THE PROSPECT, LEGAL, AND MEDICAL ISSUES IN INTEGRATING AI IN MEDICAL PRACTICE IN UGANDA

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ABSTRACT

It is not that the 21st century has witnessed a surge and development of digital technology within the global terrain. This digital technology has further taken a new dimension such as Artificial Intelligence (AI) which has aided in enhancing and transforming virtually all sectors. However, it suffices to state that AI has further led to the transformation of healthcare within the global terrain. This is concerning the fact that incorporating AI in medical practice such as telemedicine and the metaverse concept has enabled healthcare providers to render healthcare services in remote areas, training and sensitization of medical personnel and the public on healthcare issues. However, despite this potential of incorporating AI in medical practice, there seem to be legal and medical issues developing countries like Uganda may encounter. Hence, the need for this study to examine the prospect, legal, and medical issues concerning the integration of AI into medical practice in Uganda. Concerning this, the study adopts a doctrinal method of study, the data obtained from the primary and secondary sources were analysed through analytical and descriptive approaches. The study found that incorporating AI in the healthcare system in Uganda will provide several benefits. However, there are legal and medical issues in integrating the AI healthcare system of Uganda, these include regulatory ambiguities, data privacy and confidentiality of patient, the challenges patients consenting to virtual medical care, medical errors that may ensue through AI medical care, and several others. The study, therefore, concludes and recommends that AI provides significant transformative and innovative solutions to the Uganda healthcare delivery system. However, to effectively utilize the opportunities provided by AI there is a need to ensure effective regulatory compliance and engagement of the various stakeholders in initiating a proper medical and ethical practice and guide on how best to utilize AI in healthcare delivery in Uganda.

Keywords: Legal, Medical, Artificial Intelligence, Uganda

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Introduction

The 21st century has brought unparalleled advancement in digital technology, permeating every sphere of the world, with incredible influence on various sectors including health care[1]. One such advancement is Artificial Intelligence (also known as AI), which is one revolutionary force capable of revolutionizing medical practices[2]. The application of AI in healthcare has gone beyond mere automation to some high-level sophistication, such as telemedicine, personalized treatment, precision diagnosis, and even the latest concept Metaverse[3]. These latest developments are bound to improve healthcare delivery, especially for places where access to medical services is minimal, such as some remote areas in Uganda.

The use of AI in medical practice so far has proved to be very useful, globally. For instance, through AI-driven technology health professionals can offer medical services to people at a distance, which enables diagnosis and subsequent treatment that may be difficult to access[4]. AI will also facilitate training and sensitization for medical personnel so that health professionals are better equipped with state-of-the-art, knowledge and skills. In addition, public health education campaigns, through the use of AI, can spread more information successfully due to which improved health outcomes can be achieved[5]. Despite such promising developments, integration into Uganda's healthcare environment presents a unique set of challenges. The overcoming of these issues will allow countries like Uganda with limited or incomplete regulatory frameworks for digital technologies to better realize the benefits of AI in health.

One of the most important legal issues relates to ambiguous legislation. Continuous growth and development in the field of AI appear to go quicker than formal mechanisms can put into law[6]. Regarding this, there is uncertainty about the regulation of AI applied in health care. Issues such as data privacy and confidentiality are very relevant regarding the fact that AI applications do demand access to great amounts of sensitive patient data. Ensuring this information is treated according to the existing laws of privacy is critical in ensuring the continuity of patient trust and preventing abuses. Added to these are concerns about informed

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consent on the part of patients in regard to AI-navigated medical interventions. The element of AI introduces a whole new dimension into the already complex relationship between patient and provider in telemedicine or virtual consultations. For instance, there is a lack of proper understanding by the patient regarding what is involved when AI is used in their care, an aspect that sometimes raises ethical questions regarding the validity of their consent. Moreover, it is not all bed of roses when AI has been incorporated into health care[7]. As advanced as it may be, AI systems are never perfect. There might be a chance that biased algorithms or any other technical malfunction could lead to medical errors, and this is a serious threat. The result of such an error in a medical context would be disastrous and therefore calls for stringent oversight, with constant upgrading of the AI system[8].

Concerning the above, this study shall critically assess the opportunities and challenges likely to be encountered by the Ugandan healthcare system regarding integrating AI within the system. Materials for the study were sourced from both primary and secondary sources analyzed through doctrinal research, using both analytical and descriptive methods. This study aims at a full discussion of the benefits that AI can bring to the Uganda health sector, legal obstacles, and medical obstacles that will need to be addressed.

Overview of the Development of Artificial Intelligence

Artificial Intelligence, AI, has evolved over many decades and is deeply intertwined with scientific inquiry and technological advancement. The evolution in itself can be understood through distinct phases, starting with the early theoretical work in the mid-century and advancing to the sophisticated application and ethics challenge we face today. The early work in computer science that assumed machines could simulate aspects of human cognition led to the invention of artificial intelligence. Basic ideas on computation, algorithms, and machine logic by mathematicians and computer scientists like Alan Turing and John von Neumann established the groundwork for AI[9]. In the seminal work on the topic entitled "Computing Machinery and Intelligence", he probably introduced a means of assessing whether a machine could display intelligent behaviour indistinguishable from that of a human-the Turing Test. The term "artificial intelligence" was coined formally by John McCarthy in 1956 during what is called the Dartmouth Conference. It brought together McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon to outline the potential of machines for things such as reasoning, learning, and language processing. The early AI research was dominated by symbolic AI, also sometimes referred to as "Good Old-Fashioned AI" or GOFAI[10]. It uses symbols and rules to simulate parts of human reasoning: programs can be written, like the one

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[10] K Andronis and K Moysey, 'Data Governance for Health Care Providers' in 'Health Information Governance in a Digital Environment' (IOS Press 2013) 299–301 https://books.google.ee/books?hl=en&lr=&id=IfDAAQAAQBAJ&oi=fnd&pg=PA299&dq=(Andronis+%26+Moysey+2013&ots=1PSl6gOnod&sig=4LOCXOAERXTYoj7IoNazpJdbd4Q&redir_esc=y#v=onepage&q=(Andronis%20%26%20Moysey%202013&f=false accessed 1 December 2023.

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developed by Allen Newell and Herbert A. Simon called Logic Theorist-1955-that found proofs for mathematical theorems, or the General Problem Solver-1957-that at least attempted to simulate the humans' problem-solving processes. The limitation was that such a strict rule-based approach had big caveats. Many complexities existed, and to simulate human cognition, so many rules were needed that the project could not be scaled. Secondly, symbolic AI did not do so well in perceptual tasks or patterns, recognizing for instance objects in pictures or speech[11].

The skepticism and lack of computational power drastically reduced funding for symbolic AI by the 1970s, an era now often referred to as the "AI winter." Despite this discouragement, AI research remained strong and gained momentum in the 1980s in many forms, including expert systems that were designed to emulate the actions of human experts. Specific applications like MYCIN-a medical diagnosis system at Digital Equipment Corporation, and the application of XCON for configuring orders of computers were able to demonstrate practical applications based on domain knowledge that could be reduced into decision rules. Commercial success was realized in the application of expert systems to specialized domains in medicine, finance, and engineering. Unfortunately, these were brittle and rigidly dependent upon previously programmed rules incapable of learning from experience or adapting to new information[12]. The move to statistics and machine learning came with higher computational powers, the availability of datasets, and algorithmic developments in the 1990s. Machine learning allows computers to "learn" from data rather than depend on pre-programmed rules. Another key development in this phase was a neural network approach that draws inspiration from the structure of the human brain. This was the very year in which chess champion Garry Kasparov lost to IBM's Deep Blue. It was an era during which AI became a great utensil for complex problem-solving. Alongside unprecedented access to data during the Internet Revolution, improvements realized in Supervised Learning, Unsupervised Learning, and Reinforcement Learning became a reality. Strong data analysis tools such as Support Vector Machines, Decision Trees, and Ensemble Methods emerged, thus entailing contemporary Machine Learning applications.

Deep learning is a subfield of machine learning that, due to advances in neural network architectures and, secondly, thanks to the availability of extensive computational resources, created its prominence in the 2010s. Due to this combination, neural networks with many layers-deep neural networks can process large amounts of unstructured data such as images, speech, and text at remarkable accuracy levels. In 2012, the AlexNet model introduced CNNs into image recognition and won the ImageNet competition, sealing deep learning as a feasible approach to tasks hitherto considered the preserve of human cognition. With heavy investment in research by companies such as Google, Facebook, and Microsoft, deep learning breakthrough applications started to pour in: computer vision, natural language processing, the list goes on and on[13]. Large language models like GPT and BERT pushed the boundary on how

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[12] A Ajit and E Johnson, 'Information Security and Privacy in Healthcare: Current State of Research' (2010) 6(4) International Journal of Internet and Enterprise Management 279 https://doi.org/10.1504/IJIEM.2010.035624 accessed 1 December 2023.

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far AI could go in understanding and generating the language. These models showed that deep learning can achieve human performance in translation, summarization, and generating a fact that drew interest in applications across industries. So far, the 2020s have been pegged with the rise of generative AI-creating content, text, images, music, and even video. WANs, generative adversarial networks, and transformer-based architectures such as OpenAI's GPT-4 are some of the rapidly developing advancements within the field of AI in creative and productive capabilities, showing great promise within a wide array of fields, from entertainment to healthcare[14]. The development of autonomous systems is another frontier. It enables the integration of AI into real-time decision-making and perception, hence making practical self-driving cars, drones, and robotics. Such applications entail a host of machine learning, computer vision, sensor fusion, and control systems to perceive and interact with the physical world independently[15].

As AI is rapidly integrating into our lives, it is raising serious ethical, legal, and social considerations. Issues related to algorithmic bias, displacement of jobs, data privacy, and the misuse of AI for surveillance or autonomous weaponry do call for stringent regulatory frameworks. International organizations, governments, and private sectors are well in active discussion over how guidelines should be made that can promise ethical and responsible use of AI. Early legislative developments in that regard include the General Data Protection Regulation of the European Union and the proposal for the AI Act[16]. The principles of transparency, accountability, and fairness are put at the center of mitigating risks due to AI while allowing innovation for societal benefit[17]. The next phase of development with AI is Artificial General Intelligence, where machines would be able to perform any intellectual task that a human can. While still purely theoretical, the speed with which AGI is being developed has engendered both optimism and caution regarding its potential. Explainable AI, now referred to as XAI, will be developed further to make its models much more interpretable by users to create trust and further oversight. Reinforcement learning with neuromorphic computing and quantum computing is expected to continue to enhance the capabilities of AI over time where it struggles to make decisions in real-time and solve complex problems[18].

Starting from symbolic reasoning, AI development went through a sea change to machine learning, deep learning, and further. With each phase, AI came closer to the realization of one

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Prevention of Mental Disorders' (2021) 133 Journal of Psychiatric Research 223 https://doi.org/10.1016/j.jpsychires.2020.12.016 accessed 1 December 2023.

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[18] O Enabulele and JE Enabulele, 'Nigeria's National Health Act: An Assessment of Health Professionals' Knowledge and Perception' (2016) 57(5) Nigerian Medical Journal 260 https://doi.org/10.4103/0300-1652.190594 accessed 1 December 2023.

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more aspect of human cognition or intelligence and found applications across nearly every sector. While the promise is bright in the future, that future also needs to consider impacts on society and its governance frameworks to make sure that AI is developed and utilized responsibly.

Issues on Healthcare Practice in Uganda and Incorporating AI as Panacea

Healthcare practice in Uganda, like most in developing countries, is an idea based on various issues such as historical, cultural, economic, and technological. Such conceptual issues provide the background for gaining more knowledge into the challenges and opportunities created by the use of advanced technologies like AI in the healthcare system. Major conceptual issues that relate to medical or healthcare practices in Uganda range from foundational features that influence health delivery, present health infrastructure, and regulatory and policy mechanisms to the cultural dimensions setting health practices[19].

The Ugandan healthcare system operates within an arena where both public and private sectors contribute to the provision of medical services in critical proportions. Most of the healthcare services are still the responsibility of the public sector, headed by the Ministry of Health, especially in the most underpopulated rural areas. National and regional referral hospitals, district hospitals, lower-tier health centers ranging from level I to IV, and village health teams form the health infrastructure. Infrastructure is, however, faced with great problems in terms of financing, lack of medical supplies, very old equipment, and an overall serious shortage of health professionals[20]. Health care delivery is organized in a tier system primary health care at the community level to the most specialized services available at national referral hospitals. However, access to quality health care is unequal, with varying degrees of shortages of health facilities, medical personnel, and unavailable essential medicines across rural areas. This adds to the disparity in health outcomes and heightens innovative solutions, such as AI, in high demand to contribute to bridging the gaps in healthcare delivery.

Availability and adequate distribution of health professionals within the country is another challenge that has been of major concern as Uganda has been faced with a chronic shortage of health workers as its doctor-to-patient ratio is below what the World Health Organization recommends. This condition is worse in rural areas, where the majority of the population live as most of the health workers are always overwhelmed, hence leading to burnout and delivery of poor quality of services. This condition is further heightened by migration of the trained professionals to urban centers or foreign nations in search of greener pastures[21]. All these issues also affect the training and development of the workforce. The Continuing Medical Education CME is quite limited, and there is a dire need to have more robust training mechanisms that may prepare healthcare workers to emerge with the advent of new health challenges. The introduction of AI into the healthcare system could ease some of the challenges since the decision support systems, telemedicine, and other tools developed will aid in performing these functions thereby improving the capacity of the existing healthcare professionals.

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Another key conceptual issue at play includes the regulatory and policy framework that guides health care in Uganda. the Ugandan government has been making a quite good number of efforts toward setting up policies that would ensure better healthcare delivery, which include the Health Sector Development Plan and the Uganda National Health Policy. However, in reality, most such policies are not fully implemented owing to shortages of resources, corruption, or weak mechanisms of enforcement. Since the regulatory framework for new technologies such as AI is still in its infancy, broad policies need to be drawn out on ethics, legalities, and safety for integration into this sector. The absence of specific regulations on AI in healthcare at present leads to ambiguity and uncertainty concerning data privacy, patient consent, and liability of AI systems. Thoughtfully and painstakingly, it will require a robust regulatory framework for assurance that integrating AI into Uganda's healthcare system is well accomplished in safety and ethics for all stakeholders[22].

The cultural and social determinants of health in Uganda, however, remain the most influential in shaping the health care practices. Most communities have entrenched traditional beliefs and practices that affect their perception towards health, illness, and treatment. For example, many Ugandans depend on traditional healers and herbal medicine for initial treatment; this is especially true in rural areas where access to formal health care may be scarce. This dependence on traditional medicine only results in health care seeking late in formal healthcare facilities and thus worsens the health status[23]. On top of that, cultural beliefs concerning diseases, such as stigma in some diseases like HIV/AIDS or neuroses, prevent people seeking from medical help on time. These are what need consideration the new technologies, like AI, are introduced into the health system. If AI has to work, then it has to be culturally sensitive and adapted to the context, catering to the specific health beliefs and practices of the Ugandan people.

One of the major preoccupations of health practice conceptualization in Uganda is health financing. The major financing of the health care system is largely governmental, donor contributions, and out-of-pocket payments from patients. In most instances, government financing is minimal and health services depend on donor support, which mostly comes in unpredictable and unsteady waves. High out-of-pocket payments pose a great barrier to the use of health among poor and vulnerable populations. It goes to prove that the financial burden of the system is affecting the quality and access to medical services[24]. There should be innovative financing mechanisms that will increase the availability of funds for health without overburdening the patients. Integration of AI into the healthcare system could henceforth offer some cost-saving solutions due to more efficiency, reduction in repetitive tasks, early detection, and prevention of diseases at a lower cost of health care.

Another challenge to effective health care delivery in Uganda is the gross inadequacy of health information systems. Health information provides a basis for informed decision-making, proper allocation of resources, monitoring, and evaluation of various health interventions. However, there is often fragmentation in the health information systems of Uganda, making interoperability between these systems rather limited[25]. This fragmentation of health

[22] J George and T Bhila, 'Security, Confidentiality and Privacy in Health of Healthcare Data' (2019) 3(4) International Journal of Trend in Scientific Research and Development.
[23] S Ibeneme, M Ongom, N Ukor and J Okeibunor, 'Realigning Health Systems Strategies and Approaches; What Should African Countries Do to Strengthen Health Systems for the Sustainable Development Goals?' (2020) 8 Frontiers in Public Health 372 https://doi.org/10.3389/fpubh.2020.00372 accessed 1 December 2023.
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information systems contributes to a lack of efficient collection, analysis, and use of health data. Most likely, AI will drastically improve health information systems by automating the gathering of data, refining data accuracy, and eventually allowing for real-time analysis. However, if AI is to do that, it needs high-quality data and improvements in the existing health information systems[26]. The more health data becomes standardized, interoperable, and secure, it means that AI will perfectly fit within Uganda's Healthcare system. Furthermore, ethical considerations form the backbone of healthcare practices, especially in a country that is incorporating new technologies like AI. Important ethical issues concerning patients in Ugandan healthcare include those dealing with patient autonomy, informed consent, confidentiality, and the equitable distribution of resources in healthcare. Among others, these supplement the introduction of AI with novel challenges like algorithmic bias, transparency in decision-making processes of AI, and potential dehumanization of care in medicine. What is needed are ethical guidelines on the use of AI in health with the view not to harm but to leverage the rights of the patients, advance equity, and improve quality. This calls for the creation, on the part of various stakeholders themselves: health professionals, ethicists, and patients. This will surely make them comprehensive enough for diverse cultures[27].

All these are crucial in setting the tone for healthcare delivery in Uganda. Improvement in the delivery of health care would necessarily have to tackle these issues if it is to make new technologies, like AI, introductions effective and sustainable. It is through addressing these conceptual issues that Uganda would have been assured of having a health care system that was resilient enough and inclusive toward addressing the ever-changing health needs of her people.

Legal Framework Concerning the Regulation of AI in Medical Practice in Uganda

Artificial Intelligence also known as AI has greatly enhanced the global environment and virtually all global sectors. However, currently, several countries are incorporating the practice and use of AI in medical or healthcare delivery. The incorporation of AI in healthcare delivery in most countries such as China, America, Great Britain, Canada, Russia, and several other countries has greatly enhanced their healthcare delivery system. Although it suffices to state that the majority of these countries have a well-organized legal system and medical practice to substantially curtail some of the inherent challenges that may occur when incorporating AI into their healthcare delivery system. However, it suffices to state that the concept of AI is gradually creeping into Uganda's terrain and incorporating the same in various sectors, especially in the medical sector. However, it suffices to state whether there are sufficient laws to regulate this current trend will be considered below as follows:

The Uganda constitution is considered the basic and the superior law of the land upon which every other law is established. Although it is not a primary law that regulates healthcare and Artificial Intelligence, however, there are provisions of the constitution that could be interpreted to briefly provide for the healthcare system and the need for an effective healthcare delivery system. For example, several laws Under the National Objectives and Directive Principles of State Policy in the Uganda constitution, stipulate that the Uganda government should endeavor the provide basic medical healthcare services accessible to all citizens.

[26] SI Khan, ASL Haque and ML Hoque, 'Digital Health Data: A Comprehensive Review of Privacy and Security Risks and Some Recommendations' (2016) 24(2(7)) Computer Science Journal of Moldova 273.
[27] N Lord, 'Healthcare Cybersecurity: Tips for Securing Private Health Data by Nate Lord' (Digital Guardian, 17 September 2020) https://digitalguardian.com/blog/healthcare-cybersecurity-tips-securing-private-health-data accessed 1 December 2023.

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Furthermore, the fundamental Human Rights though did not specifically provide for AI to enhance the healthcare system, however, articles 22, 27, and 41 which provide for rights to life, the right to privacy, and right to access to information, could be interpreted to form guiding principles that could apply to AI enhance healthcare. This is concerning the fact that, by the Uganda constitution life is considered a sacrosanct right, hence provision of AI to enhanced healthcare delivery could aid in saving the lives of sick citizens who require or seek sophisticated medical healthcare, hence guaranteeing their rights to life[28]. Furthermore, the rights to privacy and access to information also enable patient accessing AI-enhanced medical healthcare to be protected from flagrant violations of privacy and prohibition from receiving vital information concerning their health status or information when receiving healthcare service through AI-enhanced medical systems.

It must be noted that the primary law regulating Uganda's healthcare system is the Uganda Public Health Act. This law specifically provides for regulation of the healthcare system to improve medical care delivery in Uganda. However, it specifically refers to medical practice in general and does not refer to or provide for certain pertinent issues (such as privacy, fraud, consent of patient, and confidentiality) as it concerns the trending AI to enhance the healthcare system. However, some relevant provisions tend to refer to the incorporation and regulation of AI to improve medical care[29]. This is concerning the fact that section 2 of the Act, empowers the minister of health to make inquiries as it concerns any development or issues that may correlate with enhancing public health in Uganda. This provision could be interpreted to mean that given the trend of AI enhancing the medical care system, the minister can inquire to ascertain the suitability and relevance of enhancing the Uganda healthcare delivery system. Furthermore, by section 138 the minister of health is empowered to make rules and regulations to give effect and due implementation of the act which tend to provide for a quality healthcare delivery system. In essence, AI enhances the Medicare delivery system which is a current trend that could be easily regulated and regulated through rules and regulations passed by the minister, pending comprehensive laws that provide and regulate AI to enhance healthcare delivery.

The National Information Technology Authority, Uganda (NITA-U) Act is another notable law that relates to issues or matters that concern technology or digital technology. However, by the introductory part of the act is emphatically understood that the act aims at establishing a body that will be relevant for the regulation, control, and coordination of technologies, including the trending AI concept, within Uganda. Concerning this, section 2 of the act which is the interpretation section, defined technology to include the act of science or devices in communicating, collecting, transmitting, manipulating, controlling, displaying, and storage of information or data. Section 3 of the act establishes the National Information Technology Authority as the body responsible for the control and use of technology in Uganda. Section 4 (b) and (f) of the act stipulate that the National Information Technology Authority must promote the acquisition, use, and maintenance of technology, and ensure there is uniformity in terms of

[28] A Marcelo, D Medeiros, K Ramesh, S Roth and P Wyatt, 'Transforming Health Systems Through Good Digital Health Governance' (Asian Development Bank, 2018) https://doi.org/10.22617/WPS189244-2 accessed 1 December 2023.

[29] E Murray, EB Hekler, G Andersson, LM Collins, A Doherty, C Hollis, DE Rivera, R West and JC Wyatt, 'Evaluating Digital Health Interventions' (2016) 51(5) American Journal of Preventive Medicine 843 https://doi.org/10.1016/j.amepre.2016.06.008 accessed 1 December 2023.

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adequacy, reliability, and quality of technology in all parts of Uganda. Furthermore, it also stipulates that there is a need for the relevant authority to ensure effective access to technology by any interest group, such as AI enhance healthcare delivery. Furthermore, the National Information Technology Authority is also saddled with the responsibility of advising the government concerning the trending and development of technology, regulating, monitoring, and setting the standard of technology used in the public and private sectors. Concerning this it suffices to state that the act seems to recognize and promote the use of AI in healthcare delivery. However, regulation and control on how AI is utilised in healthcare delivery are not provided for and regulated by the act.

It must also be noted that the Data Protection and Privacy Act 9 2019 is also a relevant law that provides for and regulates digital technologies as it concerns data privacy and protection of individuals residing in Uganda. In this regard, section 3 of the act stipulates that those in charge of collecting and processing data should do so lawfully, and transparently and shall be held accountable for the details of the data collected. Concerning this, section 7 of the act, stipulates that the data collector or processor must obtain the consent of the individual whose details are obtained. Concerning children that are considered vulnerable section 8 stipulates that the consent of their parents or guardians of children must be sought. Hence, by sections 3 and 7 of the acts where a patient is receiving medical care through the healthcare delivery system and there is a need to obtain information from the patient through such digitalized medium or relevant information could be stored through AI medium, the patient is receiving medical attention, the patient must be duly notified and their consent sort for proceeding with AI enhance medical care delivery to the patient. Furthermore, section 11 stipulates that when obtaining data from a data subject, the information or data shall be obtained directly from the subject, although, where the data is in the public domain and the data subject deliberately places it in the public domain, the data processor may obtain such information though with consent. Sections 12 and 13 further stipulate that the obtaining of data-by-data processor or collector must obtain such data and use same for a purpose for which they have informed the data subject. Hence, section 10 of the act specifically prohibits data collectors or processors from obtaining or processing data of an individual in ways that infringe on the privacy of the owner of the data. Furthermore, section 35 of the act prohibits the unlawful obtaining and disclosing of data and declares it as an offense punishable by ten years imprisonment upon conviction. This provision of this act could be applicable to regulate and protect the data of patients receiving medical care in AI enhanced healthcare system.

Although the Electronic Transaction Act 2011 is enacted to facilitate electronic transactions. It suffices to state that provides for salient provisions that tend to directly have a positive effect on the AI-driven health care system in Uganda. This is concerning the fact that by section 14 of the Act, the formal validity of and enforcement of a digitalized agreement and transaction has been sealed. This is concerning the fact that the sections stipulate that an agreement or consent to an agreement through a digitalized means electronic platform does not legally vitiate and invalidate the agreement. Hence, where an individual has consented and accepted a transaction through a digitalise system such agreement is valid and enforceable. Furthermore, by sections 5 and 7 of the acts, it provides that any communication held through an electronic or digitalise means is considered valid and enforceable. Also, the act recognizes digital signatures to validate any agreement done through digital technology. Hence, where there is an agreement or a patient consent through digitalized means or a conversation is held through

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digitalized means with a healthcare provider, the Electronic Transaction Act validates any communication or agreement between both parties. Provided both parties have well-informed consent and have agreed accordingly.

Concerning the above, it suffices to state that the trending of AI could enhance the Uganda medical healthcare system given it prospects and relevancies in current medical practices. Furthermore, from the review of the above laws as concern digital technologies and the healthcare delivery system in Uganda, it is evident that there are primary law laws that provide for and regulate AI to enhance healthcare delivery. However, the review of the above, reflects the fact that though there are no primary legal frameworks tailored to provide for and regulate AI to enhance healthcare delivery, the above laws seem to provide for the incorporation and use of AI in healthcare delivery and some other relevant issues such as privacy of patient and confidentiality and electronic signature to show consent. However, to avoid ambiguity, complication, duplication of provision, conflicting duties, fragmentation, and application of disjointed laws concerning the regulation of AI-enhance medical care, there is need for a harmonized laws regulating AI-enhance healthcare delivery systems.

Legal and Social Issues in Incorporating AI in Medical Practice in Uganda

Incorporating AI in Uganda's healthcare delivery system tends to provide several benefits such as better personalized treatment of patients, effective healthcare management, and improved diagnostic and training of medical personnel. However, despite these potential AI tends to enhance the healthcare delivery system in Uganda, several legal and medical challenges arise if not properly managed. Some of these challenges are briefly examined as follows.

The first legal challenge identified in these studies concerning AI-driven healthcare systems is the lack of a specific legal framework concerning the regulation of AI-driven healthcare delivery systems. This is concerning the fact that the various laws (such as The Uganda constitution, the Uganda Public Health Act, The National Information Technology Authority, the Uganda (NITA-U) Act, The Data Protection and Privacy Act 9 2019, and the Electronic Transaction Act) examined as it concerns their provision for the regulation of AI enhance healthcare system are disjointed. None of these laws are encompassing and majorly focus on the regulation of AI to enhance the healthcare system. However, these laws tend to create provisions that relate to some pertinent issues such as data privacy, incorporation or adoption of sophisticated technology, electronic signature, and transmission of information. In essence, having a multiplicity of laws or legislation tailored towards the regulation of AI-driven healthcare systems may result in overlapping, ambiguity, and difficulties in ascertaining the true position of the law by lawyers and layman.

Furthermore, it must be noted another major challenge concerning AI-driven healthcare systems could also involve data privacy and confidentiality of patient information. Artificial Intelligence is a sophisticated technology that could house millions of information about patients. In this regard, given the volume of this information, if not properly managed, it could result in data invasion, breach, and misuse of this information within the reach of the data collector, resulting in legal liabilities. However, it may be argued that legal provisions prohibit data privacy invasion and breach. However, it suffices to state that the law only becomes active if the person who infringes or invades the data is caught, in not nutshell, there is a need for technological backup to curtail and track the incidence of data privacy invasion.

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Also, it must be noted that artificial intelligence is a sophisticated technology that is also prone to error and malfunction. Concerning it suffices to state that should there be medical errors or negative effects suffered by a patient who has been given medical care or treatment through an AI-driven medical system, who will be held liable for the act or error emanating from AI-driven medical treatment? Will the healthcare provider, the scientist who developed the technology, or both parties be held liable, accountable, and responsible for such errors? This is a challenge that may affect the trust of patients in an AI-enhanced medical care system

However, irrespective of the challenges identified above, it suffices to state that the other challenges that are associated with AI enhancing the healthcare system are:

i. Challenges of compliance and implementation with data protection laws
ii. Inadequate Technology knowledge
iii. High Cost Associated with AI-driven Healthcare System
iv. Possibility and challenges of obtaining informed consent in medical treatment and utilizing data of a patient

Conclusion/Recommendation

The study has demonstrated that, in one way or the other, AI is bound to revolutionize healthcare by improving access, accuracy, and speed in health processes. AI would provide a sustained platform upon which medical practitioners in Uganda could offer advanced healthcare services to those far-flung areas, and critical gaps in service delivery, and break the barriers set by geographical limitations. More so, AI platforms offer improved and innovative solutions for continuous medical education and public health awareness. Unfortunately, despite the prospect, the integration of AI in Uganda's healthcare is faced with huge legal and medical challenges that need attention. Results from this study have identified concerns about regulatory ambiguities, data privacy concerns, problems with patient consent, and medical errors emanating from AI technologies. This study has also addressed ethical implications for AI in Health in light of confidentiality for patients, doctor-patient relationships, and equitably distributed AI medical services.

Sequel to this, it will be important that Uganda develops a robust legal and regulatory system relevant to the given context of AI in health as part of its mechanisms to maximize its full benefits while mitigating its associated risks. Such a framework would concern data protection, liability, rights of patients, and the ethics of the use of AI in a clinical setting. Additionally, the contribution of all government agencies, health professionals, developers of technologies, and patients will determine the shaping of this balanced approach to integrating AI. The integration of AI into Uganda's health care system will, therefore, be successful not only when the technological advancements have been realized but also on condition that there are clear and enforceable guidelines protecting patient welfare while ensuring innovation. Indeed, AI has the potential to change health care in Uganda but needs close attention to legal, medical, and ethical considerations in a bid to ensure the safe and effective use of AI in high-quality healthcare delivery.

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