model is chosen for experience (Chae et al., 2024). Examples of algorithms include principal component analysis (PCA), support vector machines (SVM), convolutional neural networks (CNN), and others. The experienced model is then expected to identify the characteristics and categorize a particular testing image. The fact that users must choose the characteristics that determine the image's class is one of the challenges with machine learning. This could, however, overlook certain important elements (Hosny et al., 2018). However, deep learning does not require the features to be explicitly entered by the user. Deep learning learns from far larger amounts of data, as its name implies. Deep artificial neural network models are used. In order to gradually separate advanced characteristics from rough image input, deep learning employs numerous layers. It identifies the qualities that can enhance performance and aids in deciphering the abstractions. Decades ago, the idea of deep learning was put forth. The vast volume of diagnostic images being created and the improvement of hardware, such as graphics processing unit (GPU), only made the utilization of automatic learning possible in the last ten years. But as machine learning became more and more significant every day, even GPU started to fall behind. To deal with this issue, Google created an AI accelerator integrated circuit (TPU) that its TensorFlow AI framework would use. TPU was created especially for neural network machine learning, yet it may also find use in medical imaging studies (Lee et al., 2017). Identification is the main goal of radiology research. In the 1980s, Computer-aided detection (CAD) systems started to be created by researchers. So, in the traditional machine learning methods, image modalities such as CT, MRI, and mammography were submitted in it. The actual clinical implications were not encouraging, despite quite an amazing work has been done in the field of research (Dreizin et al., 2023). Deep learning, the new era of artificial intelligence, has so far shown encouraging advancements above standard machine learning in the field of study. Actually, the preferred methodology for medical image analysis is now deep learning algorithms. Due to the recent popularity of automatic learning in diagnostic imaging studies and the thing that conventional automation requires specified characteristics and has demonstrated declining performance in recent years, it is expected that automation will continue to take over diagnostic imaging studies in radiology shown in Table 1 (Litjens et al., 2017).

B- Oncology

AI has been used in radiation oncology imaging studies for a variety of purposes, including radiomics, fiducial/marker detection, picture registration, and organ and lesion segmentation. Like radiology, it began with conventional AI and is currently using deep learning. The primary objective of region-based segmentation is to automatically divide the organs in danger for therapy selection. Automatic learning models are used to fragment the organs such as brain, lung, prostate, kidney, pelvic, and head and neck (El Naqa et al., 2023). Lesion segmentation is applied in rectum, lymph nodes, brain, liver, lung, bladder, breast, bone, and head & neck. U-net.27 was a frequently used strategy in segmentation objects. U-nets, in contrast to conventional AI, are made up of several convolution layers, deconvolution layers. As a result, the network may immediately produce segmentation possibility maps while training by analyzing the full image and relation between opposite convolution and deconvolution layers. Using the U-net-generative adversarial network (U-net-GAN), deep neural networks are trained to recognize various organs on thoracic CT scans (Sahiner et al., 2019). Among the most cutting-edge automation applications in diagnostic imaging studies is called "radiomics", which is a fresh take on precision medicine. There are two steps in radiomics. Extracting features is the first phase. There may be images from several different kinds. The desired parts are fragmented by using Image partitioning methods. Characteristics will be removed following partitioning. Examples of typical characteristics include texture, geometric information, tumor volume, shape, density, pixel intensity, and more. To decrypt the tumor's phenotype and forecast therapy outcomes, the second stage involves integrating the collected information into mathematical models (Baumann et al., 2016). An effective result forecast can yield important details for precise therapy preparation like histology and age can be among a lot of strong matches among various lung cancer patients. On the other hand, not only the tumor's picture looks different but also the survival period may vary substantially. If radiomics can use the picture information to interpret the phenotypic and predict the survival time before treatment, then different plans can be used. This is referred to as precision or tailored medicine (Allen, 2024). In order to determine patient's projection, prognostic medicine historically has depended on biomarkers, which typically needed invasive biopsies. In contrast, intrusive procedures are not necessary for radiomics. It is illustrated that

features used from CT scans of patients with lung cancer alone have quite potential for prediction and correlate favorably with gene alterations. If successful, radiomics may be able to prevent unwanted side effects from biopsy and produce predictions that are on the same level with or better than those from biopsy (Lin et al., 2023).

Table 1: Application of AI in Radiology

Application Area	Importance	References
In compliance with radiological exams	Gives advice on which imaging tests are best for a certain patient.	(Fusco et al., 2022)
Registering and scheduling patients	AI improves patient registration, which is now a laborious procedure that requires patients to manually complete paperwork.	(Hassani & Silva, 2023)
In Patient Preparation	Gives patients individualized instructions according to their requirements.	(Hassani & Silva, 2023)
Image-Guided Interventions	Making use of imaging data to provide prompt assistance during surgical procedures.	(Zeb et al., 2024)
Personalized medicine	Customizing treatment regimens based on particular imaging profiles	(Zeb et al., 2024)
Medical image storage and transfer	Using instruments and methods, radiologists examine the pictures to arrive at a diagnosis.	(Zeb et al., 2024)

3- Automation in the Drug Development and Discovery

Automation is transforming pharmaceutical research and development by increasing predicting accuracy, speeding up the time it takes to launch novel treatments, and simplifying procedures. Bringing a new medication from concept to clinical use takes more than ten years and billions of dollars in the standard drug development process, which is costly, time-consuming, and complex. These problems are being addressed by AI technologies, which offer innovative solutions that alter many phases of the procedure, from initial research to clinical trials (Velichko et al., 2023).

A- Accelerating the Procedure of Drug Discovery

Neural network models and automation can explore versatile chemical collection and foretell about the compounds most probable to form bonds with certain bio-molecules. All of these technologies employ models to find correlations and figures in complicated data, as well as chemical arrangements, biological activities, and past information from works (Xiao et al., 2023). Because automation can forecast the behaviour of chemicals, it can significantly reduce the number of substances that need clinical trials, which could speed up the detection phase. One of AI's most tremendous contributions to drug screening undoubtedly its capacity to expedite the finding of powerful therapeutic applicant. Modern pharmaceutical research usually pertains to an extensive evaluation of several compounds to detect molecules with curative capacity (Vashishat et al., 2023).

B- Improving Predictive Analysis

Big databases are used by artificial intelligence (AI) to enable automated modeling, which increases the reliability of pharmaceutical effectiveness and risk estimates. Machine learning algorithms may examine data from a range of sources, like as proteomics, genetics, as well as clinical records, to identify potential treatments and diagnostics. Artificial Intelligence (AI) can, for instance, integrate genomics information to detect DNA modification related to disorders and predict medications to certain patient groups and increasing the likelihood of positive outcomes (Yagi et al., 2023). Most importantly, this amazing technology can also predict maximum risk factors by analyzing previous data and observing model that could represent unfavorable effects, less risks, and promote medicine protection.

C- Promoting the Molecular Drug Design

Automation based formulation of drugs employ computer algorithms to forecast the cellular reactions between possible drugs and their intended target. These models can replicate how structural alterations affect a drug's strength, binding affinity, and overall effectiveness (Meanwell, 2016). The best part is, if researchers use AI to enhance the drug design, they can produce compounds with better pharmacokinetics and pharmacodynamics, which can lead to quite successful and specified treatments. Moreover, it also makes it easier to invent unique medicinal molecules with enhanced properties.

D- Simplification of Clinical Study Procedures

Medical testing, one of the most significant and costly stages of drug studies, are becoming more effective because of AI. The application of AI can be used to observe medical information instantaneously during researches, identifying possible problems or in advance adverse reactivity, which enables fast adaptation trial protocols, and improves patient safety (Schmidt et al., 2024). Not only can these, but also Artificial intelligence be employed to promote patient acquisition by searching Digital health records (DHRs) for the persons' who comply with the criteria for medical testing. This saves time and money needed to find the eligible volunteers and increases the chances of positive results from the research.

E- Enabling Personalized Medicine

Artificial intelligence (AI) systems that can investigate medical records to recognize genetic patterns and variables that forecast a patient's reaction to a particular treatment facilitate the creation of more effective and less hazardous tailored therapeutics. AI, for example, can help detect particular genetic modifications such as in tumors and meet patients with customized medicines that are more likely to work in opposition of those variants in oncology (Ho et al., 2020). Artificial intelligence (AI) contributes to medical precision by allowing the advancement of customized medicines according to a patient's environment, lifestyle, and genetics shown in Figure 3.

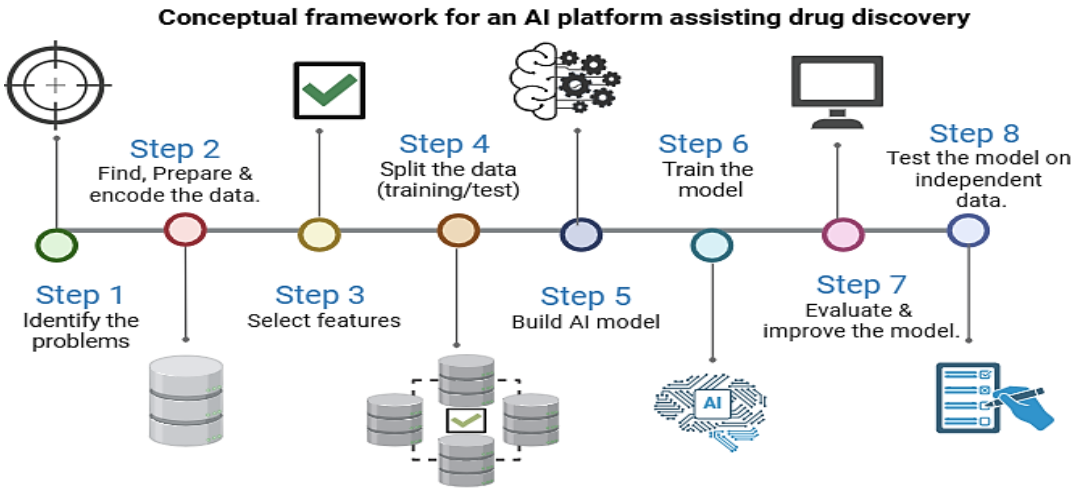

Fig. 3: Important phases for creating an artificial intelligence (AI) framework for pharmaceutical development. Rest is the process of forming an automation algorithm: (1) properly explain the major cause (goal, expected outcomes, etc.); (2) arrange the information (gather it, investigation, portray formatting and quality enhancement); (3) turn primary information into characteristics and choose relevant ones (also known as Characteristic Engineering); (4) divide the information into instruction and verification sets; (5) create algorithm; (6) teach the models using a portion of the information; test its working (cross-verification); and adjust its variables using its verification set; (7) assess the algorithm's working on the verification set and make necessary adjustments; (8) assess the model on separate data that was not utilized in the method development process (Retrieved from Biorender).

Robotic Surgery Powered by AI

Artificial intelligence (AI)-powered robotics is revolutionizing surgery by increasing accuracy, decreasing complications, and improving patient outcomes. The main advancement in surgical technology is the combination of automation and robotics, which provide a novel degree of authority, precision, and effectiveness that conventional surgery techniques frequently cannot match. The surgical profession is being transformed by this innovation by providing surgeons with new professional equipment that improve their abilities and simplify complicated interventions. AI-powered robotics are invented to accommodate surgical experts in doing accurate and less harmful treatments (Pal & Taqi, 2020). These devices, which normally contain a robotic arm, advance camera, and personalized equipment and instruments, are operated by the surgical expert while seated at a console. Apart from its exceptional precision in movement, the robotic arm can be equipped with artificial intelligence (AI) to react to the surgical techniques and offer instantaneous response. Because of this method, recovery can be done in shorter times, in less incisions, and have less blood than open surgery. For example, AI-powered robots can allow the surgeon to have more influence over the camera and instruments during laparoscopic surgery, which entails injecting gadgets through tiny incisions. This enables the surgeon to more accurately execute delicate procedures and navigate tight locations (Deo & Anjankar, 2023). Major advantages of automated robotics in surgery is the increase in control and accuracy. Conventional surgery includes the doctor personally manipulating the tools, which is not easy for intricate or fine methods. Robotic tools driven by AI offers exceptional stability and agility, which ultimately allows surgeons to perform precise operations with remarkable accuracy (Parasar et al., 2023). Through the evaluation of patient-specific data, immediate imaging, alongside information from prior surgeries, this tremendous technology plays an important role in improving surgical outcomes. Not only this but also it helps with advance preparation by shaping various surgical scenarios and predicting possible difficulties. For example, using preoperative imaging, AI may analyze a patient's anatomy to suggest the best surgical method, including the best tool ways and incision locations. Furthermore, it can also constantly observe the operation area during the procedure, providing updated information on tissue situation, equipment placement, and any problems. Due to this, chances of mistakes will be decreased and the surgeon will have more flexibility in making beforehand decisions and alter the methods as needed. The prospect for non-invasive surgery is yet one more significant advantage of AI-based robots. In contrast to open procedures, robots-based surgeries usually need smaller cuts, less physical pain, fewer risks, and quicker recovery periods; yet, they can also result in a faster come back to normal routines and less pain following surgery. For example, compared to open prostatectomy, based on robot's prostatectomy for prostate cancer can be performed with little cuts and leads to a quicker return to normal activities and less postoperative pain (Poalelungi et al., 2023). Robotics driven by AI has the ability to revolutionize surgical training and the acquisition of skills. Robotic models powered by artificial intelligence (AI) give surgeons a secure environment to practice their techniques. These simulators provide continuous feedback, allowing physicians to refine their skills prior to performing practical surgeries. In the long run, this innovative training tool enhances surgeon effectiveness and the security of patients by eliminating the conceptual gap between theory and execution. Even with these advancements, there are still concerns and considerations when utilizing AI-powered surgical robotics (Saeed et al., 2022). One challenge is the potentially high cost of robots. The advance payment in robotic technology, together with continuous sustenance and operative costs, may be a turnoff for some medical management organizations. Moreover, integrating robotic devices into current surgical which needs modification and training. Surgical doctors and staff should be skilled with the latest advancements in technology and incorporate it into their practices. One more advice is the need of continuous research and advancement to make sure the effectiveness and safety of automated robots (Ashrafiana, 2024). Despite the automation's convincing findings, continued observation and conclusion are important to represent the major issues and enhance models. Robots must be thoroughly tested and verified in order to meet strict safety and

patient care criteria. AI-driven robotics is revolutionizing surgery by increasing precision, control, and productivity. Combining algorithms with robots has various benefits, better surgical outcomes, less invasive procedures, and improved training. Despite these challenges, for future the development of AI-driven robotics has a great potential in surgical practice shown in Figure 4 (Samarpita & Sathpathy, 2022). Since technology is developing, automation's role in surgery is anticipated to become more significant, which leads to more efficient and patient-oriented surgical care. Using AI-driven robotics in surgeries could allow medical personnel to achieve higher levels of precision and creativity, which will eventually improve patient results and improve the surgical sector s.

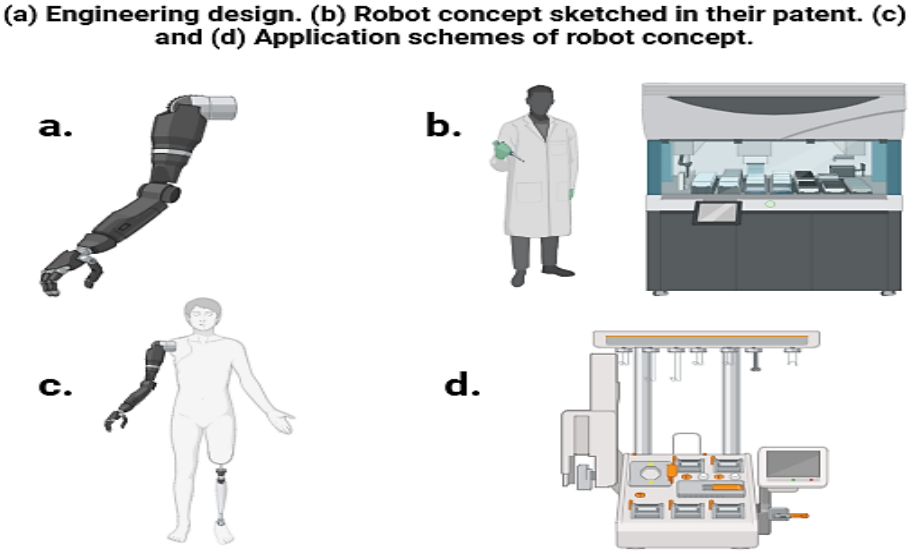

Fig. 4: (a) Engineering pattern and sole visible recording on Verb Surgical's cognitive surgical robot prototype from 2017. (b) J&J Ottava RAMIS robot idea, blueprint in their patent US20180078034A1. (c) and (d) Implementation schemes of J&J's RAMIS robot idea, made on Auris' Monarch platform, from their patent US20180078440A1 (Retrieved from Biorender).

Difficulties and Ethical issues

The revolutionary benefits of incorporating artificial intelligence (AI) into healthcare include improving diagnostics, customizing treatments, and boosting operational efficiencies. To make sure that AI models are applied successfully and ethically in the clinical area, however, significant obstacles and moral dilemmas must be addressed in conjunction with these developments. These issues include computational bias, the reliability of data, patient confidentiality, and the broader applications of AI on healthcare workers' and patients' confidence (Santosh et al., 2021). Integrity of data and quality are two of the two problems to AI applications in healthcare. Large amounts of data, including genetic details, imaging data, electronic health records (EHRs), and patient feedback, are necessary for AI systems to operate efficiently. AI algorithms must be trained on high-quality, complete, and well-organized data to produce reliable and exact predictions or recommendations (Saqib et al., 2023). Unreliable, incomplete, or erratic information might result in unsafe recommendations and erroneous forecasts. Additionally, it can be also be difficult if we integrate data from multiple sources and guarantee accessibility across various healthcare systems. Effective implementation is important for an extensive knowledge of patient health and efficiency. Algorithmic bias is one of the major issues with AI-driven healthcare. As AI systems are taught on past data, they may show deeply rooted societal leaning. If these biases are not addressed, AI systems could boost up and deepen healthcare imbalance. For example, to train an AI model, if the dataset used is not a reflection of different populations, it might not work well for marginalized groups. This might result in worse than optimum outcomes and unequal access to care. Fairness-aware algorithms, diverse and representative datasets, and continual monitoring to detect and lessen biases are required to achieve this (Shah & Parveen, 2023).

Overcoming Obstacles and Restrictions

AI has a lot of potential, but still have a lot of restrictions in implementation of pharmaceutical research and advancement. The first issue is accessibility and quality, as AI models need large, reliable databases for development, and incomplete data may limit their effectiveness and accuracy. Furthermore, Automation models are often complicated and can act as "black boxes", so it can be hard to depict their projection and in making sure their accuracy. Also, more study is required to enhance the understanding and transparency of automated models. Not only this but combining automation into pharmaceutical identification procedure needs partnership between pharmacologists and data scientists (Al-Mistarehi et al., 2023). Drug research and development are being revolutionized by artificial intelligence (AI), which speeds up the finding of treatment candidates, improves modeling of predicted outcomes, and optimizes drug design, and enhances clinical trials. These advancements have the ability to lower costs, enhance the safety and efficiency of medications, and expedite the development of tailored treatments; however, issues such as data accuracy, algorithmic transparency, and multidisciplinary cooperation need to be addressed if AI is effective in this field (Petersson et al., 2022). As AI technology develops, it is anticipated to become increasingly prevalent in medication research and development, which results in better and efficient procedures to create novel medicines and improve patient report.

A- Forthcoming Advancements and Trends in Healthcare and AI

These developments are expected to improve diagnosis, personalize therapy, boost operational effectiveness, and represent some of the main problems facing the healthcare (Kooli & Al-Muftah, 2022).

B- Enhanced Natural Language Processing (NLP)

More precise and efficient evaluation of unorganized data, including as research papers, medical notes, and patient remarks, will be possible with advancements in NLP algorithms. This will lead to improved data collection, information extraction, and decision-making support (Panayides et al., 2020).

C- Genomics and Precision Medicine

Deeper understanding of genetic variants and their effects on health and disease will be possible thanks to AI-powered advanced genomic analysis. Genomic data will be analyzed by AI algorithms to forecast illness risk, determine the best course of therapy, and customize patient care (Quazi, 2022).

Conclusion

Artificial intelligence (AI) systems are assisting physicians in identifying diseases beforehand through the use of advanced image recognition and pattern evaluation, which may result in even more successful treatments and show better improvement in patient. AI usage in healthcare is drastically altering several aspects of this system, from drug discovery and AI-based robotic surgery to identification of disease and specialized treatment. Every topic explained and concluded in this chapter shows how AI may enhance the effectiveness, efficacy, and standard of healthcare system while representing some of the most alarming problems confronting the sector. To make sure that this amazing technology used responsibly, so it is required to bring attention to the possible difficulties and ethical quandaries related to AI's application in healthcare. AI's potential and ongoing development is underscored by emerging trends and developments in healthcare. As AI advances and drives innovations that enhance patient satisfaction, expedite healthcare delivery, and enhance standards of therapy, its importance in the healthcare industry will only increase.

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