Forum: World Health Assembly

Issue: Addressing the safety concerns of technology and artificial intelligence implementation in healthcare services

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Introduction

Diagram 1: Visual illustration of utilization of AI in healthcare

As we progress through an era of human history characterized by rapid transformation of technology, corresponding shifts have occurred in administeriation of healthcare services. Amidst this era, there is an unignorable presence of development of high technology such as Artificial Intelligence, AI.Through AI, it enabled crucial improvements in businesses including web search, content recommendations, product recommendations, targeted advertising, and autonomous vehicles. By doing so, this significant technology has made inevitable enhancement in our daily lives, effecting the way we encounter and operate information (Basu, Kanadpriya et al.). The same applies for the field of medicine which suffers from challenges in accessibility, high cost, waste and aging population. This was vividly exemplified during the recent COVID-19 pandemic with rising concerns on insufficient protective equipment, erroneous diagnostic tests, lack of physicians and information exchange. Employing this efficient technology is inevitable to healthcare services since it has the potential to aid with accurate diagnosis, treatment and service operation. Some even predict that soon human labor sources will be replaced by AI in certain responsibilities within healthcare services (Basu, Kanadpriya et al.), ultimately reducing job opportunities for physicians, engendering social inequality. Furthermore, there has been a critical argument regarding its potential threat to privacy of patient's personal data, biasedness of the AI model and how to address the ethical use of AI in the healthcare service sector. Altogether, the World Health Assembly needs to develop feasible yet effective solutions that can address the safety concerns of technology and artificial intelligence implementation in healthcare services to support every member state.

Definition of Key Terms

Artificial Intelligence (AI)

AI is an interdisciplinary science that refers to a multifaceted branch of computer science that stresses upon building smart machines that can perform taskings that generally require a level of human intelligence. AI is applied to diverse fields including interfaces for visual perception, speech recognition, decision-making, and translation between languages. (Basu, Kanadpriya et al.).

Medical Technology

Medical technology refers to products, services or solutions that are utilized to diagnose, treat and/or enhance people's health and wellbeing. It includes both low and high-risk medical devices: any instrument, apparatus, implement, machine, appliance, implant, reagent that is intended by the manufacturer to be used in the medical field, whether alone or in combination. By doing so, medical technology contributes to sustainable healthcare (What Is Medical Technology).

Healthcare Service

Healthcare service is the diagnosis, treatment and prevention of factors such as disease, illness, injury and other physical and mental impairments that human and animal encounters. By uncountable advancements made in medical science, healthcare services have been able to develop further through time (Health).

Algorithm

An algorithm is a set of instructions to be followed during calculations or other operations. Having applied for both mathematics and computer science, in AI, algorithm is the programming that instructs the computer to operate on its own (Artificial intelligence (AI) algorithms).

Data Breach

Data breach is a breach of security that has resulted in destruction, loss, alteration, unauthorized reveal or access to personal data which have been caused both accidentally and intentionally. This affects confidentiality, integrity or availability of data, engendering prominent negative effect on individuals (Personal data breaches: a guide).

Internet of Things (IoT)

IoT refers to a network of connected devices that collect and share data to help us understand usage patterns and improve services. Wi-Fi equipment, Bluetooth devices, computer peripherals and smart appliances all count as IoT (Manthena).

Machine Learning

Machine learning refers to a subsequent part of AI that allows a machine or system to learn and improve from experience. Instead of programming, machine learning uses algorithms in order to analyze large amounts of

data, learn from experiences and then generate informed decisions. This technology is further developed as they are exposed to more data. Machine learning models are the output, what the program has adapted from utilizing the algorithm on training data (Artificial intelligence (AI) vs. machine learning (ML).

Background

Throughout history, there has been great advancement made to technology and AI utilization in the medical field. AI in medical field follows a typical pattern which is presented through the diagram below:

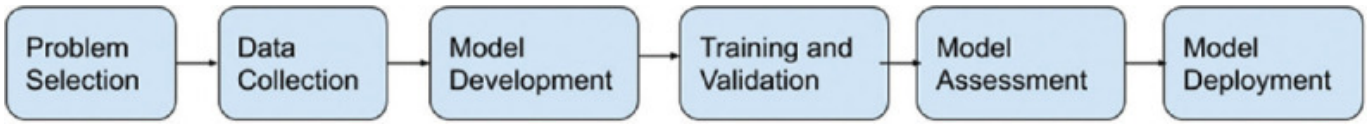

Diagram 2: Visual diagram of pattern of AI in healthcare services

The process begins by identifying the problem that it aims to resolve and collecting large amounts of reliable data about it. Afterwards, data machine learning algorithms arere adapted to gain useful information from the data. This information is then used to generate output to solve problems that occur in the healthcare services (Basu, Kanadpriya et al.).

Present use of AI in medical field

One of the present utilizations of AI in healthcare services is enhancing the efficiency of the hospital system through AI assistant clinical decision support tools. For instance, firms such as BotMD regard clinical issues including timely finding suitable physicians regarding the symptoms of the patient and scheduling the next appointment. It can also aid with drug prescription through answering prescription-related questions and helping doctors to search for available drugs all through the use of a mobile application. This can also apply when searching for relevant hospital protocol and list of available clinical tools. This enhances the overall hospital efficiency while helping to improve the experience of the patients (Basu, Kanadpriya et al.). Another example of present usage of AI in healthcare services is during patient diagnosis and prognosis. This is vividly reflected in the process of imaging analysis. By employing AI algorithms in the image from X-rays, CT scans, and MRIs, abnormalities and patterns can be identified, and radiologists can be assisted with diagnosing diseases such as cancer, cardiovascular conditions, and neurological disorders. AI can also be utilized for drug investigations and provide more personalized treatments. The company Verge Genomics has developed their application of ML algorithms to analyze human genomic data and identify relevant neurological diseases. By doing so, they were able to discover the drugs for Parkinson's, Alzheimer's, and amyotrophic lateral sclerosis (ALS) in a cost-effective way. To extend further, AI can even be adapted for pandemics regarding viruses by working as a contact tracer, contacting people who have been exposed to a person who has been contracted to the virus and acknowledging them to quarantine. By doing so, the government can limit the speed of the virus spreading (Basu, Kanadpriya et al.).

Privacy and data protection

Nevertheless, countless limitations are faced when adapting AI to practical use. One of the most significant limitations is caused when addressing the privacy of patient data. In healthcare services, securing patients' medical data is critical to follow ethical obligations, legal requirements, and practical outcomes. If not, it has the potential to threaten confidentiality and the reputation of the medical service. Furthermore, it can cause theft of medical identity and making inaccurate records.

Cases of data breaches of medical data vividly support this issue. Data breaches often occur through cyberattacks, an intentional attempt to steal, manipulate, or destroy data by either individuals or groups to rupture the information systems of organizations or individuals. These actions usually occur for financial benefits and disruption in the healthcare system. Currently, it is observed that there is more than a 50% year-over-year increase in the cases of cyber-attacks. Subsequential economic cost to recover the system disproportionately alarms developing countries with economic hardships. This was especially prominent in India with the value of 7.7% of total attacks on the healthcare industry in the year 2021. For instance, when AIIMS hospital, one of the premier public hospitals in India,was targeted, an estimated 1.3 terabytes of data were stolen, affecting 30-40 million patient databases including some significant politicians of the nation. This engendered the nation to temporarily switch to manual mode of operation and failing to deliver timely treatments to the emerging patients. Furthermore, the hackers demanded Rs 200 crore, approximately $24.5 million, posing prominent financial risk to the nation. Vulnerabilities found in medical devices also underline this issue. For instance, scientists have identified that devices such as Medtronic insulin pumps can be manipulated through cyberattacks, engendering inaccurate insulin doses being administered. This concerns patient safety and security of Internet of Things (IoT) devices utilized in healthcare (Cabuyao).

Numerous conflicts occur when resolving this problem. Minor healthcare providers lack budgets and resources for cybersecurity initiatives while total economic cost from data breaches increases every year. This limits the investments and resources for advanced cybersecurity tools, influencing cybercriminals to increase their crimes. Human fallibility is also related to this issue as even the slight errors made by employees have the potential to lead to the leak of vast amounts of patient data. Sometimes, insider threats could occur when cybercriminals threaten hospital employees to sell the patient data. This issue is further expanded since various healthcare software are interconnected, casting an effect on unrelated service providers as well (Cabuyao).

Existing laws also fail to address this issue, as most impose weak penalties for breaches of health data privacy. Due to the inconsistent and insufficient regulations, it challenges many individuals to be unaware of the method their health data is utilized and shared. It also creates confusion of the ownership of the data especially on their way to gain access to it. This can engender disruptions over data rights and responsibilities when handling AI.

Biased Data Processing

Another limitation that has evolved since implementing AI in the medical field is the potential of biasedness. Since AI models require a large quantity of sophisticated yet relevant data to be manipulated, the quality of the models depends on the availability of reliable data. However, access to the large quantity of

appropriate data is limited since data in healthcare services often involves the privacy of the patients including facial recognition and gene analysis and the rights to share private data is depended on the patient. During the process of machine learning, the model is first trained with a training data set and tested with the testing data set. If the data trained or tested by the model is biased, the output it creates will also result to be biased. This is especially highlighted during model selection when the final model to be employed is decided. Consequently, this biasedness could exacerbate marginalization for specific group of people such as women and certain races. By doing so, it promotes social inequality and false beliefs against those communities. Furthermore, when there are diverse variables influencing the results of the algorithm, it has the potential to generate unnecessary associations between patient features and outcomes. By doing so, this can result in overfitting, creating inaccurate predictions regarding its functions. Thus, it is crucial to select unbiased data to train the model and select the final product with great attnetion. Simultaneously, it is significant to introduce to the users how the model is operated, guiding them to better interpret the outputs and make insightful decisions during their experiences (Basu, Kanadpriya et al.)

Ethical concerns

As countless concerns emerge regarding safety of AI, the current system requires someone to be accountable for mistakes or inaccurate decisions made. This leads to “black box” nature of AI, which refers to situations when decisions made by AI are illogical to be understood by humans. Meaning that although AI can provide results or recommendations, the supporting reasons or mechanisms might be inaccurate. This influences the clinicians to be unable to fully adapt the AI’s untrustworthy output, impacting patient treatment to be ineffective and leading the patients to question the reliability of the technology. Due to this issue, it is challenging to pinpoint a figure that will be responsible for errors, pressuring the issue of accountability in AI application in medical outcome. This also engendered China and Hong Kong to prohibit using AI to make ethical decisions. Also, there are no standardized guidelines regarding the moral utilization of AI and ML, leading towards debate on to what extent Ai can be ethically used in healthcare services. In that case, Food and Drug Administration (FDA) of The United States was the first to attempt criteria to examine the security and efficiency of AI systems. By continuing these efforts, it will ultimately ease the justifications against ethical dilemmas.

Major Parties Involved

World Health Organization (WHO)

Having established in 1948, WHO is a specialized agency of the United Nations that explicitly promotes public health and improves global access to quality essential services such as health care, adequate nourishment, education, and literacy, among services such as health care, sufficient nourishments, education and health literacy, and others. (WHO) It is a leading global health body collaborating with the International Telecommunication Union to benchmark AI applications in health diagnostics. (WHO)

International Telecommunication Union (ITU)

Being a specialized agency of the United Nations for information and communication technologies, ITU has been established in 1865. ITU contributes to this issue by emphasizing international collaboration and interoperability of AI systems. ITU collaborates with WHO in FG-AI4H on standardization and benchmarking AI tools for healthcare diagnostics (ITU).

European Medicines Agency (EMA)

Established in 1995, the EMA is a decentralized agency of the European Union responsible for the scientific evaluation, supervision, and safety monitoring of medicines within the EU (EMA). In the field of artificial intelligence in healthcare, EMA plays a pivotal role by evaluating AI-driven medical technologies under the EU's regulatory frameworks. This process includes assessing AI applications on medical devices and their conformity to the General Data Protection Regulation. The EMA's actions are crucial to patient safety and maintaining ethical standards in applying AI to healthcare services (EMA).

Food and Drug Administration (FDA)

Established in 1906, the FDA regulates the development and implementation of regulatory frameworks for AI-driven medical devices in health care in The United States (U.S.). FDA ensures these devices are safe, with the primary spotlight on postmarket monitoring and continuous updates concerning AI systems (FDA).

The United States (U.S.)

The United States has been at the forefront of AI development and regulation in healthcare, primarily spearheaded by agencies such as the Food Drug Administration. The U.S. is also home to leading technology companies such as Google, IBM Watson Health, and Microsoft, which are involved in driving innovation within AI healthcare solutions (FDA).

China

China, along with the U.S., is also one of the countries taking the lead in this transition of AI implementation in healthcare with solid artificial intelligence technology. The Chinese government has prioritized AI in its national strategy, investing in development while integrating AI technologies into healthcare to address disparities in rural areas (Li).

Timeline of Events

Date	Description of event
1972	The MYCIN AI system was developed for the use of identifying bacterial infections and recommending antibiotics. (Copeland)

1990s	Throughout the 1990s, AI was gradually introduced in radiology to support the analysis and pattern recognition for images.
May 18, 2018	World Health Organization and ITU established FG-AI4H to establish standards that could be used for benchmarking for AI application in healthcare. (ITU)
May 20, 2019	Google developed an AI system capable of detecting lung cancer from CT scans with higher accuracy than human radiologists.
January-December, 2020	AI tools were deployed worldwide for Covid-19 diagnosis, vaccine development, and managing healthcare resources.
June 28, 2021	WHO releases Ethics Report on AI in Health services, emphasizing transparency, accountability, and equitable deployment while overcoming other issues like bias and data misuse.
October 4, 2022	AI demonstrated higher accuracy than doctors in diagnosing certain eye diseases such as diabetic retinopathy.
January 12, 2023	FDA Releases AI/ ML Framework focusing on lifecycle monitoring.
May 23, 2023	The United Nations AI Advisory Body releases a report on ethical AI use in healthcare.

Previous Attempts to Resolve the Issue

The use of AI in health care services has brought notable safety concerns. Leading International Organizations, regulatory bodies, and the government have taken numerous actions to address this issue. These actions focused on creating ethical guidelines, legal regulations, and governance frameworks to ensure the responsibility of AI in healthcare.

For instance, WHO, UNESCO, and the EU have taken proactive steps regarding AI in health by implementing principles and proposals to take control of implementation. Similarly, national bodies like the FDA have developed sector-specific frameworks to regulate these technologies effectively. However, as the field is rapidly evolving, the success of these measures remains subject to ongoing evaluation and refinement.

Relevant UN resolutions on the topic of AI implementation in healthcare:

- United Nations Gerneral Assembly Seizing the opportunities of safe secure, and trustworthy artificial systems for sustainable development, 21/03/2024 (A/RES/78/311)
- Promotion of international cooperation on peaceful uses in the context of international security, 07/12/2021 (A/RES/76/233)
- Developments in the field of information and telecommunications in the context of international security, 07/12/2021 (A/RES/76/19)

Possible Solutions

A balanced solution that considers safety, reliability, and collaboration with human-led techniques is needed to integrate AI into healthcare. AI can be used to refine noncritical tasks, like administrative duties, before moving into patient care. For example, AI has relieved some administrative burdens so that healthcare professionals can spend more time with patients. The concerns of bias, errors, etc., need to be tested vigorously with validation and continuous monitoring, as highlighted by the FDA's emphasis on GMLP and real-world performance monitoring. (FDA)

Implementation of a dual strategy is needed, which includes precautionary regulation to safeguard the well-being of society and progressive innovation to ensure that advances are promoted unless proven harmful. Moreover, region-specific models of AI meant for specific needs, coupled with human-led healthcare, improve delivery and reduce risks of over-dependence. This will help ensure equity and impactful inclusion of AI into the global healthcare system.

To address the ethical responsibilities regarding AI in healthcare services majorly falls into three categories: fairness, accountability and transparency. To do so, demanding enhancements in the training and education of health experts by providing effective training sessions to the medical staff as well as students regarding proper interaction and management of AI utilization is required. Moreover, it is essential to approach in two diverse ways: precautionary approach: urging AI to be careful controlled and prioritize societal welfare over rapid adaptations and permission-less approach: allowing implementation of AI if no harm is identified, encouraging technological advancements unless it is proven to be harmful. Furthermore, this could be implemented in ways such as establishing region-specific AI systems tuned to local medical needs and demographics as aforementioned. By being incentivized to local areas, it can address specific health issues, improve healthcare access and reduce bias, and enhance health care delivery. This can help with achieving equitable yet impactful AI integration to the global healthcare services (Khan, Bangul et al.).

In order to properly validate hardware base or software based AI algorithms, it is crucial to have a mandatory purpose approval from regular authorities. When used in clinical trials, it must be verified how AI algorithms are accurate compared to established clinical standards. This standard could possibly underline topics such as sensitivities or specificity of diagnostic tests. To continue learning of the algorithm so that it could provide timely outcomes, it is important to set the AI clinic setting system to be “frozen” so that it would not automatically gain unreliable and unrelavant data. Instead, offline validation is required on an independent series of sample data (number of patients) from acquired “frozen” model so that the patients will be able to get accurate outcomes. Hence, it is significant to come up with regular validation method to constantly update and check the coherency and accuracy of the algorithms (Khan, Bangul et al.). Another potential method to ensure accuracy of AI will be facilitating a relationship between healthcare professionals and technology experts will ensure that the decisions made by AI algorithms are both accurate in field of medicine and technology. By doing so, this will limit the chances of errors occurring (Yaraghi).

As aforementioned, strengthened regulation and detailed policies should be developed in member states to enhance the deployment of AI in healthcare services. The first is to open up the communications with patients regarding the role the AI has on their treatment. This is crucial for them to understand the possible privacy implication due to usage of AI, where their personal data might be open beyond their medical records and used for as part of ML. Through educating them about these concepts, it can extend beyond fulfilling the legal requirements but also be used as an element to enhance the trust between patients and developing healthcare system (Yaraghi).

As AI algorithms relies on large quantities of sophisticated data, it is crucial to address the potential monopolies of medical data in the healthcare market. When large medical providers strengthen their position in the market, it can potentially engender increased healthcare costs, promoting the gap between the care quality and limiting access to underserved communities. Albeit, the industry leaders, regulatory bodies and healthcare consortia to spearhead initiatives should democratize access to medical data to enhance development. To do so, health information exchange (HIEs) can be effective, serving as aggregators and integrators of data from various providers. This can aid the medical field to be supported with vast and diverse medical data. HIEs will also allow member states, especially those developing countries can be benefitted from larger datasets, generating equitable healthcare landscape globally (Yaraghi).

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