

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

**INFORMATION AND COMMUNICATION TECHNOLOGY APPLICATION
AND CHALLENGES IN MANAGEMENT OF PATIENTS' PERSONAL
RECORDS IN SOME SELECTED PUBLIC HOSPITALS IN KUMASI
METROPOLIS.**



**A dissertation in the Department of Information Technology Education, Faculty
of Technology Education, submitted to the school of
Graduate Studies in partial fulfilment
of the requirements for the award of the degree of
Master of Science
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DECLARATION

STUDENT'S DECLARATION

I, Kingsley Ofosu-Oduro declare that this dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE:

DATE:

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of the work was supervised in accordance with guidelines and supervision of dissertation as laid down by University of Education, Winneba, Kumasi.

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DEDICATION

This project is dedicated to Mr. Oduro's family.



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ABSTRACT

Information and Communication Technology (ICT) consists of the array of technologies which gives users the opportunity to receive, produce and also share resources and ideas. Healthcare facilities, such as hospitals, have little choice but to implement IT solutions. However, these technologies appear to be in short supply in hospitals, particularly in developing nations. The study showed that at public hospitals in Kumasi Metropolis, ICT tool is used to assist claims officer in generating claims for NHIA, discharging of clinical services, entering provisional diagnoses for patients and requesting for consultation service. The study revealed that Public hospitals are faced with numerous challenges in deploying ICT tools. According to the study users, management and technology are the factors that play various roles in posing as challenges in the adoption of ICT in the public hospitals. It was concluded that ICT application have effect on hospital operations. The study concluded that the board/management of the public hospital need to build the capacity of healthcare providers on ICT utilization for effective and efficient ICT usage in order to improve the healthcare service provision.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Information and Communication Technology (ICT) consists of the array of technologies which gives users the opportunity to receive, produce and also share resources and ideas (Paul, 2003). ICT therefore includes but not limited to decision support systems, e-mail and health information systems (Azlan, Yusof & Razali, 2012). Again, one of the causes of the greatest wave in technological innovation is the adoption of ICT. Thus, the adoption of Information Technologies has affected new areas of social and economic activities (Klein & Mayer, 2008) and more expectedly, the health sector has also been in the pang and struggle to bring about organizational changes and innovation based on the new possibilities opened up by ICT. ICT therefore possesses features that are able to help the physicians and the healthcare professionals in patient registration, medical billing, medical coding, communicating, accounting and others.

Ahmad (2008) assert that, one major driver of the adoption of ICT in the health sector has been the Government. Thus, the increasing pressure of the government to upgrade the healthcare industry to meet the increasing demands of the tech-savvy consumers who require better healthcare services has compelled hospitals to upgrade their services to meet these international standards. Thus, ICT has become one of the major tools in helping to improve the standard of healthcare delivery in recent times (Baldwin, Clarke, Eldabi & Jones, 2002). In the United Kingdom, healthcare professional consisting of Nurses and Doctors have been engrossed in what has been referred to as the “Radical Action plan” aimed at improving the National Healthcare service. According to Wilson and Anderson (2000), the introduction of ICT in the health sector provides enormous benefits for the discharge of administrative duties which include a decrease in paperwork

and the workload of the staff, an expansion of access to affordable healthcare and an increase in administrative efficiencies. Again, it has been discovered that the introduction of ICT in health has been effective in the prevention of medical errors.

ICT in the health sector also helps to reduce the cost of service delivery. Attention has increasingly been drawn to the potential of ICT in improving efficiency and cutting down the cost of health care. The world's healthcare agenda in recent times has been focused on high-quality assurance and cost reduction. The invaluable role of ICT in meeting this agenda has been evidenced in a number of literature and surveys where the annual savings from the efficiency of healthcare delivery has been approximated to be over seventy-seven billion US dollars (RAND, 2006).

Considering the numerous potentials of ICT in the health sector, it is gainsaying that the implementation of ICT also comes with a host of management issues which the hospital must be able to overcome. For instance, ICT in the health sector is delivered in various packages such as the management solution products in the form of knowledge management, content management and document management for handling the information of the patients and the various storage mechanisms for information preservation. This goes to show the extent of sophistication with the management of ICT in the hospital hence requiring an investigation into ICT application and its challenges in the management of patient personal records associated with the public health sector.

1.2 Statement of the Problem

Application of information technology successfully in organizations appears to be a complex task and hospitals information systems are no exception. Hospitals invest enormous amount of resources in Information technology in order to have a competitive edge, reduce cost in operations, faster storage and retrieval of patient information. The

success and failure of information technology implementation will largely be determined by how an institution handles this stage which is equally important in any project. The need for effective information systems development and implementation is inevitable and more so by hospitals and thus constitute an integral factor in the ongoing development of the business processes. Although the challenges faced in implementation of information technology are many, hospitals today are literally being forced into the implementation of information technology for their effective and efficiency. Public hospital which are the referral hospitals in the country has encountered various challenges in the implementation of the information technology for retrieval of patient's information. An observation at the various hospitals clearly showed that there is delayed ICT implementation and have identified implication as inefficiency in service delivery and controls.

Information that is outdated, inaccurate and hard to understand and make decisions is not useful to any entity and especially hospitals which are dealing with human life (O'Brien, 2002). O'Brien, mentioned that hospital staff requires high quality information and has the three main dimensions of useful information which are time, content and form. Lack of immediate information storage and retrievals also is another problem experienced by the hospitals. He emphasizes that information storage is critical since it defines the way the information will be stored and later retrieved for use. The other problems that hospitals experience with the current systems that necessitate change of the Information system include; lack of prompt updating; error prone manual calculation; preparation of accurate and prompt reports.

Literature on the implementation of information technology at hospital is scarce especially in regard to public hospitals in Ghana. For instance, Abdallah, Nantomah and Adusei (2021) dealt with the challenges facing the integration of ICT in Ghanaian

educational system, whereas Abilimi and Yeboah (2013) concentrated on assessing the challenges of Information and Communication Technology in educational development in High Schools in Ghana. It is for this reason that this study fills in the knowledge gap that currently exists and also offer useful leads for further studies in the same field. This study was different from other studies done because it focused on the challenges faced during the implementation of hospital information systems which were more specific to the health sector.

1.3 The purpose of the study

The purpose of the study is to explore the challenges public Hospitals (Kumasi Metropolis) face in the use of ICT.

1.4 Research Objective

The following are the specific objectives for this study

1. To identify the ICT application practices in public hospitals in Kumasi metropolis.
2. To identify the challenges associated with ICT application in public hospitals in Kumasi metropolis.
3. To determine the impact of ICT application practices on the hospitals' operations.

1.5 Research Questions

The following research questions are developed to guide the study

1. What is the nature of ICT application in Ghanaian public hospitals?
2. What are the technological, organisational and the human challenges confronting the ICT application?

3. What are the impacts of ICT application practices on the hospitals' operations?

1.6 Significance of Study

The significance of the study can be viewed along three strands: research, practice and policy. It will be significant to research such that, it will add to the existing literature on ICT adoption in the health sector specifically by the public hospitals in Ghana and Africa as a whole. This research will also serve as a good source of reference for students and researchers who would want to further research on Information and Communication Technology adoption not only in Ghana but also test the constituents of this research in other parts of the world.

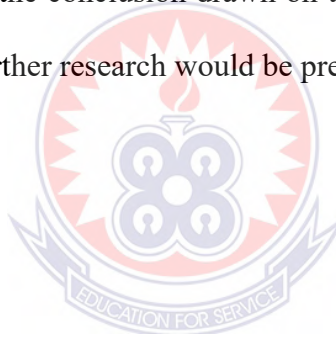
In relation to practice, this research will open-up the opportunities and/or challenges confronting ICT adoption in the public hospitals as well as offering guidelines of how their contemporaries are taking advantages of the opportunities while addressing the challenges. In relation to policy, this research can be beneficial to government agencies in-charge of the health sector by giving them a practical view of the challenges involved in ICT adoption and how best they can leverage them.

1.7 Delimitation of the study

The study will focus on health workers of 10 Public Hospitals in Kumasi Metropolis. The study specifically concentrates on the ICT application practices in public hospitals in Ghana, challenges associated with ICT application in public hospitals in Ghana, and the impact of ICT application practices on the hospitals' operations.

1.8 Organization of the Study

This study was organized in five chapters. Chapter one is the introduction which deal with the background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, delimitation of the study, and organisation of the rest of the study. In chapter two, a related literature is reviewed. A conceptual study would be developed based on the literature review. Chapter three will discuss the research design, population and sample and sampling technique, the research instrument for collecting data, method of data collection and data analysis. Chapter four presents the results and discussion of the study based on the research objectives of the study. Chapter five, the summary of the study and the key findings which also include the conclusion drawn on the findings and recommendations as well as suggestions for further research would be presented.



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter focusses on exploring concepts related to the adoption of Information and Communication Technologies in the health sector. The chapter begins by providing an overview of health information systems and a review of pertinent issues in ICT adoption.

2.1 Theoretical Framework

This study is anchored on diffusion of innovation theory. The diffusion of innovation (Rogers, 1995) is a theory that seeks to explain how, why, and at what rate a new technology (ICT) spread through an environment (a group, a community, a firm, or a country). The theory suggests that at the initial stages of diffusion of a new technology, some adopters (i.e., innovators) will choose to adopt a new technology independently of the decision of others within the social system. The first group of people to use the new technology is called innovators, followed by early adopters, next comes the early majority, then the late majority, and the last group to eventually adopt the technology is called laggards (Rogers, 1995).

Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 2003). Rogers states that there are four main elements of diffusion: Innovation; the idea, practice or object that is developed that is the focus of the adoption, Time; the acceptance rate of the innovation over time, Communication channel; how the innovation is introduced or how it is marketed to an individual, Social system; the elements (such as individuals, groups, organizations and/or subsystem) that are involved in the adoption of the innovation and

their impact on each other. Each of the four elements plays a role in the adoption of technology. The way in which ICT is adopted ensures efficiency and effectiveness of the institutions. The managers of the institutions are the main players in introducing ICT tools.

The Characteristics of Innovation that were considered were Relative advantage, Compatibility, Trialability, Complexity and Observability. Rogers (2003) states in general that successful adoption of a particular innovation should score higher in terms of its relative advantage over existing practices, compatibility to users' needs, trialability and observability, and lower in its complexity to use. There is a general agreement among researchers that Rogers Innovation Diffusion Theory is a suitable and valid theory for examining the process of adoption. Looi (2004) stated that Rogers's theory is considered valuable because it attempts to explain the factors which influence the adoption of an innovation and the manner in which new innovations are disseminated through social systems over time.

In Rogers's Diffusion Model it categorizes and groups users according to the speed in which they adopt new technology. These categories include: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards. These have been described as follows (Kiljander 2004): The innovators are the "techies", the experimenters who have technology as a central interest in their lives and pursue new technology as soon as it appears, no matter what its function is, the early adopters are the "visionaries" who blend an interest in technology with a concern for significant professional problems and tasks, The early majority are the "pragmatists". Although fairly comfortable with technology in general, their focus is on concrete professional problems rather than on the tools (technological or otherwise) that might be used to address them, the late majority are the conservatives or "sceptics". They share the

attitude of the early majority, though being less comfortable with technology. The laggards are the most likely never to adopt at all. In this study successful adoption of innovation like information technology by hospitals score higher in terms of its relative advantage over existing practices which helps to reduce cost in operations, faster storage and retrieval of patient information as a faster rate.

2.2 ICT adoption in the Health Sector

ICT is a network that provides a continuously growing variety of fresh services with significant financial implications for university data standardization (Nwafor, 2005). ICT is a computer-based instruments used in the processing of their data and communication requirements by organisation staff. It includes computer hardware and software, network and several other devices, such as audio, video, photography, camera, etc., converting data and so on into a prevalent digital form (Yusuf, 2005). According to Njoku (2006) there are three categories of data i.e. processed information (computer systems), disseminated information (telecommunication systems), and represented information (multi-media systems).

According to Pelgrum and Law (2003), ICT replaced the term 'computers' towards the end of the 1980s. This meant shifting focus from computer technology to enhancing the computer's ability to store and retrieve information. This was accompanied by the implementation of the word 'ICT' in 1992, when the general public began to receive e-mail. The Information Communication Technology idea comprises of three phrases. The word 'Information' relates to any information interaction or representation in any medium, such as facts, information or opinion. 'Communication' is component and parcel of human life. It refers to the process of transferring information from a sender to a receiver with the use of a medium in which the Communication Information is

understood by both. Technology' is the practical type of information or information application science. In education, therefore, data communication technology is frequently described as' a varied collection of technological instruments and resources used to interact, generate, disseminate, store and handle data (Blurton, 2000). These systems include computer, the Internet, radio and television broadcasting techniques, and telephony (mobile). In essence, ICT is an instrument. It can be hardware (like computers, digital cameras), software (like excellent, debate forum) or all. There are many factors which influence technology adoption. Factors such as top management, organizational behaviour and characteristics, firms' resources, government, customers, supplier and external IT consultant and vendors (Obonyo, 2016). The understanding of these factors helps to know who adopts, when and under what conditions IT adoption occurs.

ICT tools are integrated across the various departments in hospital. At the Out-patients' department (OPD), there are computers bearing the data of patients which facilitates the search of folders. They also have a public address system which helps to amplify patients' names for it to be heard anywhere within the hospital. There are pressure gauges which they use to check the pulse of patients, weighing scales which are used to check the weight of patients and thermometers for detecting the body temperature of patients. There are telephones (intercom services) which the staff uses to communicate with each other within the hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital (Obonyo, 2016).

Tinio (2005) indicated that in consulting rooms, there stethoscopes which Doctors use to examine patients, telephones (intercom services) which the staff uses to communicate with each other within the hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital. Also, there adjustable beds on which some patients lie when the need be. Tinio (2005) further affirmed that at the

information desk, there are computers storing information about the hospital including the daily totals of out-patient visits, admissions, referral, births and deaths. As indicated by Obonyo (2016), at the dispensary room, there are computers storing information on all drugs received as well as drugs dispensed for easy access of their health insurance claims. Also, there is a telephone (intercom services) which the staff uses to communicate with each other within the hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital.

Chetley et al, (2006) on the other hand viewed that at the wards department, there are adjustable beds, water heaters, pressure gauges which they use to check the pulse of patients, wheel chairs for moving patients with walking difficulties, weighing scales which are used to check the weight of patients and thermometers for detecting the body temperature of patients. There is a telephone (intercom services) which the staff uses to communicate with each other within the hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital. At the administration office, computers are used for storing information on all activities of the hospital including staffing as well as annual reports. Also, there is a telephone (intercom services) which the staff uses to communicate with each other within the hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital (Chetley et al, 2006; Tinio, 2005). At the physiotherapy, computers are used for storing the demographic data of patients who visit the unit, electro-therapy equipments for various purposes, electronic wheel chairs and massagers for massaging patients with lying difficulties, pressure gauges which they use to check the pulse of patients, weighing scales which are used to check the weight of patients and thermometers for detecting the body temperature of patients. There is a telephone (intercom services) which the staff uses to communicate with each other within the

hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital (Chetley et al, 2006; Tinio, 2005).

Obonyo (2016) revealed that there is an ultra-sound machine at the ante-natal clinic for checking the heartbeat of fetus, pressure gauges which they use to check the pulse of pregnant women, weighing scales which are used to check the weight of expectant mothers, adjustable beds on which expectant mothers lie to be examined, a telephone (intercom services) which the staff uses to communicate with each other within the hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital. As indicated by Tinio (2005), laboratory, refrigerator is required for preserving specimen, an adjustable bed on which patients lie when necessary, a telephone (intercom services) which the staff uses to communicate with each other within the hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital. Also, in the delivery ward/lying in, there are adjustable beds, water heaters which are used to boil water for bathing babies, pressure gauges which they use to check the pulse of mothers, weighing scales which are used to check the weight of mothers and thermometers for detecting the body temperature of mothers. There is a telephone (intercom services) which the staff uses to communicate with each other within the hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital (Chetley et al, 2006; Tinio, 2005).

According to Kuchenbuch, Chemaly, Chiron, Dulac and Nabbout, (2013), an X- ray tube and ultrasound machines are used for diagnosis at the radiology /x-ray department in the hospital. The blood bank required an adjustable bed on which patients lie when necessary, a telephone (intercom services) which the staff uses to communicate with

each other within the hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital (Kuchenbuch, et al., 2013). As affirmed by Pal, Mbarika, Payton, Datta, McCoy (2005) at the eye clinic, snelling chart are used for diagnosis, slit lamp for examining patients' eyes, an adjustable bed on which patients lie when necessary, a telephone (intercom services) which the staff uses to communicate with each other within the hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital.

According to Kuchenbuch, et al (2013), in the theatre, there are adjustable beds, water heaters, pressure gauges which they use to check the pulse of patients, weighing scales which are used to check the weight of patients and thermometers for detecting the body temperature of patients, an oxygen concentrator to be used in resuscitating unconscious patients and other surgical equipment for carrying out operations. There is a telephone (intercom services) which the staff uses to communicate with each other within the hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital. Kuchenbuch, et al. (2013) asserted that computers are used in management of inventory. The computer is used in storing information on drugs and other equipment available at the hospital as well as those delivered. Also, there is a telephone (intercom services) which the staff uses to communicate with each other within the hospital as well as privately owned mobile phones which they use to communicate both within and outside the hospital. All clinicians have mobile phones which they use to communicate both within and outside the hospital. Some clinicians have their privately owned laptop computers which they use for their personal activities (Kuchenbuch, et al., 2013).

2.3 Factors affecting the Adoption of ICT in Hospitals

The main factors for the adoption of ICT in hospitals is undoubtedly to improve upon the quality of health service delivery. Thus, the hospitals aim at offering world class health services to their clients. According to Kuchenbuch, et al. (2013), hospitals in recent times in their quest to improve the quality of their services adopt ICTs. These ICTs help to provide easy and quicker access to information for health care. Patients' medical records and other information are supposed to be delivered on time to ensure high quality services. Higher productivity and improved accuracy are very critical in the healthcare delivery. The implementation of ICT therefore allows for the continuous monitoring of the status of patients or clients instead of the occasional checks during manual visits to the wards (Kuchenbuch, et al., 2013). A study conducted in India (Pal, et al., 2005) also discovered that, the reasons for the adoption of e-health systems in hospitals were to help reduce travel times, costs and also to improve efficiency through better retention and retrieval of records, shared health professional staffing, better management of chronic diseases and fewer or shorter hospital stays.

Hospitals also implement ICT in their healthcare service to provide localised world-class services to their clients. This assertion is confirmed in the World Bank (2006) report which indicated that hospitals implement ICT to provide localised world-class healthcare services for their clients. Thus, one of the primary objectives for the implementation of ICT in the operations of hospitals is to provide convenient services for clients. This was also corroborated by Omary, Mtenzi and Wu (2010) who asserted that the introduction of ICT in Tanzania was aimed at helping to reduce medical errors and the cost of delivering care while improving the efficiency and also the doctor– patient relationship.

2.3.1 Influence of Financial Resources on Adoption of ICT tools

Financial resources have adverse effects on the adoption of ICT strategy in the health sector. The availability of financial resources plays an important role in the adoption decisions, since the high cost of acquiring technologies have been found to be a major barrier. Financial resources are needed not only for the initial procurement and installation of technologies, but also for training personnel, for covering operating expenses, for maintenance of the technology and its enhancements in the future. This research discusses the following factors: cost of equipment, procurement procedures, cost of hiring skilled personnel and poor resource management.

2.3.1.1 Costs Associated with ICT Equipment

ICT has potential if properly deployed to lower costs of health care, while opening up new modalities for patient treatment and welfare (Arendt, 2013). ICT strategy deployment increases the accessibility to health care especially for those that are vulnerable or in the remote areas that are mostly in need of health care. ICT strategy adoption comes at a cost. Without the requisite funds, it is difficult to benefit from the full potential of ICT strategy adoption (Calman , Kitson, & Hauser , 2010). The overall cost of implementation is cited as a barrier to the use of technology in the health care system (Chesher & Skok, 2010). The adoption of ICT in hospital would significantly reduce paperwork in the hospital management which in turn translates to reduced paper trail, reduced cases of medical errors, reduced turnaround time in viewing medical reports and in the long run contributes towards lowering health care costs (Acharya, 2010). The cost of implementing ICT strategy in the public healthcare system could be lowered by using existing equipment and infrastructure at the facilities such as mobile and broadband technology which has become widely accessible countrywide. Some of

the costs include: price of computers, installation cost and maintenance fee (Kenyan, 2015).

2.3.1.2 Procurement Procedures

Procurement is a critical area of financial management systems which is continuously undergoing reforms aimed at enhancing the efficiency of utilization of public resources. Public procurement is an important function of any government, aiming to satisfy requirements for goods, works, systems, and services in a timely manner. Ideally, public procurement should meet the basic principles of good governance, transparency, accountability, and moreover should ensure value for money (Christensson, 2010). These principles are critical to poverty reduction as well as effective utilization of resources.

The Government of Ghana is constantly reviewing the performance of the public procurement system to offer efficient services to its people. The emerging trends of technology scale and technical complexity of systems require a constant evaluation to ensure that the systems are up to date (Drury, 2015). External donors are often willing to financially assist the government to meet its ICT objectives in health care management as long as due process in procurement and donor obligations are adhered to (Frank, Shiv & Faustin, 2012).

2.3.1.3 Cost of Hiring Skilled Personnel

In the study of technology adoption by institutions, Gladys (2011) reports an interesting finding. She found that the provision of employee training increases technology adoption in firms. Other authors suggest that new ideas which are easy to understand are more quickly adopted than innovations which require one to develop new knowledge and skills (Bukachi & Walsh, 2012). Likewise, systems perceived as the easiest to use and the least complex have a greater possibility of being accepted and used by potential users

(Agarwal & Prasad, 2013). There are significant costs in the transition from a paper to computerized system, such as the temporary work of data entry from papers to computerized systems. Such a transition could pose a hindrance to productivity and management of staff costs such as hiring data entry clerks, proof-reading the entered data, and hiring a system administrator to take care of the system when technical issues arise and learning new skills (Bukachi & Walsh, 2012).

The government of Ghana has been investing actively in developing infrastructure. This has contributed to an increase in the number of internet users and the promotion of internet-based services, it is also true that the technological constraints that the health care sector has been facing are mainly in part a lack of education and skills in ICT which is an important means to obtain a competitive advantage in this global market (African Population and Health Research Center, 2015). The cost of training employees (healthcare professionals) has continued to be a key issue in the adoption of ICT strategy in Kenyatta National Hospital. Besides, health care facilities do not develop training plans. In most Kenyan public health care facilities, there is reluctance amongst management to invest in training their employees because they are afraid of losing their employees to other hospitals (e.g. private hospitals) upon their completion of such trainings, when qualifications are increase (Arendt, 2013).

2.3.1.4 Poor Resource Management

The health sector is an important sector in the economy of a country. A country with poor health systems and policies is bound to experience low economic growth as productivity of citizens might be greatly affected by illness and death from curable cases (Conrad & Schneider, 2011). Lack of finances and equipment resources are a challenge to public health institutions in the adoption of modern technologies. In developing countries quality of healthcare services are low due to poor public resource management,

scarcity of trained clinicians and majority of the citizens not able to afford high cost of healthcare services, and these are problems that can be alleviated by embracing ethical resource management in developing countries (Nyella & Mndeme, 2010). Kenya (2015) describes financial management is an art and a science in any industry, but health care is particularly challenging because the industry changes so fast. The amount of money incurred by the centralized government in terms of compensating and paying hospital bills for its citizens have been immense, mainly due to lack of insurance by most of the citizens.

There are no proper policies to address the issues related with insurance, or acquisition of any form of medical cover to cater for medical related bills. Affordability is therefore limited to the affluent few, with the majority, and especially in the rural areas being left at the mercies of well-wishers and in worst situations, succumb to illnesses due to lack of medical attention. Per Turin (2010), lack of proper policies to sensitize communities on issues of medical cover is also instigated by ignorance, with many individuals in sub-Saharan Africa being semi-illiterate. Illiteracy and ignorance coupled with lack of government intervention has led to escalating mortality rates due to preventable diseases like malaria.

2.3.1.5 High Cost of Installation

Worldwide, the installation cost of modern computer based health Information System is very high. This is the main reason why healthcare facilities opt for manual systems in managing medical information. Evoh (2012) noted that to meet the objectives of an ICT-based training and employment generation program for underprivileged youth in Africa it requires strong regulatory frameworks and contributions from the World Bank. The installation costs include employee training, salaries for the company providing the service, etc. The use healthcare Information Systems technology has been growing

slowly due to the costs associated with it. In contrast, the benefit it provides to the organization exceeds installation costs. A study done by Devin, Johnson and Sutherland (2014), found that training interventions lead to positive outcomes for the majority of SME employees, particularly those working in organizations with relatively formalized training practices.

When a new system is installed in an organization, employees need to be trained on how to operate the system efficiently. This is because without the knowledge of the system, it becomes difficult to operate and use the system. There is always a significant correlation between the employee perceived training effectiveness and their commitment, job satisfaction and motivation (Beckinsale & Ram, 2010). If employees are trained properly they are likely to bring out positive results to the company in terms of reputation, profits and shareholders wealth maximization. According to Ahmed (2012) training also reduces employee turnover, motivate employees, boost room occupancy and increase profitability in a highly competitive industry.

2.3.2 Infrastructure Influence on the Adoption of ICT Strategy

Infrastructure is critical in the adoption of ICT strategy in the public health care sector. Some of the infrastructure concerns discussed include: internet connectivity, lack of gadgets, distance, transportation and security.

2.3.3 Internet connectivity

Telecommunication infrastructure plays a key role in public health. Transmission of health information between health institutions and other health institutions, with patients, as well as health institutions and third parties such as insurance companies, patients and

health institutions is negatively affected if telecommunication and internet penetration is low (Mugo, 2014). Hospitals equipped with high levels of IT infrastructure and with good managerial structures are more likely to adopt ICT strategy systems than were other types of hospitals. Hospitals with greater IT infrastructure can easily invest in ICT systems because they have a favorable environment.

The growing interest in ICT adoption is also attributed to the growth in the number of internet users worldwide, with a larger increase reported from users in developing countries especially in the compared to the developed regions (ITU, 2016). Countries with higher GDP per capita, high literacy rate, and a well-established telecommunication infrastructure enjoy a higher dispersion of internet. That is the reason why advanced economies such as Hong Kong, Singapore, South Korea, and Taiwan lead Asia in internet development, followed by countries like Malaysia, Brunei, and Thailand (Hao & Chow, 2004). Poor ICT infrastructure and internet penetration in developing countries hampers ICT strategy adoption. Developing countries that have high internet penetration, bandwidth may still be a challenge, thereby limiting adoption of telemedicine and other internet based eHealth applications. Research by Beckinsale & Ram (2010) identified poor services of ISPs as an issue for non-utilization of sophisticated ICT strategy adoption amongst the health care sector facilities. The researchers identified that the services provided by in Ghana are inefficient and usually characterized by very low bandwidth, frequent disconnections and high subscription rates.

2.3.4 Access to devices / gadgets

Information and communications technology (ICT) is a term that includes any communication device or application, including radio, television, mobile phones, computer network hardware and software, satellite systems and so on, as well as

associated various services and applications, such as videoconferencing and e-learning (Beckinsale & Ram, 2010). Therefore, the availability of different communication tools at a reasonable price is crucial for ICT strategy adoption in the health sector. ICT strategy adoption cannot be used straight “out of the box”, and therefore to generate the desired benefits, it must be interconnected with other devices to “complement”. Therefore, lack of access to these devices introduce major obstacles in the wide adoption of ICT strategy. Current devices may not be compatible with the new ICT strategy for Hospitals in Ghana. This may lead to reluctance to get rid of the current systems already in place to have an integrated system.

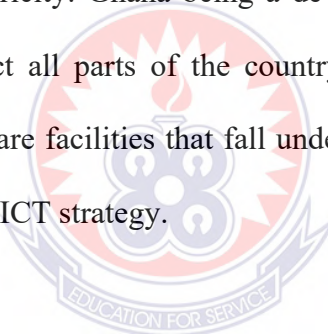
2.3.5 Distance

Gatero (2010) noted that ICT has evolved over time as a means of overcoming two principle communication barriers: time and distance. It is assumed that codified knowledge can be exchanged regardless of distance by using technologies for communication. However, to transfer tacit knowledge requires to share a common work experience through face to face relations. As a consequence, geographical proximity appears as a necessary condition for an efficient share of knowledge, especially in the case of tacit knowledge as well as intensive activities such as innovation creation and diffusion. Whereas information may be transmitted across distances, to transfer knowledge needs communication and repeated interactions. Therefore, the geographical location of clients will influence ICT strategy adoption (Drury, 2015).

2.3.6 Lack of electricity

According to IEA (2009), 1.5 billion people worldwide lack access to electricity. This severely impedes economic development (Zerriffi, 2010). Electricity is central to:

income generating activities for small and large scale businesses, provision of health services (i.e. lighting for emergency surgeries at night, refrigeration of vaccines), and for education among other uses. In addition, electricity can enhance social connectivity through the shared experiences of television radio and the use of cellular phones (Agarwal & Prasad, 2013). The electricity access problem is most severe in sub-Saharan Africa, where almost half of the population is without electricity (IEA 2009). Rural/urban disparities in electricity access are also prevalent in sub-Saharan Africa, where the urban electrification rate is 57%, but only 12% of people have access to electricity in rural areas (IEA 2009). Without electricity, it is impossible to successfully adopt ICT strategy. According to Duhoe (2013) many counties in Ghana have remote areas without access to electricity. Ghana being a developing country, the government has not been able to connect all parts of the country to the national electricity grid. Consequently, those health care facilities that fall under such areas are left handicapped and may not be able to adopt ICT strategy.



2.3.7 Privacy and Security

When the health care facility makes its decision based on the information processed by the system, privacy should be considered. It is important to note that managers use knowledge of health information mainly for financial and strategic matters which focus more on risk issues than security issues (Frank, Shiv & Faustin, 2012). A study done by Sommestad et al., (2011) found that security flaws are common in medical information and control systems operating critical infrastructure. Privacy needs to be maintained especially in medical information and treatment matters of any health care facility. In the western developed countries, the right to privacy is taken seriously and private

information in the health and financial activities is protected by law (Wymer & Regan, 2015).

Despite the presence of other challenges that countries may face in the adoption of ICT strategy in the public health care sector; privacy and security are the two most important challenges involved in protecting patient healthcare information from accidental or intentional misuse (Maheu, Hitten, & Allen, 2013). System stability, in the context of the security and privacy credentials given to the authorized users, computerized health record systems deal with sensitive medical information on patients which should be treated with confidentiality. In the USA, security and privacy is enforced by use of passwords dependent on sub-routines that check against a hash-code of the password. They have enacted strict privacy laws regarding patient information to improve the security of ICT applications (U.S. Department of Health and Human Services, 2012; Pascale Carayon, 2009). One of the important tools for data security is by using audit trails as some of the security breaches might have resulted from misuse of access privileges by authorized persons (Curry, 2010).

In most developing countries, as most of ICT applications elsewhere, this is done by hospital incentives, and many of them are relying on the password protection for the security (Drury, 2015). However, with the lack of clear security standards ethical issues are likely to arise. The confidentiality of the patient healthcare information may be broken internally or by accidental disclosure, insider curiosity or insider subordination or may be broken from outside intrusion through unauthorized access. It is of utmost importance to keep such information safe because if otherwise revealed to unauthorized parties it could then cause legal suits (Frank et al., 2012).

Inappropriate disclosure of patient information also leads to legal problems. According to (Wittig, 2013) health care professionals are more concerned about legal issues than the patients themselves since they are more aware of their professional work ethics. Reliability of the systems is the probability that a device performs its intended function within the set parameters. A system dealing with patient information must offer reliability in order to give the health care professionals some confidence that the system will always be available when needed. Technically, a major concern would be secure access to patient records if there are technical hitches within the systems hardware and software (Chesher & Skok, 2010).

2.3.8 Influence of skills and knowledge gaps on the adoption of ICT

Physicians as well as the patients have been found to have insufficient skills and technical knowledge in dealing with ICT innovations, which has resulted in resistance in the implementation of ICT initiatives in healthcare (Zerriffi, 2010).

2.3.9 Lack of training

Unqualified people will be unable to operate the financial Information System properly. That is why organizations are encouraged to employ qualified personnel, and if not they should have programs to train them (Calman , Kitson, & Hauser , 2010). Since training the unqualified staff is costly, organizations are encouraged to recruit only qualified staff to avoid extra costs. A study conducted by Mirza and Riaz (2012) to assess the need for training in the health sector found that in practice training identifies more than one training need; the training manager, working with management, prioritizes the training based on urgency, the number of employees needing training, and the resources required. Most health care facilities adopt the strategy of outsourcing the operation of health care

information systems. Outsourcing of activities is cheaper as there are no extra costs associated with the training of employees.

Training boosts awareness and confidence level as users can overcome technophobia while relating usage to expected benefits (Sahay & Walsham, 2012). In countries that have assimilated ICT training for clinicians on the global stage, acceptance of eHealth and actual use is relatively high (Khan et al., 2012). Qureshi et al. (2013) argue that optimal use of IT towards the transformation of health care requires IT knowledge in the medical communities. As the disadvantaged users are playing catch up, the advantaged ICT users are always adopting newer technology and services. According to Malik et al (2010) sluggish internet use among doctors in Pakistan was due to unavailability of proper technology and lack of computer training. Without adequate ICT training, user involvement in selection and development of ICT systems becomes difficult and if it happens, it is not only to rubberstamp the experts' decisions. This might lead to having health care systems that are not widely accepted or used adequately.

According to IT-Online (2015), although there are many ICT solutions available they are neither well-known nor much used an explanation for this anomaly is the limited availability of suitable technologies. In a study by Sood et al. (2014) which examined challenges that healthcare workforce face while implementing ICT strategy, technology and computer literacy was the main challenge. Omary et al (2011) attributes low adoption of ICT strategy among developing countries to lack of computer skills amongst the clinicians. There exists a training gap between high, medium, low and non-users. Computerized Health Records are hi-tech systems and complex hardware and software; therefore, a certain level of computer knowledge is required for its effective use (Miller and Sim, 2013). There are inadequate personnel with capacity for management and data analysis.

The health care professionals must show willingness to invest in Information Technology for enhanced quality assurance Cibulskis and Hiawalyer (2012). According to Flanagan (2013), technology integration is meant to be cross curricular rather than become a separate course or topic in itself. In the same context, most of the current generation of experienced health care professionals received their qualifications before IT programs were introduced and for those still in study don't have that much concentration on studying IT related courses. Health care system developers overlook the level of computer skills required from health care professionals to efficiently operate the system like good typing skills to enter patient medical information, notes and prescriptions into the health care system and general knowledge on how database systems work could be lacking and could lead to typos. This general lack of skills could hinder the wide adoption of ICT strategy.

Also, complexities of systems due to the amount of data they need to store refine and give a comprehensive report. For those with limited ICT training might have a problem with catching up on the usability of some ICT functions and systems. In general, the systems might not have the appropriate graphical user interface that is easy to maneuver around. The lack of ICT training could lead the health care professionals to regard the health care system as extremely complicated. Miller and Sim, (2014) argue that health care systems could be challenging to use because of the multiplicity of screens, many unclear options and navigational aids". The complexity and usability problem could result in wrong system feeds and wrong interpretation. Further health care practitioners must allocate time and effort to master the systems so that they can handle the system effectively and efficiently. There could also be the concern of the ever-changing technology. The machine based systems could become obsolete as time passes and not be valid to use any more as the systems reach their limitations (Arendt, 2013). The

correlation between ICT training and adoption of health care systems is also discussed by Ojo et al (2011) who points out that inadequate ICT skills in the health sector in Kenya explains the low adoption of health care technology systems. Hogan and Palmer (2015) believe those health care professionals who lack the ICT skills of processing the online health data end up spending too much time on the same.

According to Miller and Sim (2014), the health care professionals might have some ICT training but the systems available cannot meet their special needs or requirements. Some health care professionals could also use the excuse that the systems are not “customized” for them but for larger health facilities. According to Randeree (2011), "customizability refers to the ability to be adapted of the technology system that fails to conform to specific needs of the user applications". Health care professionals are not technical nor are they ICT experts, hence for them to operate the systems they need as much training and support for the systems and they might be reluctant to adopt the systems if they are not given adequate support (Ludwick et al, 2010). Simon et al (2012) similarly noted that “health care professionals struggle to get appropriate technical training and support for the systems from the vendor and if they do get this support it comes at a cost”.

2.3.10 Illiteracy in Technology

Illiteracy has largely affected ICT strategy adoption in the health care sector. Culture may influence the level of illiteracy in information technology and even in other fields such as record keeping (Bukachi & Walsh, 2012). For example, in some cultures technology is believed to be evil and meant to destroy the young and growing generation. Cultural dimensions have a greater influence on takeoff time in countries with highly developed economies, dense populations and low illiteracy rates. Cultural dimension of individualism also has a significant context independent influence on takeoff dynamics,

whereas masculinity has no such effect (Calman, Kitson, & Hauser , 2010). By these authors saying that masculinity has no effect on illiteracy, it contrasts with some African communities that also believe that men are supposed to be more educated than women. In fact, they believe that educating a girl child is only waste of money and resources as the girl will finally be married.

Kumar, Mitra & Murayama (2013) revealed that in India the probability of working is higher for a male child compared to a girl child because girl children are often engaged in household activities and even when they are engaged in income earning jobs they are displayed as helpers. Even where the health care systems operate efficiently in the organization, the users of medical information are unable to interpret the results. This leads to the users making wrong investment decision because they do not understand the terms used in the financial reports and are unable to interpret the medical results effectively (Gatero, 2010).

As most organizations look for qualified people to fill different positions in the organization, they must also consider other factors. These include the ability of leading, motivating, innovating, being independent and working under pressure. This is the reason why besides seeking academic qualification, computer literacy and relevant working experience, most potential employers now require graduates to possess additional qualities such as leadership, motivation, innovative skills, being independent and able to work under pressure. The government of Ghana is trying to do away with illiteracy level in women by supporting girl child education and even encouraging women to innovate by providing youth and women with funds. The government is also trying to improve technology in the country through laptop project, where the standard one kids will be provided with laptops (Nyella & Mndeme, 2010).

With regards to the skills issue, Mugo (2014) explored that health care institutions tend to avoid the use of ICT in their operations, if it is complex. Alam and Noor (2009) also identify the lack of suitable technical and managerial staff with sufficient ICT expertise as a major barrier for the health care sector in terms of adopting ICT strategy and concludes the health care facilities usually lack skills amongst their workforce. Lack of skilled staff frustrates successful ICT strategy implementations. It is often reported that hospitals are unable to use equipment effectively, despite the confirmation to the specifications. This is due to lack of human resource skills (Frank, Shiv, & Faustin, 2012). Similarly, Lee and Kim (2012) advocate that lack of technological skills amongst the health care workers / employees and their management capability can be a barrier to the adoption and extension of ICT systems. The authors highlighted in their research, that some health care practitioners are concerned about the introduction of ICT because of the fear that their employees might not be familiar with it.

2.4 ICT adoption Challenges in the Health Sector

This section discusses the phenomenon of ICT adoption in healthcare institutions by reviewing literature with a focus on the three major perspectives that mostly pose as challenges to the deployment of ICT. These are Organisational, People and technology (Zakaria, Affendi & Zakaria, 2010). The Figure 1 outlines these three major factors who play various roles in posing as challenges in the adoption of ICT in the medical institute or hospital.

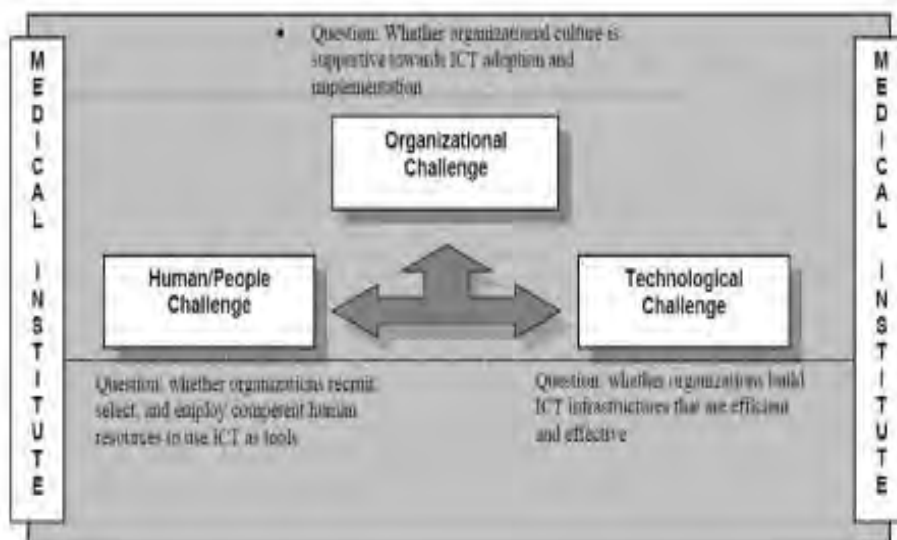


Figure 1: Framework of Challenges in the adoption of ICTs in Hospitals

Source: Zakaria, Affendi and Zakaria (2010).

2.4.1 Organizational Challenges

These are organisational related challenges which include the organisation's culture and the attitude of the management of the hospital towards the implementation of the ICT. The cost of ICT investment has been one of the major questions discussed in the implementation of ICTs in hospitals. This include the cost of both the hardware and the software for the hospital's e-health system. In addition to acquiring the hardware and the software, the management of the hospital must consider the costs which are associated with specifying the requirements, planning, training of personnel, reengineering of the healthcare system of the hospital and customising the systems to meet the requirements of the hospital. Miller and West (2007) for instance postulate that it may cost a hospital as high as 54,000 US Dollars to 64,000 US Dollars to implement e-health systems. According to Zakaria, Affendi and Zakaria (2010), the major question thus becomes; who will be the bearer of this expensive ICT investment costs?

One other major challenge the hospital faces is the organisational culture. Some beliefs and practices are embedded in the hospital. The staff of the hospital understands and

complies with the basic beliefs and practices including policies that govern the discharge of their duties. The organisational culture concept extends beyond the organisation to include individual clients who interact with the organisation's structures and systems. An accommodating culture which accepts changes are mostly seen to be better environments for technology implementation than other cultures which are static and less accommodating (Nchise, Boateng, Mbarika, Saiba & Johnson, 2012; Zakaria & Yusof, 2001).

2.4.2 Human/People Challenge

A major asset which contributes to the success of the organisation is the Human resources or the people within the organisation. Skilled human resources are required to operate or work with the complex and sophisticated technology implemented in the organisation. Experienced managers are supposed to work with these ICT systems to achieve the maximum returns on investment for the organisation. It is therefore recommended for the top management of organisations including the IT managers to put in place plans to handle the skill shortages that may arise after the implementation of ICT. It should be noted that the human resources or staff who are reliable and skillful with a lot of capabilities are likely to increase the efficiency and effectiveness of the implemented IT systems especially at the hospital. Therefore, the hospitals need to ensure they can train, and retain talented IT experts to manage the e-health systems (Nchise, Boateng, Mbarika, Saiba & Johnson, 2012).

It is worth noting the vast benefits a hospital or an organisation can get from IT investment if the IT managers and staff are reliable and competent. Thus, the competent IT managers can offer assistance and disseminate the operations and services in a very fast and easier way than people without expertise in IT or people who do not understand how to operate the system. User training must therefore be done in order to bring the

users to an acceptable level of competence to operate the system. Johnson (2001) for instance has suggested for the inclusion of three major activities in the implementation of ICT in any hospital. These include the conduct of a research to better understand the advantages or the relevance of the implementation of ICT to the stakeholders; educating all the professionals in the healthcare delivery; and also, propagating for the use of ICT in the hospital (Zakaria, Affendi & Zakaria, 2010).

2.4.3 Technological Challenges

Technological challenges include all the difficulties the hospital faced in the implementation of ICT which are related to the technology. Thus, hospitals adopt ICT to be able to provide efficient services to clients which may include the ability to retrieve records, access information from the internet and communicating with various departments to speed up the waiting time for attending to clients. The ease at which the physicians, nurses and the health workers are able to operate the devices to offer these services can lead to maximizing the returns on their investment. Some challenges are technological when they are related to the ease of use of the ICT device or technology, compatibility of the ICT system with old systems, information systems security issues and the usability of the devices. These challenges arise due to the technological change the hospital staff face.

Technological change is seen to mean “the change period, during which something new is planned and introduced, e.g. the period associated with the introduction of new processes that have major new technological ingredients” (Gulick, 2001). The challenges that stem from such changes need to be managed. According to Benjamin and Levinson (1993), “The greater the functionality of an IT system, the more levels of learning and adjustments are required to use it (p.30).” In support of that, Zakaria and Yusof (2001)

suggest that readiness and willingness to learn about the new technology at a greater depth and the customization of each of the processes are key issues that need to be taken into account when planning or undergoing technological change. Only then can the learning and transition processes during ICT adoption and implementation be a success.

2.5 Effects of integrated ICT in healthcare delivery

One of the many challenges facing countries the world over, with particular reference to developing countries today is preparing their societies and governments for globalization and the information and Communication revolution (Lallana, 2003). The terms “technological society,” “technocratic society” and “technetronic society,” “digitally native generation” have been used by authors to refer to the modern social nature (Prinloo & Du Plessis 2008; Dogbey, 2011). It is envisaged that, man can no longer live without information technology; in the absence of technology, life is totally boring and meaningless. Furthermore, Dogbey, (2011) noted that, technology is more a necessity in every field of man’s endeavours and it is unfortunate most institutions especially in developing countries are not much sophisticated and challenging enough to accommodate the quest for this service in order to satisfy the needs of the generation X and Z or the digitally native citizens of modern time. Despite the fastness, friendliness, reliability and time saving potential of technology and its applications, it has an astronomical fiscal value; a factor which militate its access to a good number of people who need it most. Chetley et al, (2006), in a framework paper to assess the role of ICTs in the health sector of developing countries, identified some crucial roles ICT application will bring to the healthcare industry. These include:

- Improved dissemination of public health information and facilitates public discourse and dialogue on major public health threats.

- Enabling remote consultation, diagnosis and treatment through telemedicine
- Facilitating collaboration and cooperation among health workers, including sharing of learning and training approaches
- Supporting a more effective health research and the dissemination and access to research findings
- Strengthened ability to monitor the incidence of public health threats and respond in a more timely and effective manner
- Improved efficiency of administrative systems in healthcare facilities.

The applicability of ICTs in healthcare cut across several sectors of the healthcare industry including; medicine, medical laboratory technology, diagnosis, pharmaceuticals, public health and many others. According to Houghton (2002) in study of the impacts of ICTs on the pharmaceutical and healthcare industries, assessed improvements in healthcare costs, health outcomes and pharmaceutical industry development made possible by the introduction of ICTs into healthcare practice and the entire healthcare industry. Mugo (2014) revealed that ICT integration in the healthcare provide enhance information sharing, provides greater data accuracy and improve the access to medical information of patients. Mugo (2014) further indicated that ICT integration can enhance the processes and capabilities of healthcare management in public health facilities by both the medical providers and the patients in Kenya. International Telecommunication Union (2016) explored and found that most health care facilities (both public and private) benefit from having an integrated ICT network to manage their data and health care resources. Efficient ICT systems would significantly improve the delivery of service to patients and improve the utilization of resources within the health centers (Conrad & Schneider, 2011). As indicated by Mulwa (2013) ICT integration improves the quality of treatment given to the patients, and improve the access to medical information of

patients. Mulwa (2013) further asserted that the adoption of ICT strategy would also to streamline key processes in the health care industry, integrate activities across health care organizations, reduce overall health care costs, improve medical record management, health program management and improve patient care quality.

According to Li et al. (2013), health is an increasingly information-intensive sector where ICT adoption can significantly contribute to improved quality of service, efficiency, and accessibility. According to Hardey (2011), ICT plays an important role in delivering healthcare today. Hardey (2011) mentioned that healthcare professional including doctors and nurses require ICT tools to plan for improving the national healthcare services in most countries. Ganesh (2004) observe that the implementation of ICT in health care services is regulated by five main factors: performance expectancy, social influence, facilitating conditions, effort expectancy and threat appraisals. Ganesh (2004) indicated that ICT adoption in health care service improve health care operations.

2.5.1 ICT enables information and knowledge to travel faster and further

ICT is, and will continue to be, a catalyst in advancing economic growth and poverty reduction as well as improve the system of doing things more proficiently toward achieving desirable goals at a cheaper cost within the shortest possible time. New information and communication technologies overcome the barriers of distance and time, and significantly improve the accessibility of information and knowledge. As a result, the sharing of information and knowledge is quicken and effectively becomes feasible as well as acts as a key element in achieving development goals and mitigating the impact of unforeseen events such as natural disasters or outbreaks of disease.

In the views of Roblyer (2003), recent advancement in communications technology has contributed immensely to minimize the effect of distance in the way we do business or respond to any kind of situation. Roblyer (2003) aptly describes the situation as the “death of distance”. She writes that the death of distance has given new life to education. Another significant milestone on the necessity of ICT was drawn by World Bank (1998), in the assertion that “ICTs greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities of business for the rich and the poor. One of the greatest hardships endured by the poor, and by many others, who live in the poorest countries, is their sense of isolation. Inculcating ICT in any kind of services delivery offer potential for in-depth learning opportunities on a situation under study and what is yet to be discovered.

The report establishes that access to information and knowledge is critical to development learning. Generally, ICT is suited to be quickly reaching larger numbers of people across a wide geographical space. The ability of radio and television to reach into both urban concentrations and remote areas is unquestioned. The Internet is fast becoming the communication tool that is unrivalled for its power, speed and ability to reach a vast number of users world-wide. Video conferences that allow people to see each other and to exchange information and ideas in real time can also reach large numbers. The mobile phone is becoming commonplace and contributes greatly to information transmission among small businesses and entrepreneurs. E-mail is another familiar ICT product that allows large numbers of people to communicate directly, cheaply and fast. The use of ICT in health service delivery via Video conferencing, E-mails, Intercoms, mobile phones, etc promote effective diagnosis and prescription,

proper utilization of patient data, acquisition of quality guidelines and skills from competent medical practitioners over a distance, saving of patients' lives no matter the location of the health facility as well as reduction in the time spent by patients at the hospital, among others.

2.5.2 ICT supports information and knowledge sharing on a large scale

Knowledge sharing and learning are increasingly recognized as being powerful contributors to the development process. The classic training model which has been and continues to be widely used to transmit knowledge and information to trainees does not usually promote knowledge sharing and learning in the manner now considered more effective in contributing to the growth of individuals and communities but the application of knowledge rather (Roblyer, 2003). As ICT continues to innovate and advance, its capacity to support interactivity, from one way broadcasting to two way interaction, from asynchronous (not real time) to synchronous (real time) grows, the development and increasing availability of new and affordable information communication technology, such as email, e-discussion tools, instant messaging, IP phone and VC, offers promise for widening the scope and scale of knowledge sharing and learning for development. Many practitioners seek guidance on how best to use these technologies in meeting their specific developmental challenges (Roblyer, 2003).

2.5.3 ICT can significantly reduce access and service provision costs

Due to advances in ICT, the personal computer continues to become more and more accessible and affordable. The internet and cellular phone is becoming commonplace for millions of people including those in developing countries. The cost of videoconferencing connection is also lowered if Internet Protocol (IP) is used. By using

ICT, training and learning can reach a large number of people at a low marginal cost. The savings on travel and the economies of scale gained reduce learning costs and bring about cost effectiveness. Tinio (2005) expatiates that ICT development and usage encourage inventive thinking.

2.6 Conceptual Framework

A Conceptual Framework was developed based on the extensive review of literature. The variables used in the study were the independent demographic characteristics which comprised of application and communication technology application and challenges in patients personal records. The intervening variables comprised of ICT implementation practices in hospitals. The dependent variable of the study Hospitals operations. Conceptual model is shown in Figure 2.

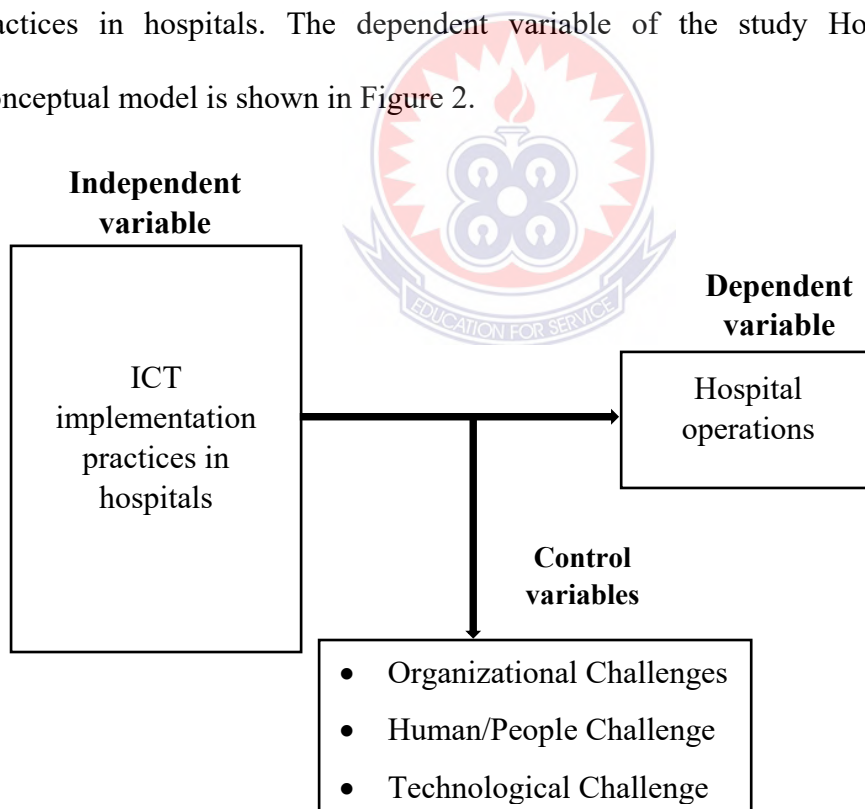


Figure 2: Conceptual model of the study

Source: Researcher field construct

Integration of ICT tools at the various departments in hospital including computers bearing the data of patients which facilitates the search of folders, public address system

which helps to amplify patients' names for it to be heard anywhere within the hospital, pressure gauges to check the pulse of patients, weighing scales used to check the weight of patients and thermometers for detecting the body temperature of patients affect the operational efficiency of hospitals. There are many challenges which includes organizational, human/people, and technological challenges affect the effective implementation of ICT to provide an improvement in the efficiency of service delivery. The understanding of these challenges helps to know how to adopts, when and under what conditions IT adoption occurs.

Effective implementation of ICT improves hospital operations in terms of healthcare costs, and health outcomes. Efficient ICT systems would significantly improve the delivery of service to patients and improve the utilization of resources within the health centers. Mugo (2014) revealed that ICT integration in the healthcare provide enhance information sharing, provides greater data accuracy and improve the access to medical information of patients. International Telecommunication Union (2016) explored and found that most health care facilities (both public and private) benefit from having an integrated ICT network to manage their data and health care resources. As indicated by Mulwa (2013) ICT integration improves the quality of treatment given to the patients, and improve the access to medical information of patients. Mulwa (2013) further asserted that the adoption of ICT strategy would also to streamline key processes in the health care industry, integrate activities across health care organizations, reduce overall health care costs, improve medical record management, health program management and improve patient care quality.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents details of the methodology for conducting the study in order to achieve the research objectives as well as answer the research questions. It discusses the research paradigm, research approach, research design, population of the study, sampling and sampling technique employed, data collection instrument and data collection procedure described. It also discusses validity and reliability, data analysis technique

3.2 Research Paradigm

There are variations in researches because of the way researchers view the world and how they interact with the setting around them. These are practically based on the set of beliefs the researcher in question has with respect to the phenomenon under study. Paradigms according to Kuhn (1970), are the entire constellation of beliefs, values and techniques that are shared by the members of a scientific community. Creswell (2009), refers to this as worldview; the general orientation about the world and the nature of research that a researcher holds. Although these beliefs usually remain implicit in most research, they affect the practice of the research.

Myers and Avison (2002) assert that, three major paradigms exist in Information Systems research. These are the positivist, interpretive and critical paradigms. Interpretive research investigates individual's accounts of how sense is made of the world and the structures and processes found within this world view (Fisher, 2010). Positivist studies basically test theory in an effort to enhance the predictive understanding of an issue. (Myers & Avison, 2002). However critical realism according to Mingers, Mutch and Willcocks

(2013), offers a robust framework for the use of a variety of methods in order to gain a better understanding of the meaning and significance of information systems in the contemporary world. Having looked at the above, this study therefore employs the critical realist stance as it will help achieve the purpose for which this research is conducted; to explore the challenges involved in the adoption of ICT in a public hospitals in Ghana. The justification for selecting Critical Realism is based on the fact that it seeks to explain a social phenomenon rather than to predict.

3.3 Research Approach

Research approach is a systematic and logical procedure for solving a problem with the support of facts (Yin, 2003). Fellows and Liu (2003) provide that there are two principal approaches to research namely; qualitative and quantitative approaches. However, Denzin and Lincoln (2000), assert that research approaches may be categorized as qualitative, quantitative or multi-methodology. Also, Creswell (2003) concurs with Denzin and Lincoln (2000), on their assertion of three major approaches. He identified a third approach which he calls the mixed method approach earlier referred to as multi-methodology by Denzin and Lincoln.

In this study, quantitative approach was adopted. The quantitative research method adopts a deductive and objective view, which is characterized by tangible data such as counts, weight, mass, and other physical measures (Fellows & Liu, 2003). Boateng (2014) emphasizes that the quantitative method is used to determine the extent of a problem or the existence of a relationship between aspects of a phenomenon by quantifying the variation. It usually includes the investigation of frequencies and different measurable variables with the aim of explaining a certain phenomenon (Phoya, 2012).

3.4 Research Design

A research design is a strategic framework for action that serves as a bridge between research questions and the execution or implementation of the research (Durrheim, 1999). Research design refers to the decisions a researcher makes in planning the study (Fouché, 2005). The study adopted a quantitative research approach. Quantitative research explains a phenomenon by gathering numerical data that are analysed using statistically based methods (Creswell, 1994). The use of quantitative research hinges on a positivist paradigm which is based on the assumption that knowledge is an objective reality (Greene et al., 2009). According to Leedy and Ormrod (2005) quantitative research encompasses several approaches to research, yet all have two things in common.

The study adopted descriptive survey design in investigating the challenges facing public hospitals in the implementation of ICT. Descriptive survey design is considered most appropriate since the purpose of the study is not to study causal nexus between variables but one that seeks to simply examine, discuss, and document the facts about parents' socioeconomic status. This approach is also useful for identifying variables and constructs that may warrant further. Orodho (2005) noted that a descriptive survey design is an appropriate way of evaluating educational programmes as educational activities operate in a social context. According to Yin's (2009), descriptive survey design is a fact finding study which involves collecting data directly from a population thereof at a particular time. This design is ideal for this study because the study was conducted in a setting that requires direct responses from the respondents while investigating existing phenomenon without manipulating the variables. The design also allows the participants to describe and provide their opinions regarding the variables being studied in detail

3.5 Population

Gorard (2001) stated that, population consists of group of individuals whom one wishes to obtain results to generalize one's selected sample. Further, Polite and Hangler, (1996) cited by Avoke (2005) defined population, as the entire aggregate of cases that meet the designated set of criteria. The target population of the study was 1021 health workers at 10 public Hospitals in Kumasi Metropolis in the Ashanti Region of Ghana.

3.6 Sample and Sampling Technique

Creswell (2005) stated that, sample refers to a sub-group of target population that the researcher plans to study for the purpose of making generalization about the target population. Sample as a small group of larger and identifiable groups, Avoke (2005) continued that, samples usually reflect subset of the entire population of interest to the researcher. The sampling interval was determined as the ratio of the population to the sample size. The sample size was determined from a table developed.

In determining the sample size for the study, a table developed by the Research Advisors (2006) with a confidence level of 95% and margin of error (degree of accuracy) of 5.0% was used. Based on this Table, a sample of 285 health workers were selected for the study (Appendix A). Simple random sampling technique was used to select the health workers. Simple random sampling ensures that every possible element of the population has an equal chance of being selected for the study. It is the type, which does not select people based on their skills or background (Kumepkor, 2002). Amedahe (2010) in his study viewed that the larger the sample, the better the result of the study and fairness in generalization.

3.7 Data Collection Instrument

Questionnaire was used for collecting the necessary information. The questionnaire was designed for the selected 285 health workers; the items were related to the research questions raised in the study. Avoke (2005) narrated that, questionnaire are the instruments used to collect data for decision making in research. Creswell (2005) further described questionnaire as, a form used in survey design that participants in a study complete and return. It is a mechanism which information is gathered by a researcher, asking forms of questions to respondents on a topic being researched. In addition, Kaul (2001) stated that, questionnaire serves as a device that consist of series of questions comprising, psychological, social and educational topics given to an individual or groups of individuals with the objective of obtaining data required with regards to some problems under investigations.

The researcher divided the questionnaire into two (2) sections A and B. The section A consisted of bio data of respondents, while, B reflected the constituents of the Likert scale of which the health workers were expected to respond to statements raised. Respondents were expected to tick (✓) the created boxes of columns where they strongly agree; agree; disagree and strongly disagree to the given statements. In this study, the Likert scale which had five (5) columns from number five (5) to one (1) in a requisite order attached to various columns. On the scale the rating was arranged in five (5) columns. The Likert scale provides the basis for neutral response, as well as ranking highest and lowest responses of respondents in the study. Responses were ticked (✓) in the available boxes with correspondents boxes attached.

3.8 Validity and Reliability of Instruments

To ensure validity and reliability, questionnaire items were shown and discussed at length with colleagues in the school, lecturers and finally shown to the supervisor of the study. Items which seem similar were deleted and restructured to make sure the questions were authentic. Creswell (2005) said that, the goal of a good research is to maintain measures that are valid and reliable. Cohen, Marion and Morrison (2003) stated that, validity must be based upon the particular instrument used to determine the purpose to which it is put.

Reliability of research instrument is much concerned with consistency where stable responses are generated to build confidence in further planning and decisions in the study to provide good results. Taale and Ngman-Wara (2003) revealed that, reliability refers to the consistency that measures test items from one period to another over a period of time, situations and examiners. Normally, if results obtained seems similar, from the same test across situations, time and period, high degree of reliability is produced. Sometimes, reliability is seen when consistent or stable responses are generated. Cohen et al., (2003) reiterated that, reliability has to do with measuring the consistency and reliability over time, type of instrument, and group responses. The questionnaire obtained satisfactory Cronbach Alpha of 0.792.

3.9 Procedure for Data Collection

The researcher obtained official permission from the human resource managers of the selected public Hospitals in the Kumasi metropolis before administering questionnaire. The permission was obtained through an introductory letter, given to the researcher from the Akenten Appiah-Menka University of skills training and entrepreneurial

development, Kumasi. The questionnaire was personally administered by the researcher to the health workers. The questions were explained to respondents to further establish better rapport. The respondents were required to ticked (✓) within the appropriate columns, with columns structured in Likert scale based on research questions raised in the study. The rationale for Likert scale was to create a platform where respondent's attitude, opinions and interests were subject to investigations; with aggregate scores identified in the strength of the agreement and disagreement. Furthermore, the researcher gave the respondents few weeks to respond to the statements, and later collected all the questionnaires for further analysis.

3.10 Data Analysis

In the study, Statistical Product for Scientific Solutions (SPSS) was used in analysing the data, and to find out the statistical significance of different variables made by respondents in the questionnaire. The data was summarised using frequencies, percentages and mean score and presented in tabular form. In order to ascertain the impact of ICT application practices on the hospitals' operations, regression analysis and Pearson correlation analysis were used. The Pearson correlation test was adopted at 5% (0.05) significance level. The results generated from the quantitative analysis were presented in tables.

3.11 Ethical Consideration

It is worth nothing that no researcher should never forget about ethical issues when considering a research work since organizations and individuals are being contacted before one gather data, analyses the data and reports the information gathered. As such, every research work should involve an express moral approval. In other words, a

research should be subjected to disapproval or conforming to accepted standards of conduct.

In this research work therefore, respondents willingly took part in the study though they also had the right to withdraw from the research. Protection of confidential data given by identifiable respondents and the anonymity and reactions of respondents were also observed and handled as such. A comprehensible account of the rationale and type of access required was therefore provided from the food operators consent sought for.



CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

The chapter presents the results and discussions of the study. The chapter specifically looks at the ICT application practices in public hospitals, identify the challenges associated with ICT application in public hospitals, and the impact of ICT application practices on the hospitals' operations.

4.2 Response Rate

A total of 285 questionnaires were sent out to collect data from respondents comprising all health workers of public hospitals selected in the study. However, after the data collection exercise, it was realized that 212 out of the 285 questionnaires sent out were good to be included in the analysis. Whilst some of the questionnaires were not returned, key questionnaires that were critical in meeting the study objectives were not answered on some of the returned questionnaires.

In spite of this, 212 questionnaires comprising health workers of some selected public hospitals deemed good to be used gave a response rate of 74.3%. According to Bowling (2004), a response rate of 70.0% is good in social science research, though he admits that the higher the response rate, the better the analysis.

4.3 Background Information of Respondents

This section describes the general background information of the respondents, gender, working experience as well as the level of education of respondents. The background of respondents were very necessary to enable the researcher describe the peculiar characteristics of the respondents.

Table 1: Age category of Respondents

Age	Frequency (N)	Percentage (%)
20-30years	26	12.2
31-40years	113	53.3
41-50years	58	27.4
51-60 years	15	7.1
Total	212	100.0

In this study, the survey was conducted from a population of 285 health workers at public hospitals in Kumasi Metropolis. There were 212 usable responses to the survey. Among the respondents, the highest proportion (53.3%) came from the '31–40 years' age group; 27.4% and 12.2% responded '41-50 years' and '20–30 years' age group respectively, while the smaller section (7.1%) of the respondents were within the age group of 51-60 years (Table 4.1). Age category of the respondents was captured in the study to help the researcher assess the different age categories that are health workers at public hospitals in Kumasi Metropolis. The results also suggests that majority of the respondents were matured and therefore could be captured in an academic study such as this. The finding buttress with Asemahagn (2015) more than half of the health professionals (58.0%) were within 25-30 years. The mean, standard age of health professionals was 28 ± 4 years.

Table 2: Gender of Respondents

Gender	Frequency	Percentage (%)
Male	77	36.3
Female	135	63.7
Total	212	100.0

The findings on the gender for the hospital staff is depicted in Table 2. The statistics indicate that both males and females were captured in the study. This is because the views of both genders were needed to make fair conclusions on the subject. But from the statistics, it could be seen that majority (63.7%) of the respondents were females, while 36.3% of the respondents were male respondents. This indication means that majority of health workers at the public hospitals in the Kumasi Metropolis are females.

Table 3: Working Experience of Respondents

Working experience	Frequency (N)	Percentage (%)
0-5 years	31	14.6
6-10 years	123	58.0
11-15 years	58	27.4
Total	212	100.0

From Table 3, Out of the 212 respondents, 31 of them constituting 14.6 % have been working in public hospital for under 5years, 123 of them forming 58.0% have had a working experience at the public hospital for 6-10 years, and the remaining 58 respondents representing 27.4% have worked in the public hospital for 11-20years. Majority of responders had been with the organization for 6 to 10 years. This means that majority of respondents are experienced, skilled, and capable of exercising sound

judgment, and that their responses could be relied upon. The result concurs with the study by Asemahagn (2015) that more than half (54.0%) of health professionals have >5 years professional working experiences.

4.4 ICT application practices in Public Hospitals

The respondents were asked to state the ICT application practices in Public Hospitals and to rank their level of agreement or disagreement along a number of constructs. The study used a 5-point Likert type scale ranging from “Strongly disagree” to “Strongly agree”, in descending order. In addition, the Mean (\bar{X}), and standard deviation (SD) were computed. Table 4 presents the results.

Table 4: Responses on the ICT application practices in Public Hospitals

S/N	ICT application in public hospitals	N	Mean	Std. Dev.	Decision
1.	Claims Officer generate claims for NHIA by using ICT tools	212	4.10	1.012	Agreed
2.	Hospitals implement ICT in the discharge of their clinical services	212	4.06	.929	Agreed
3.	Provisional diagnoses for patients are entered using ICT tools	212	3.92	1.122	Agreed
4.	Requesting for consultation Service	212	3.86	1.225	Agreed
5.	ICT tools are used in entering laboratory test results of patients	212	3.77	1.190	Agreed
6.	The hospital adopts ICT for stocks and inventory management	212	3.67	1.259	Agreed
7.	The hospital use ICT tool to register patient visitation to the hospital	212	3.45	1.385	Agreed
8.	ICT tools are used in entering patients vitals at nursing station	212	2.59	1.228	Disagreed
9.	ICT tools are adopted to communicate with care provider	212	2.45	1.107	Disagreed
10.	Pharmacist used ICT tools to view patient drugs and serving of drugs	212	2.35	1.136	Disagreed
11.	ICT tools are used to check and locate patients folder	212	2.29	1.042	Disagreed

Note: $\leq 3.0 = \text{Disagreed}$ $\geq 3.0 = \text{Agreed}$

Table 4 revealed that an ICT tool is used to assist claims officer in generating claims for NHIA at public hospitals in Kumasi Metropolis. This statement had a mean score of 4.10 and a standard deviation of 1.012. Moreover, the respondents agreed that the public hospitals implement ICT in the discharge of their clinical services. This finding had a mean score of 4.06 and standard deviation of .9296. With a mean score of 3.92 and a standard deviation of 1.122, the respondents agreed that provisional diagnoses for patients are entered using ICT tools. The finding agrees with the study by Asangansi, Adejoro, Farri and Makinde (2008) that health care practice reduce the use of ICT to support the discharge of clinical services, diagnoses for patients, and patient's records keeping. A report by Wheatley (2013) indicated that the deployment of ICT in healthcare management has provided a mechanism for discharging clinical services and diagnosing of patients.

Again, the respondents agreed that ICT tools are used in requesting for consultation service at public hospitals in Kumasi Metropolis. This statement reflected a mean of 3.86 and a standard deviation of 1.225. The respondents asserted that at public hospitals, ICT tools are used in entering laboratory test results of patients. This statement had a mean of 3.77 and a standard deviation of 1.190. The finding aligns with the study by Bello, Arogundade, Sanusi, Ezeoma, Abioye-Kuteyi, and Akinsola (2014) that implementation of ICT products by hospital has transformed modern system in the areas of consultation service and communication with other health service personnel, storage and retrieval of up-to-date health information and it has impacted in entering laboratory test results of patients.

In addition, the respondents agreed that the public hospitals adopt ICT for stock and inventory management as shown by a mean of 3.67 and a standard deviation of 1.259. Furthermore, with a mean of 3.45 and a standard deviation of 1.385, the respondents

mentioned that the public hospitals in Kumasi Metropolis use ICT tool to register patient visitation to the hospital. The result aligns with the study by Bukachi and Walsh (2012), healthcare sector use ICT tools to coordinate patient care, register patients visitation, manage inventory, share relevant information, and monitor compliance with relevant guidelines. Increased use of information technology in healthcare especially the introduction of clinical decision support and better linkages in and among systems would result in process simplification. Drury (2015) on the same issue revealed that the use of ICT has helped develop new ways of providing efficient and secure healthcare. This has resulted in a rapid increase in the use of ICT applications in managing inventory and registering patient visitation to the hospital.

On the contrary, the respondents disagreed that at public hospitals in Kumasi Metropolis, ICT tools are used in entering patients vitals at nursing station. This statement had a mean of 2.59 and a standard deviation of 1.228. Again, with a mean of 2.45 and a standard deviation of 1.107 respondents disagreed that ICT tools are adopted to communicate with care provider. The respondents further disagreed that Pharmacist used ICT tools to view patient drugs and serving of drugs as shown by a mean of 2.35 and a standard deviation of 1.136. However, with a mean of 2.29 and a standard deviation of 1.042, the respondents disagreed that ICT tools are used to check and locate patients folder. All these statements failed to meet the predetermined cut-off point of 3.0.

The finding shows that at public hospitals in Kumasi Metropolis, ICT tool is used to assist claims officer in generating claims for NHIA, discharging of clinical services, entering provisional diagnoses for patients and requesting for consultation service. The study further reveals that ICT tools are used by the public hospitals in entering laboratory test results of patients, managing stocks and inventory, and registering patient visitation to the hospital. The study by Kleiner, Akers, Burke and Werner (2015), revealed that

Hospital Administration and Management System (HAMS) has been instrumental in the services of the various hospitals. Kleiner, et al (2015) affirmed that the HAMS is used to assist in the core duties of the hospital which are the clinical services. These includes capturing Patients' records through daily attendance and daily measurements such as temperature, Body Mass Index (BMI) and others. Patients registrations and service requests are also performed using the HAMS. Client Consultations, prescriptions and admission and discharges are major services offered via the HAMS. Investigations which include X-Rays, Ultrasound Scans, Laboratory tests and others are also performed through the use of the Hospital Administration and Management System (Kleiner et al., 2015).

4.5 Challenges associated with ICT application in public hospitals

The respondents were asked to state the challenges associated with ICT application in public hospital and to rank their level of agreement or disagreement along a number of constructs. The study used a 5-point Likert type scale ranging from “Strongly disagree” to “Strongly agree”, in descending order. In addition, the Mean (\bar{X}), and standard deviation (SD) were computed. Table 5 presents the results.

Table 5: Responses on the challenges associated with ICT application

S/N	Challenges	N	Mean	Std. Dev.	Decision
User challenges					
1.	Lack of interest by health personnel	212	4.22	.765	Agreed
2.	Lack of skills in ICT usage	212	4.10	.989	Agreed
3.	Inconvenient data entry	212	4.00	1.001	Agreed
4.	Low computer literacy level among health personnel	212	3.94	1.130	Agreed
5.	Frequent breakdown of ICT tools	212	2.26	1.011	Disagreed
Management challenges					
1.	High cost of acquisition, use and maintenance of ICT tools	212	4.36	.811	Agreed
2.	Lack of effective education on the value and use of ICT tools	212	4.16	1.031	Agreed
3.	Lack of adequate management support for ICT usage in the hospital	212	4.14	1.036	Agreed
4.	Limited access to ICT facilities in the hospital	212	3.70	1.270	Agreed
5.	Unstable power supply to support most services at the hospital	212	2.719	1.240	Disagreed
Technological challenges					
1.	ICT tools networked across the various departments are inadequate	212	4.19	.993	Agreed
2.	Lack of networked ICT facilities	212	3.98	1.099	Agreed
3.	Insufficient bandwidth or speed	212	3.87	1.119	Agreed
4.	Limited accessibility and network connection	212	3.68	1.301	Agreed

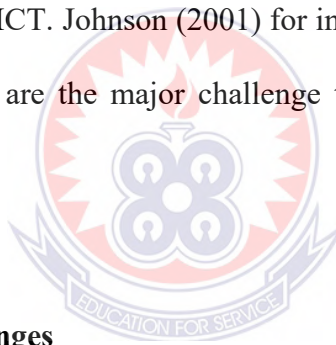
Note: $\leq 3.0 = \text{Disagreed}$ $\geq 3.0 = \text{Agreed}$

4.5.1 User Challenges

According to Table 5 it appeared that lack of interest in health personnel posed a challenge to ICT application in public hospital as shown by a mean of 4.22 and a standard deviation of .765. Also, with a mean of 4.10 and a standard deviation of .989, the respondents agreed that lack of skills in ICT usage posed a challenge to ICT application in public hospital. On average, the respondents also agreed that inconvenient data entry posed a challenge to ICT application in public hospital as shown by a mean score of 4.00 and a standard deviation of 1.01. In addition, the respondents confirmed that low computer literacy level among health personnel posed a challenge to ICT application in public hospital. This statement had a mean score of 3.94 and a standard

deviation of 1.13. Conversely, the respondents disagreed that frequent breakdown of ICT tools posed a challenge to ICT application in public hospital. This statement had a mean score of 2.26 and a standard deviation of .988.

The study reveals that lack of interest in health personnel, lack of skills in ICT usage, inconvenient data entry, and low computer literacy level among health personnel are the major user challenges associated with ICT application in public hospitals in Kumasi Metropolis. This is in line with a work done by Nchise, et al. (2012) that a major asset which contributes to the effective implementation of ICT in hospital is the people or users of the ICT. Nchise, et al. (2012) mentioned that skill shortages in ICT usage, lack of interest in ICT and low computer literacy level among health personnel affect effective implementation of ICT. Johnson (2001) for instance suggested lack of ICT skill and lack of interest in ICT are the major challenge to implementation of ICT in any hospital.



4.5.2 Management challenges

With regard to management challenges associated with ICT application at public hospital in Kumasi Metropolis, it was observed that high cost of acquisition, use and maintenance of ICT tools posed a challenge to ICT application. It has the highest mean score of 4.36 and a standard deviation of .811. Also, lack of effective education on the value and use of ICT tools had mean score of 4.16 and a standard deviation of 1.03. However, the respondents emphasized that lack of adequate management support for ICT usage in the hospital posed a challenge to ICT application as shown by a mean of 4.14 and a standard deviation of 1.036. Furthermore, limited access to ICT facilities in the hospital had a mean score of 3.70 and a standard deviation of 1.270. On the other hand, with a mean of

2.71 and a standard deviation of 1.240 the respondents disagreed that unstable power supply to support most services posed a challenge to ICT application at the hospital.

The finding indicates that high cost of acquisition, use and maintenance of ICT tools, lack of effective education on the value and use of ICT tools, lack of adequate management support for ICT usage in the hospital, and limited access to ICT facilities in the hospital are the major management challenges associated with ICT application at the public hospital. The finding align with the study by Miller and West (2007) that attitude of the management at the hospital affect the implementation of the ICT. Miller and West (2007) indicated that high cost of acquisition, use and maintenance of ICT tools, and limited access to ICT facilities are the challenges towards the implementation of ICTs in hospitals. The cost of acquisition may include both the hardware and the software for the hospital's e-health system. In addition to acquiring the hardware and the software, the management of the hospital consider the costs which are associated with specifying the requirements, planning, training of personnel, reengineering of the healthcare system of the hospital and customizing the systems to meet the requirements of the hospital which may posed a challenges ICT application in hospitals.

4.5.3 Technological Challenges

It is evident from the result that inadequate ICT tools networked across the various departments posed a challenge to ICT application. This statement had a mean score of 4.18 and a standard deviation of .993. Again, the respondents asserted that lack of networked ICT facilities posed a challenge to ICT application as shown by a mean of 3.98 and a standard deviation of 1.099. On the other hand, the respondents agreed that insufficient bandwidth or speed impede effective implementation of ICT. This statement reflected a mean of 3.87 and a standard deviation of 1.113. Conversely, the respondents

emphasized that limited accessibility and network connection. This statement attained a mean of 3.68 and 1.296.

The result shows that inadequate ICT tools networked across the various departments, lack of networked ICT facilities, insufficient bandwidth or speed, and limited accessibility and network connection are the major technological challenges associated with ICT application at the public hospitals in the Kumasi Metropolis. The finding agrees with the study conducted in Kenya by Mugo (2014). The study revealed that ICT strategy adoption in Kenyan health care include: slow or unreliable internet connectivity, inadequate ICT tools networked across the various section; lack of awareness of what is available; lack of relevance of available information (i.e. not meeting peoples' needs in terms of scope, style, or format); lack of time and incentives to access information; and limited accessibility of network.

The finding concurs with the study by Zakaria and Yusof (2001) that all the difficulties the hospital faced in the implementation of ICT are related to the technology. Zakaria and Yusof asserted that lack of networked ICT facilities, and limited accessibility and network connection are the technological challenges associated with ICT application in hospitals to be able to provide efficient services to clients. Benjamin and Levinson (1993) challenges are technological when they are related to the ease of use of the ICT device or technology, compatibility of the ICT system with old systems, inadequate ICT tools networked across the various departments, limited accessibility and network , information systems security issues and the usability of the devices. These challenges arise due to the technological change the hospital staff face (Benjamin & Levinson, 1993)

4.6 Impact of ICT application practices on the hospitals' operations

In order to evaluate the impact of ICT application practices on the hospitals' operations, the

variables for the various public hospital operations were performed.

4.6.1 Descriptive Analysis of hospitals' operations

The main issue considered under this section related to the overall operations measurement at various public hospital when ICT application practices is adopted. Respondents were asked to indicate their level of agreement to statements (indicators) on the operation performance measurement at the various public hospital. The responses gathered with the aid of questionnaire administration are presented in Table 6.

Table 6: Responses on hospital operations variables

S/N	Hospitals' operations	N	Mean	Std. Dev.	Decision
1.	ICT improves the quality of service provided	212	4.23	.998	Agreed
2.	ICT tools has enhanced information sharing with the health personnel in the hospital	212	4.07	.996	Agreed
3.	ICT improves the quality of treatment given to the patients	212	4.02	1.153	Agreed
4.	ICT tools has provided greater data accuracy on the hospital inventories	212	3.92	1.160	Agreed
5.	ICT improve the access to medical Information of patients	212	3.75	1.221	Agreed
6.	Efficiency of care provider improves due to ICT tool usage	212	3.74	1.194	Agreed
7.	ICT tools has ensured accuracy of workdone in the hospital	212	3.49	1.278	Agreed
8.	ICT improves the quality of diagnosis given to the patients	212	2.38	1.222	Disagreed
9.	ICT tools has enhanced drugs and non-drugs availability to clients	212	2.36	1.301	Disagreed
10.	ICT have reduced cost of ordering stock	212	2.19	1.131	Disagreed
11.	ICT has improved speed of service to delivered to the patients	212	2.11	1.068	Disagreed

Note: $\leq 3.0 = \text{Disagreed}$ $\geq 3.0 = \text{Agreed}$

As depicted in Table 6, the respondents agreed to almost all the hospital operations performance variable. It can be seen that with a mean score of 4.23 and a standard

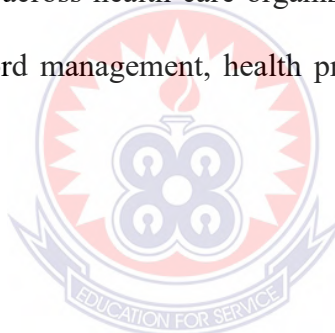
deviation of .998, ICT improves the quality of service provided. Followed by the statement that ICT tools has enhanced information sharing with the health personnel in the hospital. This statement had a mean of 4.07 and a standard deviation of .996. It can also be explained that ICT improves the quality of treatment given to the patients as shown by a 4.02 and a standard deviation of 1.153. On the other hand, with a mean of 3.92 and a standard deviation of 1.160, the respondents indicated that ICT tools has provided greater data accuracy on the hospital inventories.

In addition, the respondents agreed that ICT improve the access to medical Information of patients. This statement reflected a mean of 3.75 and a standard deviation of 1.220. However, with a mean of 3.74 and a standard deviation of 1.194, the respondents agreed that efficiency of care provider improves due to ICT tool usage. The respondents further asserted that ICT tools has ensured accuracy of workdone in the hospital as shown by a mean 3.49 and a standard deviation of 1.278. According to the respondents, ICT improves the quality of diagnosis given to the patients, enhance drugs and non-drugs availability to clients, reduce cost of ordering stock, and improve speed of service to delivered to the patients had the lowest mean value of 2.38, 2.36, 2.19 and 2.11 respectively.

The finding reveals that ICT improves the quality of service provided, enhance information sharing, improves the quality of treatment given to the patients, provides greater data accuracy on the hospital inventories, and improve the access to medical Information of patients. The finding confirms with the study by Mugo (2014) that ICT integration in the healthcare provide or enhance information sharing, provides greater data accuracy and improve the access to medical information of patients. Mugo (2014) further indicated that ICT integration can enhance the processes and capabilities of

healthcare management in public health facilities by both the medical providers and the patients in Kenya.

International Telecommunication Union (2016) explored and found that most health care facilities (both public and private) benefit from having an integrated ICT network to manage their data and health care resources. Efficient ICT systems would significantly improve the delivery of service to patients and improve the utilization of resources within the health centers (Conrad & Schneider, 2011). As indicated by Mulwa (2013) ICT integration improves the quality of treatment given to the patients, and improve the access to medical information of patients. Mulwa (2013) further asserted that the adoption of ICT strategy would also to streamline key processes in the health care industry, integrate activities across health care organizations, reduce overall health care costs, improve medical record management, health program management and improve patient care quality.



4.6.2 Regression Analysis

In order to determine the relationship between ICT application practices on the hospitals' operations, regression analysis was used. The results are summarized and the original Table from SPSS-23.0.

Table 7: Regression result on the effect of ICT application on hospital operations

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.754 ^a	.576	.398	1.013	.333	9.742	1	210	.000

a. Predictors: (Constant), ICT application practices

b. Dependent Variable: Hospital operations

From the summary model Table 7, the study found a positive and significant ($p=0.000<0.01$) relationship between ICT application practice and hospital operations. It

also reveal that the number of column R, is the relationship between ICT application practice and hospital operations (correlation coefficient) is 0.754 which means there is a strong and direct or positive relationship between ICT application on hospital operations. R square states the magnitude of the influence of motivation on employee performance (coefficient of determination) is 0.576. This means the magnitude of the effect of ICT application on hospital operations is 57.6%, while the remaining 42.4% (100% – 57.6%) is influenced by variables – other variables not examined in this study.

Table 8: Result of Coefficient Regression-Hospital operations

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	24.061	2.564		9.451	.000
ICT application practice	.525	.080	.738	8.600	.000

Based on the regression coefficient test findings in Table 8, it is determined that the regression equation used to assess successful hospital operations is influenced by ICT application practices is $Y = 24.061 + 0.525X$ where Y is the effectiveness of hospital operations and X is the ICT application practice. Based on the results, it is known that there is influence of ICT application practice on hospital operations, then the quality of service provided, information sharing with the health personnel, quality of treatment given to the patients, greater data accuracy on the hospital inventories, and access to medical Information of patients will be improved. The finding concurs with studies (Huber *et al*, 2010; Liwei *et al.*, 2013) who have shown that the implementation of ICTs in service delivery has a significantly positive impact on clients' behavioural intention and satisfaction when receiving services and this could lead to expand the healthcare service market share and an improvement in service delivery.

The finding also aligns with the study conducted by Li *et al.* (2013). According to Li *et al.* (2013), health is an increasingly information-intensive sector where ICT adoption can

significantly contribute to improved quality of service, efficiency, and accessibility. According to Hardey (2011), ICT plays an important role in delivering healthcare today. Hardey (2011) mentioned that healthcare professional including doctors and nurses require ICT tools to plan for improving the national healthcare services in most countries. Ganesh (2004) observe that the implementation of ICT in health care services is regulated by five main factors: performance expectancy, social influence, facilitating conditions, effort expectancy and threat appraisals. Ganesh (2004) indicated that ICT adoption in health care service improve health care operations.



CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter sums up the findings from the study, and the relevant conclusions drawn from the findings indicating how the study has contributed to knowledge. In addition, it presents the recommendations made based on the findings of the study and the suggestions for future research.

5.2 Summary

Information and Communication Technology (ICT) consists of the array of technologies which gives users the opportunity to receive, produce and also share resources and ideas (Paul, 2003). ICT in the health sector also helps to reduce the cost of service delivery. Attention has increasingly been drawn to the potential of ICT in improving efficiency and cutting down the cost of health care. In view of this, healthcare facilities such as hospitals are left with no other option than to adopt IT tools. However, there seems to be a lack of these technologies in hospitals especially in developing countries. Thus, a handful of hospitals in developing countries have made efforts at implementing ICTs in their operations due to numerous challenges.

Based on this background, the study aimed at exploring challenges facing public Hospital's ICT application in Kumasi Metropolis. The specific objectives were to identify the ICT application practices in public hospitals in Kumasi Metropolis, identify the challenges associated with ICT application in public hospital, and determine the impact of ICT application practices on the hospitals' operations.

Descriptive survey research design was employed for the study. The target population of the study was 1021 health workers of 10 Public Hospitals in Kumasi Metropolis in the Ashanti Region of Ghana. In determining the sample size for the study, a table developed by the Research Advisors (2006) with a confidence level of 95% and margin of error (degree of accuracy) of 5.0% was used. Based on this Table, a sample of 285 health workers were selected for the study. Simple random sampling technique was used to select the health workers. The reliability test achieved 0.794 alpha. The questionnaire was mostly Likert scale type. Data collected were edited and computed into the SPSS for analysis. Mean and standard deviation were used to analyse the data. An inferential statistics such as Pearson correlation and regression analysis were performed to ascertain the effect of ICT application practice on hospital operations. The results were presented using tables.

5.3 Summary of Findings

A number of findings were made after a discussion of the responses. They are summarized as below;

5.3.1 ICT application practices in public Hospitals

- The study showed that at public hospitals in Kumasi Metropolis, ICT tool is used to assist claims officer in generating claims for NHIA, discharging of clinical services, entering provisional diagnoses for patients and requesting for consultation service.
- The study further revealed that ICT tools are used by the public hospitals in entering laboratory test results of patients, managing stocks and inventory, and registering patient visitation to the hospital.

5.3.2 Challenges associated with ICT application in public hospital

- The study revealed that lack of interest in health personnel, lack of skills in ICT usage, inconvenient data entry, and low computer literacy level among health personnel are the major user challenges associated with ICT application in public hospitals in Kumasi Metropolis
- It was evident from the study that high cost of acquisition, use and maintenance of ICT tools, lack of effective education on the value and use of ICT tools, lack of adequate management support for ICT usage in the hospital, and limited access to ICT facilities in the hospital are the major management challenges associated with ICT application at the public hospital.
- The finding showed that inadequate ICT tools networked across the various departments, lack of networked ICT facilities, insufficient bandwidth or speed, and limited accessibility and network connection are the major technological challenges associated with ICT application at the public hospitals in the Kumasi Metropolis.

5.3.3 Impact of ICT application practices on the hospitals' operations

- The study found a positive and significant ($p=0.000<0.01$) relationship between ICT application practice and hospital operations.
- The finding revealed that ICT improves the quality of service provided, enhance information sharing, improves the quality of treatment given to the patients, provides greater data accuracy on the hospital inventories, and improve the access to medical information of patients.

5.4 Conclusions

Improving the health of individuals and communities, and strengthening health systems, disease detection and prevention are crucial to development and poverty reduction. This proposition requires evidence-based medicine (EBM) which demands appropriate and timely acquisition of the best available evidence often offered by ICT in order to answer clinical questions. Widespread adoption of ICT is a key strategy to meet the challenges facing health systems internationally of increasing demands, rising costs, limited resources and workforce shortages. According to the study public hospitals in Kumasi Metropolis used ICT tools to assist claims officer in generating claims for NHIA, discharging of clinical services, entering provisional diagnoses for patients and requesting for consultation service. Also, ICT tools are used by the public hospitals in entering laboratory test results of patients, managing stocks and inventory, and registering patient visitation to the hospital.

Public hospitals are faced with numerous challenges in deploying ICT tools. According to the study users, management and technology are the actors that play various roles in posing as challenges in the adoption of ICT in the public hospitals. It appeared that lack of interest in health personnel, lack of skills in ICT usage, inconvenient data entry, and low computer literacy level among health personnel are the major user challenges associated with ICT application in public hospitals in Kumasi Metropolis. It was evident from the study that high cost of acquisition, use and maintenance of ICT tools, lack of effective education on the value and use of ICT tools, lack of adequate management support for ICT usage in the hospital, and limited access to ICT facilities in the hospital are the major management challenges associated with ICT application at the public hospital. The study concluded that inadequate ICT tools networked across the various departments, lack of networked ICT facilities, insufficient bandwidth or speed, and limited

accessibility and network connection are the major technological challenges associated with ICT application at the public hospitals.

It can be concluded that if ICTs are actively deployed, healthcare delivery becomes improved and the public health is better for it. The study discovered that ICT integration improves the quality of service provided, enhance information sharing, improves the quality of treatment given to the patients, provides greater data accuracy on the hospital inventories, and improve the access to medical information of patients.

5.5 Recommendations

Based on the findings of this study, the following specific recommendations were made:

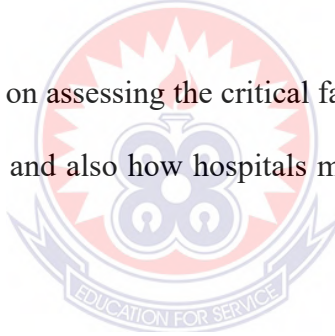
- The board/management of the public hospitals need to build the capacity of healthcare providers on ICT utilization for effective and efficient ICT usage in order to improve the healthcare service provision.
- The health care providers needs to have a positive attitude towards ICT utilization in order to be able to embrace it and appreciate its benefits in healthcare provision in Ghana.
- The Public hospitals should involve an in-house IT experts to serve as the gatekeepers for the system in order to ensure effective integration of ICT tools.
- The public hospital should create a conducive and supportive working environment that will lead to effective ICT application within the hospital.
- The administrators of the Public hospitals should continuously provide ICT training workshops for all the personnel within the hospital.
- Public hospitals should set up Information Technology policies in order ensure success of ICT application practices. The IT policies help to ensure the use of the

hospital's IT resources and support the hospital's vision and mission in the best possible way.

5.6 Suggestion for Further Studies

This study comprises of limited data related to the application of ICT in a public hospitals in Kumasi Metropolis. Further empirical studies using larger sample sizes from different and greater geographical settings. Subsequent research needs to be engaged in the development of more valid and reliable operational definitions on the tested variables and overcoming the limitations posed by the data source used in this study. Also, more structured interviews should be conducted among health workers of different Public hospitals in Ghana, in order to continuously address the challenges facing.

Future studies could be done on assessing the critical factors that influence the success of ICT application in hospitals, and also how hospitals manage the challenges they face in the application of ICT tools.



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APPENDIX

UNIVERSITY OF EDUCATION, WINNEBA COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

TOPIC

INFORMATION AND COMMUNICATION TECHNOLOGY APPLICATION AND CHALLENGES IN MANAGEMENT OF PATIENTS' PERSONAL RECORDS IN SOME SELECTED PUBLIC HOSPITALS IN KUMASI METROPOLIS.

PREAMBLE: The researcher, a student of University of Education, Winneba, Kumasi is seeking information relating to the above mentioned topic. The information that you are to provide is purely for an academic exercise and would be treated with absolute confidentiality. Please offer answers to all the questions in all frankness as much as possible and to the best of your knowledge. You may tick (✓) where applicable or give a brief explanation where necessary.

Section A: Background Information

1. What is your Gender?
Male [] Female []
2. What is your Age Bracket?
20 – 30 years [] 31 – 40 years [] 41 – 50 years []
51 – 60 years []
3. How many years have you worked for the Hospital?
0-5 years [] 6-10 years [] 11-15 years [] 16-20 years []
21 and over []

4. In which department do you serve the Hospital?
Medical Staff (Physicians, Nurse, Dentists, Pharmacists) []
Accountant [] Store officer [] NHIS Claim officer [] Human
Resource Officers [] Administration and Record Officers []
If other (specify):.....

Section B: ICT application practices in public hospitals in Ghana.

5. What is your understanding of the use of ICT tools in healthcare delivery?

.....
.....

6. What ICT tools are available in the Hospital for Health delivery? Tick as many as its available.

- Surgical and service line technologies []
Smartphones and tablets applications []
Ultrasound imaging devices []
Infection detecting technologies []
Healthcare staffing management technology []
CCTV Cameras []

If other (specify):.....

7. Are these devices sufficient enough to cater for the demands of the departments and wards? Yes [] No []

8. What other ICT tools do you recommend for the successful integration of ICT in Healthcare delivery at this hospital?

.....
.....
.....

9. Is there a need for the use of these devices in health service delivery at this hospital?

.....

.....

.....

5. Please indicate ICT application practices in health service delivery in the hospitals. Use a scale of 1-5 where 1= strongly disagree, 2= Disagree, 3= Neutral, 4=Agree and 5= Strongly agree. *(tick where appropriate)*

S/N	ICT application practices	Scale				
		1	2	3	4	5
1.	Hospitals implement ICT in the discharge of their clinical services					
2.	The hospital adopts ICT for stocks and inventory management					
3.	The hospital use ICT tool to register patient visitation to the hospital					
4.	Requesting for consultation Service					
5.	ICT tools are used in entering patients vitals at nursing station					
6.	Provisional diagnoses for patients are entered using ICT tools					
7.	Pharmacist used ICT tools to view patient drugs and serving of drugs					
8.	ICT tools are used in entering laboratory test results of patients					
9.	Claims Officer generate claim for NHIA by using ICT tools					
10.	ICT tools are adopted to communicate with					

	care provider					
11.	ICT tools are used to check and locate patients folder					

Section C: Challenges associated with ICT application

6.0 To what extent do you agree or disagree with the following challenges associated with ICT application in public hospital in Ghana. Please indicate the extent to which you agree or disagree to each of this item. Use a scale of 1-5 where 1= strongly disagree, 2= Disagree, 3= Neutral, 4=Agree and 5= Strongly agree. (*Tick where appropriate*)

S/N	Challenges associated with ICT application	Scale				
		1	2	3	4	5
	User challenges					
1.	Inconvenient data entry					
2.	Frequent breakdown of ICT tools					
3.	Lack of skills in ICT usage					
4.	Low computer literacy level among health personnel					
5.	Lack of interest by health personnel					
	Management challenges					
1.	Unstable power supply to support most services at the hospital					
2.	High cost of acquisition, use and maintenance of ICT tools					
3.	Lack of adequate management support for ICT usage in the hospital					
4.	Lack of effective education on the value and use of ICT tools					
5.	Limited access to ICT facilities in the hospital					
	Technological challenges					

1.	Limited accessibility and network connection					
2.	Insufficient bandwidth or speed					
3.	ICT tools networked across the various departments are inadequate					
4.	Lack of networked ICT facilities					

Section C: Impact of ICT application practices on the hospitals' operations

6.0 To what extent do you agree or disagree with the following impact of ICT application practices on the hospitals' operations. Please indicate the extent to which you agree or disagree to each of this item. Use a scale of 1-5 where 1= strongly disagree, 2= Disagree, 3= Neutral, 4=Agree and 5= Strongly agree. (*Tick where appropriate*)

S/N	Impact	Scale				
		1	2	3	4	5
1.	ICT tools has enhanced information sharing with the health personnel in the hospital					
2.	ICT tools has provided greater data accuracy on the hospital inventories					
3.	ICT improve the access to medical Information of patients					
4.	ICT tools has ensured accuracy of work done in the hospital					
5.	ICT has improved speed of service to delivered to the patients					
6.	ICT tools has enhanced drugs and non-drugs availability to clients					
7.	ICTs have reduced cost of ordering stock					
8.	ICT improves the Quality of diagnosis given to the patients					
9.	ICT improves the quality of treatment given to the patients					
10.	ICT improves the quality of service provided					

11.	Efficiency of care provider improves due to ICT tool usage					
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