Technology needs in a healthcare environment: Assessment of Information Communication Technology at Ejisu Government Hospital, Ghana

Abstract

Information, Communication Technology (ICT) offers innovative ways for healthcare organisations to increase access to quality healthcare delivery and ensures proficient administration of healthcare resources. The ICT policy initiative in the Ghana Ministry of Health supports a framework that ensures the use of emerging technology in healthcare and proper deployment of ICT to hasten the delivery of healthcare in all health facilities across the country. However, the application of ICT in most of the facilities is plagued with several challenges. This paper examines ICT needs of Ejisu government hospital in the Ashanti region of Ghana using internationally acclaimed technology needs assessment tools. We collected quantitative data from 22 respondents [service providers (n=11) and patients (n=11)], conducted direct observation of hospital inventory and reviewed hospital documents. We used descriptive statistical analysis to describe the sample variables that emerged from the three themes: use of technology; opportunities for funding of health information technology; barriers and strengths of implementing ICT interventions in the facility. To calculate reliability scores, percentage and means of component variables were used. The results showed that majority of health workers engage in the use of electronic health record system, electronic medical records, health information exchange, electronic registry and internet use. Majority of the staff have used electronic medical records or electronic health records before. High ICT cost and limited infrastructure were the leading challenges faced by providers while low health literacy and high internet cost were the main barriers on the part of patients. The findings further demonstrated that willingness to learn and implement technology interventions were the major strength for both providers and patients. The paper contributes to ICT application in a healthcare environment and recommends improvement in ICT infrastructure and education for patients and a

subsidised operational cost for ICT implementation in the facility.

1.0 Introduction

Information, Communication Technology (ICT) has evolved with other analytical tools and social media platforms such as Facebook, Twitter, etc. The use of ICT has improved access to information in recent times making it easy for people to receive relevant information through smart phone notifications and other available applications [1]. In healthcare, these tools or platforms have been used to mine information to help prevent the spread of diseases, detect and manage certain disease conditions. For example, ICT has been used to monitor high risk patients [2], reduce cross infections in hospitals and trace the origins of outbreaks during a pandemic [3], facilitate routine check-ups from a distance [4], improve quality of care, patient safety, data security, and reduction in administrative costs [5]. In public health, ICT is significant in disease prevention process - supporting data collection, systematic reviews, monitoring and evaluation of health programmes [6]

While ICT has been shown to offer innovative ways for healthcare organisations to increase access to quality healthcare delivery and ensure proficient management of healthcare resources, its application in many Low-Middle Income Countries (LMIC) is limited [7]. In Ghana, the health sector ICT policy and strategy which is guided by the Ghana ICT for Accelerated Development (ICT4AD) policy is aimed at charting a roadmap to support a framework for the use of enhancing modern technology in the delivery of healthcare in health facilities across the country [8]. The relative development in Ghana of ICT in healthcare

delivery is an attempt to improve provision of healthcare at all levels of care.

However, the extent of possible gaps between policy and practice in Ghana are not known. Hence a technology needs assessment at Ejisu government hospital to gather information about the state of ICT in the hospital and how clients and providers can use ICT to achieve the goals of quality health care delivery in the hospital. The aim of the assessment was to examine the health technology situation and requirements needed for healthcare improvement, performance measurement, reporting and engagement of users; access to care as well as funding and equity of services.

The purpose of the assessment was to provide the hospital with a first hand or baseline information on the health technology situation at the hospital and also the technology needs for effective service delivery. It also serves as a guide in developing plans for health information technology for providers and service users as well as the broader stakeholder groups and to drive implementation of health interventions in the hospital and the communities with appropriate means of technology. In addition, the assessment offers managers the opportunity to examine the trajectory of ICT development and service delivery goals over the past years.

This paper draws inferences from existing protocols for assessing applications and interventions in healthcare environment and the broader healthcare ecosystem. In its simplest form, assessment could be explained to mean the ability to determine the relative value or worth of something. The emergence of different actors with competing interest has led to the diverse definitions, approaches and concepts [9]. Some scholars have made the efforts to group these concepts. For example, Alkin and Christie [10] introduced the concept of an assessment tree with roots and branches and others have suggested a classification system that linked assessment to the program cycle (design, implementation and outcomes)[11]. Similarly, some scholars have identified proactive, clarificative, interactive, monitoring, and impact assessment [12] and frameworks such as the five assessment approaches system [13].

Indeed, technology assessment in healthcare environment has received broader attention in recent times. In the Makkah region of Saudi Arabia through technology assessment, it was detected that physicians from some hospitals showed resistance to record patient information in the electronic medical records system [14]. Again, in a study to assess technology needs of pharmacists, the findings indicated that most pharmacists lacked computer, database and internet searching skills and therefore needed to upgrade their skills in order to improve pharmacy practice [15].

In other context, J Li, et al [16] were able to use ICT evaluation outcomes to develop a novel method for eHealth readiness evaluation of a pandemic. ICT assessment has also been used to aid the planning for distributed healthcare manufacturing technologies [17] Even though ICT assessment in healthcare has provided several useful and positive outcomes the literature shows that healthcare delivery which is over reliant on the use of ICT is considered to be costly, too risky, and often seen to be distant from the primary objective and purpose of health sector programmes [18].

2.0 Methodology
2.1 Study Setting
Ejisu Government Hospital is located in the Ejisu-Juaben Municipality in the Ashanti Region of Ghana. It was established in 1972 as a Health Centre and upgraded to a hospital status in 2010. It is a 64- bed capacity facility and provides healthcare to over 179,376 people living in and around the Ejisu municipality. The total full - time staff strength of the hospital is 77 plus 32 casual staff. The departments that provide healthcare to the people include; Out Patient, Surgery & Obstetric, Maternal & Reproductive Health, General Administration, Eye care, Diagnostics, Psychiatry and Pharmaceutical. In response to the health sector's policy initiative on ICT to enhance quality healthcare delivery, the hospital envisions an accelerated ICT application in the delivery of its core services. However, like other healthcare facilities in Ghana, the application of ICT is seriously constrained by several challenges. This paper is part of a holistic ICT assessment plan aimed at evaluating the state of ICT needs at the hospital.

2.2 Description of target audience
The survey was designed to gather information from Senior Management Team Members (Medical Director, Matron, Health Service Administrator, Accountant and Pharmacist), medical officers, nurses, midwives, accounts officers, procurement managers, administrators and human resource managers, laboratory technicians, dispensing technicians, biostatistics officers and health information officers. The survey targeted both men and women who had served the hospital for two or more years. The survey also targeted patients to seek their

views about technology usage in the hospital. The patients included men and women over 18 years and above of age seeking health care at the time of the survey and also willing to provide answers to the survey instrument

2.3 Data collection and analysis method

A quantitative research method together with a purposive sampling technique was used. I contacted potential participants through a letter from the district health administration. The needs assessment was conducted in two phases [survey of service providers (n=11) and patients (n=11)]. Due to the COVID-19 pandemic, all social distancing and hygiene protocols were observed before, during and after the survey. These included the wearing of face mask, hand washing and social distancing protocols. We designed a 20 - item structured questionnaire for the survey. The questionnaire was in two categories; questions meant for providers and those for patients. The questionnaire asked service providers to indicate whether they are aware of the use of technology in healthcare, the types of ICT in their facility and if they have been using the technology in their day to day activities. They were also asked to indicate the barriers they face in using ICT in their day to day activities. The same approach used in collecting data from service providers was applied to the patients.

To improve the content validity of the survey instrument, I used easily understood words and had an official of the Ministry of Health ICT department as well as other experts to comment on the final copy. I then adapted the questionnaires to the target groups by pretesting them on a sample like the target group. The pretesting was followed by an analysis procedure which led to the modification of items deemed to be ambiguous or confusing. The data collection was carried out over a period of 3 days. A total of 11 service providers and 11 patients responded to the questionnaire. The questionnaires were reviewed daily to ensure all data gaps were addressed. The data that emerged were put into themes and I performed the reliability data analysis using SPSS V25. Descriptive statistics (percentages) were used to describe the characteristics of the samples that emerged in the themes

3.0 Results and Discussions
3.1 Use of Technology

Table 1 Technologies being utilized within the facility to engage health workers, National Health Insurance and Employer.

Technologies	Health Workers		National Health Insurance		Employer	
	%Yes	%No	%Yes	%No	%Yes	%No
Electronic Health Record (EHR) System	90.9	9.1	36.4	63.6	0	100
Electronic Medical Records (EMRs)	63.6	36.4	18.2	81.8	27.3	72.7
Electronic Registry	54.5	45.5	9.1	90.9	18.2	81.8
E-Prescribing	18.2	81.8	0	100	0	100
Health Information Exchange (HIE)/Regional Health	63.6	36.4	36.4	63.6	0	100
Information Organization (RHIO)	54.5	45.5	18.2	81.8	36.4	63.6
Interactive Tailored Media	27.3	72.7	0	100	18.2	81.8
Interactive Voice Response	45.5	54.5	0	100	0	100
Internet	54.5	45.5	18.2	81.8	27.3	72.7
Secure Messaging	27.3	72.7	0	100	18.2	81.8
Social Media (networks, blogs, etc.)	45.5	54.5	0	100	0	100
Personal Health Records (PHRs)	36.4	63.6	27.3	72.7	0	100
Text Messaging	27.3	72.7	0	100	18.2	81.8
Game Platforms	45.4	54.5	0	100	0	100
Other (please describe)	18.2	81.8	0	100	0	100

Source: Field Data, 2021

Table 1 shows the type of technologies that are being used at Ejisu government hospital to engage, health workers, NHIS and the employer of the facility. The table shows that majority of the respondents are of the view that health workers engage in the use of electronic health record system (90.9%), electronic medical records (63.6%), health information exchange (63.6%), electronic registry (54.5%) and internet (54.5%). Again, many respondents are of the view that the NHIA engages in electronic health records system (36.4%) and health information exchange (36.4%). The employer however engages in information organisation as 36.4% of the respondents held that view.

Table 2 demonstrates respondents who have used EMR and e-prescribing in the facility before. From the table, 56% of the total respondents have used EMR or HER while 81.8% have used e-prescribing before.

Table 2: Percentage of respondents in the facility who have implemented an EMR/HER system and e-prescribing

	Doctors who have used EMR/HER		Doctors who are using e-prescribing	
	Frequency	Percent	Frequency	Percent
Yes	6	54.5%	9	81.8%
Don't know	5	45.5%	1	9.1%
Missing	0	0	1	9.1%
Total	11	100	11	100

Source: Field Data, 2021

3.2 Funding Opportunities

Table 3 evaluates the availability of local funding opportunities or incentive programs from stakeholders, foundations, organizations, employers or businesses. The table shows that 36.4% of the respondents knew of the availability of such opportunities, while 45.5% did not know about that.

Table 3: Local funding opportunities or incentive programs (from payers, foundations, organizations, businesses, employers, etc.) for the implementation of health information technology

	Frequency	Percent	Valid Percent	Cumulative percent
Yes	4	36.4 %	44.4%	44.4%
Don't know	5	45.5%	55.6%	100%
Missing	2	18..1%		
Total	11	100%		

Source: Field Data, 2021

3.3 Barriers and Strengths

Table 4 presents the barriers that healthcare providers encounter in using ICT at the facility. According to the table, 81.8% of the respondents attribute high ICT cost as a barrier in implementing ICT interventions in the facility. The next challenge that appeared high was lack of infrastructure or support systems for the implementation of technology. Disbelief in the potential effectiveness of HIT interventions

Table 4: Barriers for Healthcare providers in using ICT.

Identified Barriers	Frequency		Percent	
	Yes	No	Yes	No
Cost	9	2	81.8%	18.2%
Time constraints	3	8	27.3%	72.7%
Workflow disruption	3	8	27.3%	72.7%
Lack of infrastructure/support systems for the implementation of Technology	5	6	45.5%	54.5%
Privacy and security concerns	3	8	27.3%	72.7%
Low interest in the use of ICT	2	9	18.2%	81.8%
Disbelief in the potential effectiveness of ICT interventions	0	11	0	100%
Challenges of developing/implementing/culturally relevant ICT programmes	3	8	27.3%	72.7%
Concerns about patients' low health literacy	1	10	9.1%	90.9%
Concerns about patients' low technology literacy	3	8	27.3%	72.7%
Concerns about patients' limited access to computers, Internet	3	8	27.3%	72.7%
Other (describe)	3	8	27.3%	72.7%

Source: Field Data, 2021

Table 5 presents the strengths that exists for healthcare providers to using health information technology in the facility. According to the table, willingness on the part of providers to learn and implement technology interventions appeared as a major strength for providers with 81.8% of the respondents indicating that as strength. This was followed by access to funds or support for the implementation of health information technology (72.7%) and then availability of support systems for ICT implementation within the facility (63.6%).

Table 5: Strengths that exist for healthcare providers in using HIT interventions.

Identified Strengths	Frequency		Percent	
	Yes	No	Yes	No
Willingness to learn about/implement technology	9	2	81.8%	18.2%
Support systems and resources for the implementation of ICT within the practice setting	7	4	63.6%	36.4%
Significant presence of/access to existing ICT (i.e., EMRs/EHR systems, secure messaging) within the practice setting	5	6	45.5%	54.5%
Access to funds or in-kind support for the implementation and use of ICT	8	3	72.7%	27.3%
Consumer/patient demand for the use of ICT	4	7	36.4%	63.6%

Support amongst stakeholders (hospital systems, payers, etc.)	5	6	45.5%	54.5%
Other (describe)	1	10	9.1%	90.9%

Source: Field Data, 2021

Identified Strengths	Frequency		Percent	
	Yes	No	Yes	No
Technologically savvy audience	5	6	45.5%	54.5%
Availability of/access to public computers	4	7	36.4%	63.6%
Willingness to learn about/implement technology	8	3	72.7%	27.3%
Support systems/networks for the use of ICT, especially among low tech/literacy/access groups	5	6	45.5%	54.5%
Significant presence of existing ICT (i.e., EMRs, secure messaging)	6	5	54.5%	45.5%
Consumer/patient demand for the use of ICT	5	6	45.5%	54.5%
Other (describe)	1	10	9.1%	90.9%

Source: Field Data, 2021

Table 6 below shows the barriers that confront patients in using health information technology at the facility. The table indicates that majority of the respondents (63.6%) are of the view that low health literacy and high internet cost are the major barriers affecting ICT use by patients in the facility. These factors were followed by low technology literacy and limited access to internet in the facility with each scoring 45.5% of respondents' rate.

Table 6: Barriers for patients

Identified Barriers	Frequency		Percent	
	Yes	No	Yes	No
Low health literacy	7	4	63.6%	36.4%
Low technological literacy	5	6	45.5%	54.5%
Limited access to computers	6	5	54.5%	45.5%
Limited access to Internet	5	6	45.5%	54.5%
Privacy and security concerns	3	8	27.3%	72.7%
Low interest in the use of ICT	4	7	36.4%	63.6%
Cost	7	4	63.6%	36.4%
Disbelief in the potential effectiveness of HIT	2	9	18.2%	81.8%

Interventions				
Lack of culturally relevant ICT programmes	3	8	27.3%	72.7%
Lack of awareness about ICT capabilities or interventions	3	8	27.3%	72.7%
Other (describe)	1	10	9.1%	90.9%

Source: Field Data, 2021

Table 7: Strengths that exist for patients in using HIT

Identified Strengths	Frequency		Percent	
	Yes	No	Yes	No
Technologically savvy audience	5	6	45.5%	54.5%
Availability of/access to public computers	4	7	36.4%	63.6%
Willingness to learn about/implement technology	8	3	72.7%	27.3%
Support systems/networks for the use of ICT, especially among low tech/literacy/access groups	5	6	45.5%	54.5%
Significant presence of existing ICT (i.e., EMRs, secure messaging)	6	5	54.5%	45.5%
Consumer/patient demand for the use of ICT	5	6	45.5%	54.5%
Other (describe)	1	10	9.1%	90.9%

Source: Field Data, 2021

Table 7 shows the strengths that exist for patients to using health Information technology in the facility. From the table, willingness on the part of patients to learn about technology being used in the hospital appeared to be a major strength for patients with 72.7% of respondents indicating that as strength. This is followed by the presence of some basic technology at the facility (54.5%).

Table 7: Strengths that exist for patients in using HIT
Source: Field Data, 2021

4.0 Conclusions

This assessment was conducted to provide the Ejisu government hospital baseline information on the health technology situation at the hospital and also the technology needs for effective service delivery. It also serves as guidance in developing plans for health information technology for providers and service users as well as the broader stakeholder groups and to drive implementation of health interventions in the hospital

and the communities with appropriate means of technology. Three main themes emerged from the survey. They include; use of technology, opportunities for funding of health information technology, barriers and strengths of implementing health information technology interventions in the facility.

In terms of the use of technology, the findings show that majority of the respondents are of the view that health workers engage in the use of electronic health record system, electronic medical records, health information exchange, electronic registry and internet. Again many of the clinicians have used electronic medical records or electronic health records in the facility before. On the part of funding, the findings show that less than half of the respondents knew of the availability of funding opportunities, while about 45.5% did not know about that funding opportunities as all. With regards to barriers, high cost in the implementation of ICT interventions and lack of infrastructure were the leading challenges faced by providers while low health literacy and high internet cost were the main barriers on the part of patients. The findings further demonstrate that willingness to learn and implement technology interventions appear as a major strength for both providers and patients. The study recommends the need for improvement in infrastructure and ICT education for patients as well as a subsidized operational cost for ICT implementation in the facility. Finally, the authors suggest the need for more elaborate and comprehensive assessment of ICT in health facilities in the Ghana Health Service to bring to light the situation of ICT to inform policy and practice of e-health applications in the country

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