



THE IMPACT OF DIGITAL HEALTHCARE TECHNOLOGY ON PATIENT SAFETY AND RIGHTS IN NIGERIA: LEGAL AND ECONOMIC IMPLICATIONS

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The development and increasing use of technology in modern healthcare raises a number of socio-economic and legal concerns. A breach of patient safety can be traditionally classified under medical negligence as a tort. However, the scope of patient rights and safety transcends beyond the duty of care owed by medical personnel to their patients; the patient, by law, has a role in determining the extent of liability. A cursory examination of the Nigeria Patients' Bill of Rights (PBoR) reveals that, in order to secure the rights of patients, the following actors are involved: the government, the medical institution, the medical personnel, the patient, and the patient's family. Thus, patient safety and rights create different legal possibilities beyond the parochial conception of the patient-doctor relationship within the traditional tort of negligence. Despite the undeniable global shift towards the use of healthcare technology to enhance patient safety, one of the major impediments to adopting healthcare technology in Nigeria is the lack of adequate funding. If the purpose of healthcare technology is to enhance patients' rights and safety, it follows that provisions ought to be made for it by the government to medical institutions. Since the adoption of healthcare technology is costly, what are the economic implications for the patient who, by PBoR, has a duty to pay bills? The research postulates that the law on patient safety indicates scenarios of contract, human rights, and tort as the case may be, while the challenge of funding may require institutional reforms towards ensuring sustainable development goal on good health and well being.

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(I) INTRODUCTION

Digital health is the acceptable terminology used to describe technological tools adopted in any situation for the purpose of delivering services to patients or consumers so that they can effectively manage their personal health concerns and ensure personal wellness.¹ Digital healthcare technologies tools are different and they seek to achieve different patient safety goals. Some digital healthcare tools are basically for the purpose of sharing information about health and treatments while some others can be used as a treatment forum where patient can interact with physicians on treatment models.² Different possibilities have been made a reality through software developments and several other technology tools that help enhance patient-doctor interfaces. Telemedicine for example uses various types of networks so that physicians can share ideas, surgeons anywhere in the world can perform a single operation together irrespective of where the operating theatre is, nurses and paramedics can retrieve a patient's record anytime anywhere.³

The primary goal of healthcare services is to ensure the safety of patients. Patient safety has gained legal attention due to advancements in digital healthcare technologies and a global movement to address safety concerns.⁴ Patients have enforceable rights that healthcare professionals and businesses must uphold, including respectful care, dignity, privacy, continuity of care, second opinions, and access to medical records.⁵ Healthcare Information Technology (HIT) involves the use of computer hardware and software to process, store, retrieve, share, and utilize

¹Margo Edmunds and others (eds), *Consumer Informatics and Digital health* (Springer Nature Switzerland, 2019) 12

²C Donald Combs and others (eds), *The Digital Patient* (John Wiley & Sons Inc. 2016) 7

³Bernard Fong, ACM Fong & CK Li, *Telemedicine Technologies* (John Wiley & Sons Publication Ltd, 2011) 15

⁴ World Health Organisation, Patient Safety Rights Charter. See the Background

⁵University College Hospital, Ibadan, Patients Rights and Responsibilities available at <https://uch-ibadan.org.ng/patients-rights-and-responsibilities/><accessed 14 January 2025> . See also Olejarczyk Jacob, Young Miachael, 'Patient Rights and Ethics' (StatPearls Publishing LLC) available at <https://www.ncbi.nlm.nih.gov/books/NBK538279/><accessed 14 January 2025>

healthcare information for communication and decision-making.⁶ Concepts that are fundamental to this research underpin the relationships between safety, rights, technology, and patient health. These concepts intersect with various legal areas like torts, crime, contract law, and human rights.

Mobile health or digital health is the growing trend in telemedicine in modern society. These recent developments are made possible through the combination of artificial intelligence and cloud computing.⁷ In the United States, there are increasing cases of stroke which has been accepted to be the major cause of other illnesses such as weakness, numbness, vision problems, confusion, and trouble walking and talking.⁸ Because of this situation, there is an intentional demand for an application that can monitor patient remotely and possibly be able to create an alert awareness during an emergency.

What then is mobile health? Mobile Health is the integration of mobile computing and health monitoring. It is the application of mobile computing technologies for improving communication among patients, physicians, and other health care workers.⁹ Mobile Health applications are receiving increased attention largely due to the global penetration of mobile technologies. It is estimated that over 85% of the world's population is now covered by a commercial wireless signal, with over 5 billion mobile phone subscriptions.¹⁰

Several scientists have proposed a number of scientific programs specifically designed to address certain illnesses. Joseph John Oresko proposes a real-time, accurate, context aware ST segment monitoring algorithm, based on PCA and a SVM classifier and applied on smart

⁶D Brailer, 'The decade of health information technology, Framework for Strategic Action' http://www.providersedge.com/ehdocs/ehr_articles/the_decade_of_hit-delivering_customer-centric_and_info-rich_hc.pdf accessed 28 January 2025.

⁷Homerios Rivas and Katarzyna Wac (eds), *Digital Health* (Springer International Publishing, 2018) See abstract.

⁸Ibid.

⁹R Shahriyar, MF Bari, G Kundu, SI Ahamed, & MM Akbar 'Intelligent mobile health monitoring system (IMHMS)' in *International Conference on Electronic Healthcare* (Springer, Berlin, Heidelberg 2009) 5–12.

¹⁰Royal Tropical Institute, 'What is mHealth?' <http://www.mhealthinfo.org/what-mhealth> accessed 26 January 2025.

phones, for the detection of ST elevation heart attacks,¹¹ Madhavi Pradhan proposes a model for detection of diabetes¹², Oguz Karan presents an ANN model applied on Smartphone to diagnose diabetes¹³, Peter Pes develops a Smartphone based decision support system (DSS) for the management of type 1 diabetes in order to improve quality of life of subjects and reduce the aforementioned secondary complications.¹⁴ All these AI developments are towards ensuring that patients can be monitored remotely even in emergency situations.

Furthermore, the need for consistent development in AI particularly in relation to health has been a major endeavour in developed States. Remote medical systems have created more opportunities in healthcare systems. As much as several algorithms have been developed towards addressing several health issues remotely, it was discovered that little or no success has been achieved in remote detection of cancer.¹⁵ Experiments are consistently being performed towards developing mobile teleradiology for cancer patients.¹⁶

Artificial intelligence is the most currently explored scientific discovery being sought to be used in all facet of life. It has been very effective and used in the banking sector, educational sector, and other scientific fields amongst others. It is therefore a desirable development that AI is being sought to be relevant in provision of healthcare services for all cases of illnesses. It is no doubt that the technological advancement in Nigeria is at its low level and no considerable alignment with current technological

¹¹JJ Oresko, 'Portable heart attack warning system by monitoring the ST segment via smartphone electrocardiogram processing' (PhD thesis, University of Pittsburgh 2010).

¹²M Pradhan, K Kohale, P Naikade, A Pachore, & E Palwe, 'Design of classifier for detection of diabetes using neural network and fuzzy k-nearest neighbor algorithm' (2007) 2(5) International Journal of Computational Engineering Research 1384–1387.

¹³ O Karan, C Bayraktar, H Gmkaya, & B Karlk, 'Diagnosing diabetes using neural networks on small mobile devices' (2012) 39(1) Expert Systems with Applications 54–60.

¹⁴Peter Pesl, Pau Herrero, 'Mobile-Based Architecture of a Decision Support System for Optimal Insulin Dosing' (2010) Imperial Comprehensive Biomedical Research Centre.

¹⁵Dac-Nhuong Le, Chung Van Le, Jolanda G. Tromp and Gia Nhu Nguyen, *Emerging Technologies for Health and Medicine* (Scrivener Publishing, 2018) 118

¹⁶ Ibid at 131.

advancement in medicine is noticeable if at all it does exist in some hospitals.¹⁷

(II) CONCEPTUAL CLARIFICATION

The expediency of promoting good health and well being is one of the basics of sustainable development goals. Digital healthcare therefore is one of the routes to be taken towards making this goal a reality. *Bernadette Richards, Mark Taylor, and Susannah Jacobson*¹⁸ emphasized the need to regulate and rightly channel the use of healthcare technology innovation in the right course to achieve patient safety. The authors examined the adequacy of current regulatory approaches, the identifiable gaps, risks, and liabilities, and how these legal matters should be collectively addressed. The authors expressed the importance of ensuring that there is public trust in healthcare even as there is inevitable technological progress in healthcare. The work of these authors presents multifaceted areas of law that must intersect such as health law, technology law, law and development, and law and society.

*Chinmay Chakraborty*¹⁹ while justifying the immediate requirement for digital healthcare, referenced the COVID-19 experience by which individuals could hardly access medical care physically. Just like other authors reviewed earlier, Chinmay highlights how IoT (Internet of Things) can be integrated into the healthcare system for better diagnostics, monitoring, and treatment of patients, the use of artificial intelligence for predictive and preventive healthcare systems, and effective remote diagnostics and telemedicine approach for developing smart care, among others. The implication of focus on patient safety is seen in Chinmay's work which is primary but the consequential legal implications of digital health care technology should not be ignored.

¹⁷ Onoja A Johnson, OF Sanni, O Awelewa, S Peterside and S Onoja, 'Poor Availability of Information Communication and Technology in Sub-Saharan Africa Health Sector: A Case Study of Nigerian Health Facilities' (2021) 15(1) *Journal of Health Informatics in Developing Countries* <https://www.jhidc.org/index.php/jhidc/article/view/313> accessed 28 January 2025.

¹⁸ Bernadette J. Richards and others, *Technology, Innovation and Healthcare* (Edward Elgar Publishing, 2022)

¹⁹ Chinmay Chakraborty, *Digital Health Transformation with Blockchain and Artificial Intelligence* (1st edn, CRC Press 2024) 10

Sustainable development goal 3 aims towards promoting good health and well being. *Loick Menvielle, Anne Françoise Audrain-Pontevia and William Menvielle*²⁰ discussed extensively the revolution brought about by adoption of digital health. Authors are of the firm view that IT has infiltrated the health sector and it is now beginning to have a growing influence on both doctors and patients. More than a passing trend, the health sector is undergoing a revolution which could change the way doctors and patients relate. While some companies may be adopting these changes for their own benefits, the digital revolution could be extremely positive for all of us.²¹ The authors further provided statistics that according to PWC reports in 2015, eHealth market is worth more than US \$250 billion, with an encouraging prospect of between 10 and 25%.²² Authors while describing some of the uses of digital health states that digital health is seen as a solution to care access issues, but not only this but that it will give patients with chronic diseases the possibility to manage their illness. For healthy individuals, digital health can provide a preventive approach, especially with self-monitoring apps, which are arousing more and more interest from Google, Apple, Facebook, Amazon (GAFAs).²³

Furthermore, the economic implication of digital health is a matter of importance for a government to make firm policy on. Whether availability of digital healthcare will be available for low costs will depend on economic policy and private equity arrangements as the case may be. For example, *Homero Rivas and Katarzyna Wac*²⁴ examined the historical development of digital health and how it is economically profitable today. Considering that one of the foremost desire for digital health is the presumption of its cost effectiveness. The authors states the fact that many of these technological advancements were subsidized into existence through the major health reforms of the past decade, which should not be overlooked—notably the Affordable Care Act and the Health

²⁰Loick Menvielle, Anne Françoise Audrain-Pontevia and William Menvielle, *Digitization of Healthcare* (Macmillan Publishers Ltd, 2017) x-xi.

²¹Ibid.

²²Ibid. See preface

²³ Ibid.

²⁴ Homeros Rivas and Katarzyna Wac (eds), *Digital Health* (Springer International Publishing, 2018) 1

Information Technology for Economic and Clinical Health (“HITECH Act”). These legislative changes inspired venture investors in Silicon Valley and other tech hubs to open their checkbooks to health technology entrepreneurs, and for the world’s most valuable companies like Apple, Amazon, and Google to begin eyeing opportunities in the \$3 trillion medical sector for the first time.²⁵ There is a need for developing nations like Nigeria to equip their laws with formidable economic policies that will ensure that digital health technology is made available at affordable costs to the people.

This current research examines basic legal and economic perspectives to adoption of digital healthcare technologies in medical practice especially in developing countries like Nigeria where technology advancement is still low.

(III) WHY IS DIGITAL HEALTHCARE IMPORTANT TO MODERN MEDICAL PRACTICE?

The practice of medicine dates back to the stone-age where primitive methods of performing surgery were discovered and utilised.²⁶ Medicine has improved over the years with several methods of approach and delivery being developed such as antisepsis, anesthesia, analgesia, antibiotics, endoscopic, robotic and even scar-less surgery.²⁷ Despite these laudable developments, the practice of medicine is still highly artisanal, requiring the presence of both the doctor and the patient in all cases.²⁸ This represents one of the challenges facing modern medical practice. The challenge of medical brain drain has reduced the chances of many patients being treated. This particularly raises a major concern for Nigeria where there is a high rate of emigration of medical doctors leading to socio-economic challenges and poor delivery of medical services.

²⁵Ibid. See foreword

²⁶Homerios Rivas and Katarzyna Wac (eds), *Digital Health* (Springer International Publishing, 2018) 1

²⁷Ibid

²⁸Ibid at 2

According to the report by Finnegan in 2016, the Association of American Medical Colleges estimating the US could lose as many as 100,000 doctors by 2025, primary care physicians are already in short supply, particularly in rural areas, according to a Market Watch report. Some 65 million Americans live in what's "essentially a primary care desert," said Phil Miller, of the physician search firm Merritt Hawkins. In fact, in about one-third of states, only half or less of patients' primary care needs are being met.²⁹ Similarly, according to the report from World Health Organisation in 2016, the report from Africa shows that life expectancy has been improving globally at a rate of more than 3 years per decade since 1950, with the exception of the 1990s. During that period, progress on life expectancy stalled in Africa because of the rising HIV epidemic; and in Europe because of increased mortality in many ex- Soviet countries following the collapse of the Soviet Union. Life expectancy increases in most regions from 2000 onwards, and overall there was a global increase of 5.0 years in life expectancy between 2000 and 2015, with an even larger increase of 9.4 years observed in the WHO African Region.³⁰

The President of the Nigerian Medical Association (NMA) stated that to have a quality medical service delivery in Nigeria, it will require a mix of 23 doctors, nurses and mid wives per 10,000 population of Nigerians. However, in his interview, this possibility has been short circuited by migration of over 5,600 professionals to the United Kingdom. In his estimates he stated that currently there is only one doctor available to attend to 30,000 patients in South Western States of Nigeria and one doctor to over 45,000 patients in Northern Nigeria.³¹ The law maker, Mr. Johnson while seeking further justifications argued that the Nigerian medical education when compared to developed States like the US is cheap and almost free. He said this to emphasize that the medical doctors have

²⁹Joanne Finnegan, 'Primary Care 'Deserts' Leave Patients without Physicians' Fierce Healthcare <http://www.fiercehealthcare.com/practices/primary-care-deserts-leave-patients-without-physicians> accessed 27 January 2025.

³⁰ World Health Organization, 'International Statistical Classification of Diseases and Related Health Problems, 10th Revision' <<http://apps.who.int/classifications/icd10/browse/2016/en.>> accessed 27 January 2025

³¹ Leke Baiyewu, 'Reps Propose Compulsory Five-Year Service for Medical Workers' <<https://www.google.com/amp/s/punchng.com/brain-drain-reps-propose-compulsory-five-year-service-for-medical-workers/%3famp>> accessed 27 January 2025

no reason not to give back to the society.³² These arguments are not the focus of this research. The crux of the matter is that in Nigeria brain drain has created a challenge of maintaining artisanal mode of medical delivery, hence the importance of the need to explore the advantages of digital health.

The position is right that medicine itself can only scale to a degree by medical education, rendering new doctors who will see more people, or by implementation of public health through preventive medicine strategies.³³ Digital health prides itself in the ability to deliver medical healthcare by leveraging on the use of information systems and other technological tools for the purpose of delivering health services to the public.³⁴ The purpose of digital healthcare which has also been referred to as ‘online medical practice’ has been highlighted by LoickMenvielle, Anne Francoise Audrain-Pontevia and William Menvielle as follows:

1. It will please the computer scientist that will see a potential development of new apps for smart phones, to better help the care consumer to be aware of his own body.
2. It will help the legislator to make better guidelines in regulating online medical practices by contributing to law, directives, and standards.
3. It will allow the ethicist to better appreciate what users do with medical data and also with health information provided by Internet users that consult forums or online communities.
4. It will help the sick person to better understand its rights, its involvement in this complicated and changing medical world, and will help him understand how data may be used.
5. It will provide some guidance to general practitioners and medical specialists by showcasing best practices in the “online” medical field. Finally, this book will help every kind of person that is curious as well to find out more about connected health.³⁵

³² Ibid

³³Ibid (note 4) 2

³⁴Ibid at 3

³⁵LoickMenvielle, Anne Francoise Audrain-Pontevia and William Menvielle, *Digitization of Healthcare* (Macmillan Publishers Ltd, 2017) x-xi

It is therefore important to understand that the goal of digital health is to address imminent concerns and demands of the contemporary society. As medicine has evolved over the years, recent developmental areas have involved developing digital options both for the doctors and for the patients. Digital health therefore seeks to achieve in our modern society what WHO considers the definition of health which is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.³⁶

Patients in hospitals are faced with several challenges that place their health at risk. One of the prevailing concerns is one regarding the inadequacy of doctors available to attend to myriads of patients who are waiting to be treated. Brain drain being one of such concerns and it is agreed to be a global phenomenon. For example, it reported that more than forty-one thousand professionals and technicians have emigrated from other parts of the world to the United States in 1973.³⁷ It was also reported by the Pan American Health Organization that in a space of five years more than three thousand educated Latin-Americans have immigrated into the United States.³⁸ It was also reported in Argentina that over a period of ten years, over four thousand professionals have migrated permanently to other countries.³⁹ The United Kingdom has a report given by an ad hoc committee stating that more than 12% of its Ph.D British University graduates in sciences emigrate permanently every year; also that over one hundred thousand British scientists leave the country for the United States annually.⁴⁰ The clear cut fact in all of these figures is that the United States have been confirmed the destination of most skilled professionals from across different boundaries and territories.⁴¹

In Nigeria, brain drain has affected the society in ways that both the doctors and patients have been put at risk. On 29 December 2022, an unfortunate incident occurred in Oghara, Ethiope West Local

³⁶ World Health Organization, Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19–22 June, 1946; signed on July 22, 1946 by the representatives of 61 states (Official Records of the World Health Organization, no 2, p 100) and entered into force on April 7, 1948..

³⁷ A Portes 'Determinants of the Brain Drain' (1976) 10 International Migration Review 489

³⁸ Ibid at 489

³⁹ MA Horowitz, *La Emigracion de Tecnicos Profesionales Argentinos* (1962)

⁴⁰ A Portes, 'Determinants of the Brain Drain' (1976) 10 International Migration Review 489

⁴¹ Ibid.

Government Area of Delta State, Nigeria where a female patient approached the hospital and was attended to by a medical doctor. While consultation was going on, the patient called her relatives to come and pay her medical bills. Upon their arrival, they shot the medical doctor on sight and killed him. Following interrogation, the culprits accused the doctor of being the cause of the death of one of their relatives even though they had no proof of it.⁴² However, the deceased doctor was reported to have been at work for more than 48 hours without break because of lack of adequate medical personnel within that community. Similarly, there are several unreported incidents of attacks on doctors at the Accident and Emergency Wards in Nigeria where family of victims believes that their family members were left unattended to. A victim does not care whether or not the doctors are adequate who could handle the numerous patients they have to attend to in a day. So also, medical doctors are not only short in supply but are not adequately remunerated.⁴³ Both parties have a right but how can they be educated and helped to be able to function within their social environment without causing havoc or breeding violence.

Having access to medical information is the epoch of digital health where people can access medical information through online resources and articles. This development began in 1980s when the use of computer began to gain global notice.⁴⁴ Health-related websites⁴⁵ provides medical information to people, and others began to give consumers direct

⁴² Sandra Nwokolo, 'How Medical Doctor was Killed while Attending to 'patient' in Delta' available at <<https://tribuneonline.com/how-medical-doctor-was-killed-while-attending-to-a-patient-in-delta/>> accessed on 21 June 2023

⁴³ I Ogunyemi 'The Saudi Recruitment of Nigerian Doctors' <https://tribuneonline.com/the-saudi-recruitment-of-nigerian-doctors/> (accessed 18 May 2023). The news report reveals that over 500 Nigerian medical doctors turned up for the recruitment test for Saudi Arabian medical jobs. Sahara Reporters, a news media in Nigeria reports that Nigerian may lose these numbers of medical doctors within a month. The Punch Newspaper reported after a few months consequent upon the recruitment when one of the recruited medical doctors said '...we had tears of joy after receiving our first salary in Saudi Arabia...'. This fact shows the poverty undertone which led to the decision to leave Nigeria. Also, Saudi Arabia's desire to recruit Nigeria trained medical doctors show the recognition of their expertise, skill and intelligence which they believed that their own country have failed to recognize.

⁴⁴ Margo Edmunds, Christopher Hass and Erin Holve (eds), *Consumer Informatics and Digital Health* (Springer Nature, Switzerland 2019) 3

⁴⁵ Examples are WebMD™, healthfinder.gov amongst others.

access to professional medical journals as well as information that was translated and synthesized for lay people, allowing them to learn about their own and their family members' medical diagnoses and conditions.⁴⁶ Consumers also started some of the earliest web sites to share their personal experiences managing their own chronic conditions, such as asthma and diabetes, and online communities grew around these common concerns and goals. As a result of gaining direct access to medical information, many people started asking their clinicians how to interpret contradictory findings from different studies, how to know what treatment and prevention strategies would work best for them, and how they could learn more about managing their own health conditions.⁴⁷

It follows therefore that while access to medical information has improved online over the years, modern society demands that diagnosis, treatment and monitoring of patient ought to be practicable by digital means. This is where this current research seeks to analyse. As a matter of case study, the story of Hugo Campos perfectly illustrates the concept of an empowered patient (ePatient) defined as a patient who is engaged and actively participates in their own treatment and health. The term ePatient was first used by Dr. Tom Ferguson to describe individuals who are equipped, enabled, empowered and engaged with their health care.⁴⁸

The ePatient journey begins with the search to truly understand themselves and their own health. Hugo Campos is one of the many ePatients who are redefining Health Care and redefining our thinking of how technology can be used to redefine the doctor-patient relationship.⁴⁹ After passing out on a train platform and receiving a diagnosis of hypertrophic cardiomyopathy, Hugo Campos's life was forever changed. Campos was considered at high risk for sudden cardiac arrest and was fitted with an implantable cardioverter-defibrillator (ICD). As his condition slowly took over his life, he realized that he needed to learn as much as he could about his condition so that he could have

⁴⁶ WB Lober and JL Flowers, 'Consumer empowerment in health care amid the internet and social media' (2011) 27(3) *Seminars in Oncology Nursing* 169–182

⁴⁷ note 24 *supra*

⁴⁸ T Ferguson, 'e-Patient Scholars Working Group E-patients: how they can help us heal healthcare' (2007) *Patient Advocacy Health Care Qual* 1–126.

⁴⁹ R Steven and M Steinhubl, 'Can mobile health technologies transform health care?' (2013) *JAMA* 1–2. doi:10.1001/jama.2013.281078. Conflict.

educated conversations with his care team. What he really wanted was access to the data that was being collected by his ICD to help guide his interactions and better empower his decisions.⁵⁰

Emerging health technologies are very crucial to ensuring the safety of patient in modern society. The projection of unimaginable decrease in the number of doctors by 100,000 according to the US report by 2025 suggests that patients are at the risk of being ever treated.⁵¹ The projection that the number of patients may increase and the number of physicians may decrease is a potential threat to the safety of patients. Digital healthcare therefore affords opportunity to patients in some cases to be able to interact with physicians online, get diagnosed and treated. The physician on the other hand can manage more patients through online consultation compared to physical consultation. This forms a major basis for desiring digital health technology in the treatment of patients. The old time belief is that patients are not capable of understanding complex medical information.⁵² They have also been told what to do or not to do. However, people have generally turned to seeking their own information and judging their own lifestyle by online information which is the option that works in our modern society.⁵³ These are several premises upon which the desire for digital health technology is based.

(IV) PATIENT SAFETY AND PATIENT RIGHTS IN LEGAL PERSPECTIVES

Patient safety is often viewed through a tortuous lens but also incorporates elements of human rights, criminal law, and contract law. This research focuses on classifications like torts, human rights, and contracts within the Nigerian health system, which faces challenges such as inadequate infrastructure, staffing shortages, limited funding, poor regulation, and patient education. These challenges lead to safety concerns like medication

⁵⁰ibid

⁵¹LoickMenvielle, Anne Francoise Audrain-Pontevia and William Menvielle, *Digitization of Healthcare* (Macmillan Publishers Ltd, 2017) 8.

⁵² Margo Edmunds and others (eds), *Consumer Informatics and Digital Health* (Springer Nature Switzerland, 2019) 10

⁵³ ibid.

errors, misdiagnosis, and hospital-acquired infections.⁵⁴ These are challenges that digital health technologies aim to address. Legal complications arising from these challenges and the impact of digital health technology adoption on traditional medical negligence laws will therefore be explored.

Law of Torts

Patient safety, from a legal standpoint, involves the duty of care between a doctor and a patient. With the integration of digital health technology, this duty becomes more complex, extending beyond the doctor to include the health technology used or the manufacturer of the health tool.⁵⁵ The doctor's duty may involve the correct use and application of digital health tools in patient treatment.⁵⁶ The law of torts addresses fundamental questions about how people should treat each other and who is responsible when things go wrong.⁵⁷ In the context of digital health technology, tort law emphasizes breaching norms of conduct governing interactions between individuals. The duty owed by a doctor when dealing directly with a patient is not the same as when adopting a developed digital health tool in a patient's treatment.⁵⁸ The standard of care remains the same, although the sharing and determination of liability may differ.⁵⁹

The law of negligence places limits on the risks individuals can impose on each other. Not all risk imposition is inappropriate, as Lord Reid noted in *Bolton v Stone*⁶⁰, stating that in modern crowded conditions, even the most careful person cannot avoid creating some risks and

⁵⁴ BC Ephraim-Emmanuel, A Adigwe, R Oyeghe, DST Ogaji, 'Quality of health care in Nigeria: A myth or a reality' (2018) 6(9) *Int J Res Med Sci* 2288–875.. DOI: 10.18203/2320-6012.ijrms20183621

⁵⁵ Kyle T Jorstad, 'Intersection of Artificial Intelligence and Medicine: Tort Liability in the Technological Age' (2020) 3 *Journal of Medical Artificial Intelligence*.

⁵⁶ Kevin Tobia, Aileen Nielsen and Alexander Stremitzer, 'When Does Physician Use of AI Increase Liability' (2021) *The Journal of Nuclear Medicine* 7–21.

⁵⁷ Jules Coleman and others (eds), *The Oxford Handbook of Jurisprudence and Philosophy of Law* (Oxford Handbook Online 2004) 21.

⁵⁸ Kevin Tobia, Aileen Nielsen and Alexander Stremitzer, 'When Does Physician Use of AI Increase Liability' (2021) *The Journal of Nuclear Medicine* 7–21.

⁵⁹ *Ibid.*

⁶⁰ [1951] AC 850; 1 All ER 1078

accepting others.⁶¹ Inappropriate risks, when imposed, are at the injurer's own risk. If a risk is not inappropriate, its costs lie where they fall, as part of the risks of ordinary life.⁶²

The introduction of digital health technology in patient treatment presents undeniable risks, especially in the use of artificial intelligence (AI) and machine learning.⁶³ While these technologies can predict outcomes and recommend treatments, challenges remain due to untested safety and effectiveness of some digital health tools. The boundary between appropriate and inappropriate risks is determined by norms of equal freedom, allowing all individuals to pursue their goals without interfering with others. The standard of care in negligence is objective, requiring all to meet a common standard of foresight to protect everyone equally.⁶⁴

It is crucial for the law to establish standards of care to ensure patient safety when digital health tools are used in medical treatment. These standards must consider the complexities of healthcare technology to provide equal protection for all involved.⁶⁵ Patient safety, like traditional negligence cases, requires a common objective standard that considers the impact of digital health technology. The law, as seen in *Vaughan v Menlove*⁶⁶, does not consider individual sensibilities or weaknesses when evaluating negligence claims. Norms should apply universally, regardless of an individual's abilities or circumstances.

⁶¹ *Ibid*

⁶² Jules Coleman and others (eds), *The Oxford Handbook of Jurisprudence and Philosophy of Law* (Oxford Handbook Online 2004) 21.

⁶³ Olejarczyk Jacob, Young Miachael, *Patient Rights and Ethics* (StatPearls Publishing LLC) available at <https://www.ncbi.nlm.nih.gov/books/NBK538279/> <accessed 14 January 2025>; A Jay Holmgren, Susan McBride, Bryan Gale and Sarah Mossburg, 'Technology as a Tool for Improving Patient Safety' (Agency for Healthcare Research and Quality).

⁶⁴ Noshin Tasnim Chowdhury, 'The Reasonable Man: Subjective and Objective Standard' (London College of Legal Studies) <https://lcls-south.com/the-reasonable-man-subjective-and-objective-standard/> accessed 16 January 2025.

⁶⁵ Joachim Dietrich and Ian Field, 'The Reasonable Tort Victim: Contributory Negligence, Standard of Care and the 'Equivalent Theory' (19..) 41 *Melbourne University Law Review* 602.

⁶⁶ [1837] 132 ER 490 (CP)

The norm applies when it is part of a system of norms that is justified.⁶⁷ Therefore, there is a need to determine the legal norms that regulate the application of digital health technology in enhancing patient safety in Nigeria.

The introduction of health technologies is undoubtedly required in medical practice to address medical concerns in contemporary society. Despite the high priority we attach to safety, any investment in safety requires forgoing other valuable things.⁶⁸ As a result, there are limits on how much sense it makes to spend. Those limits are arguably a function of three things: the cost or inconvenience of the precaution, the type or seriousness of damage to avoid, and the likelihood of that damage occurring.

Suppose I am deciding whether to purchase a new ladder for changing light bulbs. Whether the expenditure makes sense depends on the cost of the ladder, the harm it would help me avoid, and the likelihood of that harm occurring. Consider two scenarios. Perhaps the only alternative to the ladder is for me to stand on tiptoes on the top edge of an old and unstable ladder. The extra expenditure makes sense because of the likelihood and seriousness of the harm that might result— a broken arm or back if I fall. But if I am unusually agile, perhaps the injury is unlikely, and so the expenditure is unnecessary. Alternatively, perhaps the old ladder is just as stable as the new one, but the new one has a special hole for holding light bulbs, so I am less likely to drop one if I get the new ladder. Since light bulbs are inexpensive, it does not make sense for me to get the new ladder because the expected cost it is supposed to avoid is lower than the cost of the precaution.⁶⁹

Each digital health technology tool is meant to provide a solution to a specific medical challenge, and by its spread, digital health technologies are useful in lowering risks in certain medical treatments.⁷⁰

⁶⁷ Ch. Perelman and Harold J. Berman, *The Justification of Norms' Justice, Law and Arguments* (D Reidel Publishing Company) 107-113.

⁶⁸ *Ibid.*

⁶⁹ Jules Coleman and others (eds), *The Oxford Handbook of Jurisprudence and Philosophy of Law* (Oxford Handbook Online 2004) 21.

⁷⁰ Ugwu Emmanuel Chika and others, 'Digital Healthcare Tools in Nigeria: Strengthening Public Health and Pandemic Preparedness-Insights from COVID-19 Crisis' *Telehealth and Medicine*

Patient safety concerning the adoption of digital health technology tools requires adequate legislation to address specific issues slightly different from the traditions of medical negligence law. For example, the issue of allocation of liability is very vital where digital health technology has been used for a patient.

Michelle M. Mello and Neel Guha⁷¹ in their policy brief observed that when a product has caused injury to a patient, what the courts do is examine the matter within established legal rules to determine the allocation of liability between the party using the product and the company that manufactured it. According to the traditional rules of the doctrine of negligence, the party must show that the defendant owed a duty of care to him and that the conduct of the defendant falls below the expected standard of care. The authors however opine that making these determinations is much more complex for AI and other software tools applied in healthcare settings.⁷² This current research intends to expatiate the allocation of liability where healthcare technology has been adopted in the treatment of patients. In the case of *Sergeant v. Orthopaedic Associates Medical Clinic*⁷³, physicians, a technician, and a clinic were sued after a human error during a reprogramming of an infusion pump which led to lethal morphine dosing. In this case, there is a human error which means that the humans who made the error will be liable. Is the situation different where the software fails after all expertise has been disbursed by the humans? The authors' conclusions were based on the fact that Plaintiffs often encounter problems if they are unable to show the specific design defect in the software that caused the injury. The issue of liability is very important in developing a legal framework for patients' safety and healthcare technologies.

Peter D. Jacobson⁷⁴ in his research report examined how technology is central to the gaps often created in the doctrine of negligence

<https://telehealthandmedicinetoday.com/index.php/journal/article/view/445/1046#info> accessed 17 January 2025; *United States v Carroll Towing Co* 159 F 2d 169, 173 (2d Cir 1947).

⁷¹ Michelle M Mello and Neel Guha, 'Understanding Liability Risk from Healthcare AI' (Stanford University, Human Centered Artificial Intelligence, Policy Brief, HAI Policy and Society, 2004).

⁷² *Ibid*, 2

⁷³ *Ibid*

⁷⁴ Peter D Jacobson, *Medical Liability and the Culture of Technology* (2004).

with a specific focus on medical liability. He avers further that the history of medical liability is a struggle between technological advancement and injuries resulting when those advances fail. The recent interest in patient safety through healthcare technology in Nigeria will therefore require a proactive disposition toward a review of the torts law on negligence especially on medical liability. This current research will therefore examine the current jurisprudence on medical liability in Nigeria with the intent to determine legal developments required for the inclusion of the impact of patients' safety and healthcare technologies on the law.

Law of Contract

Hughes is of the view that an occupation consists, in part, of a successful claim of some people to licence to carry out certain activities which others may not, and to do so in exchange for money, goods or services. According to him, those who have such licence will, if they have any sense of self-consciousness and solidarity, also claim a mandate to define what is proper conduct of others toward the matters concerned with their work.⁷⁵ The implication of this postulation is that while medical personnel has a duty to provide professional services, a patient also but maybe not equally has a role to play to ensure a desired result. This therefore establishes a contractual nature of doctor-patient relationship

The operation of contracts within the context of doctor-patient relationship raises a number of questions. The condition of a private right of action in the common law of contracts typically requires that the plaintiff proves that the defendant breached a contractual obligation to perform.⁷⁶ The state does not have the power to require parties to perform a contract freely. Rather, the state only requires a promisor to perform when the promisee has a private right of action for specific performance. The availability of courts where a disappointed promisee can compel specific performance is an affirmative right of citizens to secure compliance with promises made to them. A private right of action in a contract for specific performance is a power to legally compel a promisee to perform, under the possible contempt sanction by the state, on pain of

⁷⁵ EC Hughes, *Men and Their Work* (Greenwood Press 1958) 78.

⁷⁶ Jules Coleman and others (eds), *The Oxford Handbook of Jurisprudence and Philosophy of Law* (Oxford Handbook Online 2004) 14.

a possible contempt sanction by the state.⁷⁷ The court's relief is not simply due to the defendant's obligation to perform; it is the plaintiff's rights to have the defendant perform based on the defendant's promise to them.

Despite these traditional doctrines of contract, the situation is not exactly the same under patient safety. For example, in the United Kingdom, the subject of safety has been transformed from a private professional problem to an important issue of global public health. It is no longer the preserve of doctors to be burdened with the whole demand of patient safety.⁷⁸ This means that the government and its agencies designed to regulate and are involved in the health system of the State have roles and are part of the contract to ensure patient safety. The inventions of digital health technology increase the number of contractual actors to include companies and manufacturers of these mobile health technologies.

Human Rights

Whether access to health in Nigeria can be regarded as actionable rights is arguable. Chapter II of the Constitution of the Federal Republic of Nigeria 1999 (as amended) has been long settled to be of no legal effect as to ground a cause of action before the Court. However, subscription to international legal instruments such as Universal declaration of human rights and other regional human rights instruments may be used as a basis to argue that access to health when denied may be construed as a breach of a person's fundamental right.⁷⁹

That rights are universal is a generally accepted proposition. Everyone possesses certain fundamental rights simply by virtue of being human.⁸⁰ Some argue that rights are a modern, Western invention, while others believe rights are natural and instinctive, as natural law theorists do. This forms the basis of the philosophy of certain rights deemed as fundamental. Health is one of those fundamental rights. Access to health is a universally endorsed human right. Every person, male and female, has the right to access adequate health care. WHO defines health as "a state of

⁷⁷ Stanford Encyclopedia of Philosophy, 'Philosophy of Contract Law' <https://plato.stanford.edu/entries/contract-law/> accessed 17 January 2025.

⁷⁸ Oliver Quick, *Regulating Patient Safety* (Cambridge University Press, 2017) 29

⁷⁹ See Article 25 of Universal Declaration of Human Rights; Article 16 of African Charter on Human and People's Rights

⁸⁰ James Griffin, *On Human Rights* (Oxford University Press 2008) 1–2.

complete physical, mental, and social well-being and not merely the absence of disease or infirmities.”⁸¹

The Universal Declaration of Human Rights states that every person has the right to a standard of living adequate for their health and well-being, including food, clothing, housing, and medical care.⁸² This implies the importance of ensuring a lifestyle that guarantees the health of individuals. A discussion about patient safety also requires a discussion about patient rights. A patient has the right to be cared for, the right to life, the right to health, and the right to the best treatment available. Anything below this standard could result in a human rights violation. Rights are theoretically classified as either objective or subjective.⁸³

The objective sense of “right” is expressed by the formula “It is right that p,” where p represents a proposition describing an actual or possible fact. For example, “It is right that promises are kept.” Subjective right, on the other hand, expresses a relationship between a person and a state of affairs, such as “X has a right to a thing or to do something.” The concept of subjective right is a moral relationship between a person and a state of affairs. Rights theory must determine whether moral reality can be fully described in terms of objective right or subjective right.⁸⁴

If doubts arise as to whether or not lack of provision of adequate medical care leading to jeopardizing the safety of patient is actionable as a human right issue, the only question left to be answered is whether a jurisdiction considers it as a right at all. However, the introduction of digital health technology is one of the ways a government can commit itself to improving the safety of its citizens. If they fail to do so, what can the Patient legally do?

⁸¹Constitution of the World Health Organization, July 22, 1946 (entered into force Apr. 7, 1948) Basic Documents (Geneva: World Health Organization, 39th ed. 1993).

⁸² Article 25 Universal Declaration of Human Rights 1948

⁸³ Frank S. Alexander and John Witte, Jr (eds), *Christianity and Human Rights* (Cambridge University Press, 2010) 38

⁸⁴ Frank S. Alexander and John Witte, Jr (eds), *Christianity and Human Rights* (Cambridge University Press, 2010) 38; William A Edmundson, *An Introduction to Rights* (Cambridge University Press, 2012) 8.

(V) ECONOMIC IMPLICATIONS OF DIGITAL HEALTH TECHNOLOGY ON MEDICAL COSTS

Healthcare is one of the world's largest industries. Globally, the size of the healthcare market is estimated to be between five trillion and six trillion dollars.⁸⁵ In general, the economics of digital health seem very conducive for the universal adoption of many of its value propositions. Usually, for a given innovation to be massively adopted it must be simple in nature, simple to use, easily reproducible or scalable, cost effective, make sense, have relative advantage(s), low cost, and be safe among other features.⁸⁶ Just as one example of how large the healthcare industry actually is globally, one should consider this: all spending on products and services concerning the heart (pharmaceuticals such as beta-blockers, cardiovascular surgery procedures, etc.) is actually larger than the entire automotive industry. Therefore, it is no wonder that investors have traditionally looked at healthcare as a lucrative industry in which to invest.⁸⁷

Digital health is certainly a hot subsector of the healthcare economy. Over 7600 digital health start-ups were in operation around the world in 2015 and the market for investing in them is quite bullish and optimistic.

The beauty of investing in digital health is that it combines the high-risk/high-reward paradigm, synonymous with the tech industry, and the stability/defensiveness paradigm of the healthcare industry, thereby hedging or mitigating the investor's risk and providing an ideal counterbalance to future rewards. While many investors are singularly driven by maximizing profit, a great number of healthcare and digital health investors are driven by the tandem outlook of both financial profitability and improved societal benefits.⁸⁸

⁸⁵Homerios Rivas and Katarzyna Wac (eds), *Digital Health* (Springer International Publishing, 2018) 290

⁸⁶ *Ibid* at 7

⁸⁷ *Ibid* at 290

⁸⁸ Mussaad Al-Razouki, 'Who Will Pay for Digital Health? The Investor Point of View' in Homerios Rivas and Katarzyna Wac (eds), *Digital Health* (Springer International Publishing 2018) 288.

Whether or not digital health technology is cost effective will depend on each patient and the kind of desired outcome.⁸⁹ Digital health may reduce medical cost considering the number of persons who will be attracted to its usage. It is expected that the funding of these digital health tools will be mostly investors who no doubt expected a return on investments in any case. In a research conducted in Europe, it was shown that digital interventions in health are favourable in effect in terms of cost and health outcomes.⁹⁰

The Nigeria experience shows that Nigeria government's investment in healthcare is minimal compared to the needs of the sector. Reports show that only an average of 3% of its Gross Domestic product (GDP) is allocated to the health sector.⁹¹ As a result of this, most Nigerians must pay for their medical needs with little or no government support.⁹² A change in government's attitude is therefore required in order to meet the growing trend of digital healthcare. With government's funding and investment in digital health technology, the rate of service will be reduced and citizens will be able to afford the services.

(VI) RECOMMENDATIONS

First, a legal review of the traditional rules of law of torts is necessary within the current Nigeria legal framework in consonance with the inclusion of digital health technology globally. Telemedicine or mobile health or ePatient provides an opportunity for a Nigerian who is resident in Nigeria to interact with a physician in the United States. Issues relating to medical liability, product liability and general liability will erupt and traditional beliefs may necessarily be challenged. Territorial laws may

⁸⁹ Andrea Gentili and others, 'The Cost-effectiveness of digital health interventions: A systematic review of literature' National Library of Medicine <https://pubmed.ncbi.nlm.nih.gov/articles/PMC9403754/> accessed 5 February 2025.

⁹⁰V Puelo, A Gentili, G Failla, A Melynk, G Di Tanna, W Ricciardi and F Cascini, 'Digital Health Technologies: a systematic review of their cost-effectiveness' (2021) 31 *European Journal of Public Health supplement* 3.

⁹¹ The Borgen Project, 'Unaffordable Medical Care in Nigeria' <<https://borgenproject.org/medical-care-in-nigeria/#:~:text=The%20Cost%20of%20medical%20care,%20options%20for%20proper%20medical%20attention.>> accessed 5 February 2025.

⁹²Ibid.

require necessary philosophical and jurisprudential amendments in order to globally address the legal implications of digital health technology.

Secondly, the Nigerian government is advised to provide solid economic policy framework that will ensure sustainable financial interventions and investments in the health sector of the country in order to facilitate quality and affordable delivery of digital health technology treatments. A few of private hospitals in Nigeria are gradually navigating the digital healthcare in their operation in terms of digitalization of medical records and this has increased medical costs in these private hospitals. Where public hospitals are neglected in digitalization of healthcare, age-long healthcare challenges will persist and safety of patients is put at risk which may ultimately lead to the death of the patient.

There is also a need for a review of Health laws in Nigeria. The 2016 National Health Policy, however came at a most opportune time, shortly after the enactment of the first *National Health Act 2014* for the country and at a time when there is global recommitment to a new development framework, the Sustainable Development Goals (SDGs), and an increasing global support for the attainment of Universal Health Coverage (UHC).⁹³ The document contains ten (10) policy thrusts. They were derived from the National Strategic Health Development Plan (NSHDP) thrusts and the WHO health systems building blocks. They are: governance, health service delivery, health financing, human resources for health, medicines, vaccines, commodities and health technologies, health infrastructure, health information system, health research and development, community /ownership/participation, and partnerships for health.⁹⁴ From the list of items, issues relating to health information system, health research development and health infrastructure are foundational items that are relevant to the development of digital healthcare technology, but they are yet to be implemented in any form perceivable by the public. Considering the current development in digital technology, the National Health Policy requires urgent review.

⁹³ Prof. Folorunsho Isaac Adewole, Federal Ministry of Health, 'National Health Policy 2016' Promoting the Health of Nigerians to Promote Socio-economic Development (2016) Foreword.

⁹⁴ *ibid* at 4

Finally, the National Health Act though enacted in 2014 recognized the use of technology in delivering healthcare services. Regulations were provided that any health organisation that is to be established and would adopt the use of technology must possess certificate of standards.⁹⁵ It states that without being in possession of a Certificate of Standards, a person, entity, government or organization shall not: (a) establish, construct, modify or acquire a health establishment, health agency or health technology⁹⁶; increase the number of beds in, or acquire prescribed health technology at a health establishment or health agency⁹⁷; provide prescribed health services⁹⁸; or continue to operate a health establishment, health agency or health technology after the expiration of 24 months from the date this Act took effect.⁹⁹ This provision has several implications especially with a view to adopting digital health technology which is the current trend in medical practice of modern society. Paragraph (a) is of the effect that no health establishment will be able to construct, establish, modify or acquire health technology without first obtaining a certificate of standards. This provision discourages any inventor from taking steps towards innovation. Why should a certificate of standards be obtained before a technology is ever constructed? This law in the view of this current research would require an extensive review in order to reflect the trends in modern medical practice especially with specific reference to digital healthcare technology acquisition and ease of developing same indigenously in Nigeria. Digital health technology should not be suffocated before it is ever allowed to develop and operate effectively.

(VII) CONCLUSION

In conclusion, inclusion of digital health care in medical practice is the future of medicine globally towards improvement of good health and well being (SDG 3) and it is imperative that there is timely jurisdictional response in terms of both regulatory compliances and economic

⁹⁵Section 13 National Health Act 2014, Laws of the Federation of Nigeria 2004

⁹⁶ Section 13(1)(a) *ibid*

⁹⁷ Section 13(1)(b) *ibid*

⁹⁸ Section 13(1)(c) *ibid*

⁹⁹ Section 13(1)(d) *ibid*

regulations to avoid business manipulations and abuse of profit maximization in the operation of digital healthcare tools.