USE OF INFORMATION COMMUNICATIONS TECHNOLOGY FOR COMMUNICATION AND COLLABORATION AMONG HOSPITALS IN IBADAN, NIGERIA

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ABSTRACT

Using data collected from 78 out of the 149 hospitals in Ibadan, Nigeria, which are registered with the Nigerian National Health Insurance Scheme (NHIS), this article examines how these hospitals use information communications technology (ICT) to communicate information and collaborate with other hospitals for health care services. The results showed that the level of ICT literacy level in the hospitals is generally low; Internet access is mainly through mobile phones; and only two of the 78 hospitals own websites. Communication concerned mainly with local hospitals and collaboration across the Internet network to solve client health problems seldom occurred. Rather, patients were always physically moved to other hospitals, facilitated mainly by a combination of referral letters and mobile phones. The study location consisted of both rural and semi-urban areas but all the NHIS registered hospitals were concentrated in the semi-urban areas, and there was no reference to communication or collaboration between hospitals in the rural areas and those in the semi-urban areas. The gregarious nature of medical practice generally and the affiliation of the respondents in the study to many professional and interest associations could be explored to develop policies and programmes for promoting communication and collaboration among health facilities for improved efficiency in health care service delivery.

KEYWORDS

information communications technology, communication, collaboration, Ibadan, Nigeria

1   INTRODUCTION

Various types of information and communication technology (ICT), particularly mobile phones and computers, are increasingly being used by hospitals in Nigeria. In recent studies, Idowu, Cornford and Bastin (2008) and Onwukamuche (2010) have shown evidence that medical doctors in Nigeria have access to and use various types of ICT to meet their personal and professional needs. Nwagwu and Adio (2012) have shown that private hospitals in Osun State, Nigeria, are using ICT mainly for administrative purposes. Adegunwa (2011) has also investigated how doctors involved in palliative care at the University College Hospital, Ibadan, Nigeria, are using ICT to link themselves, their patients and patients' relatives and other stakeholders for the purpose of managing terminal cancer cases; the results of the study showed that there is a promising increase in the use of ICT in the country's hospitals. These studies provided exciting information about the level of consciousness and awareness among health care practitioners in Nigeria regarding ICT use in health care. However, the studies did not provide information about whether and how the hospitals communicate information and collaborate with each other to provide health care services using ICT.

Medical practice has an age long history of communication and collaboration for the purpose of providing quality, efficient and comprehensive care for the patients they serve. ICT is a credo in the health system that achieving adequate health care delivery would often demand physicians and other health care providers to seek consultation from, or provide consultation to, one another (WHO 2008). In this respect, when practitioners with primary clinical responsibilities encounter conditions that are beyond their level of expertise, they are expected to rely on a second, or more, opinion. Communication and collaboration take place among all the stakeholders in patient care at various levels, such as doctor-doctor and doctor-nurse, and so on, and institutions, such as among hospitals.

Slavicek, Javornik and Dostal (2008) observed that on a daily basis within hospitals, clinical laboratories and physicians and other health care providers are involved in either sending or receiving health information to and from primary, secondary and tertiary health care specialists. In addition, referrals are made; clinical laboratory results are sent from outpatients' laboratory services to physicians' offices; and hospital-generated patients' information is distributed to affiliated clinicians. Besides exchange of information, referrals may also entail the physical movement of patients to hospitals which have better facilities or expert manpower in the area of the health need at hand. Practically, however, many cases that often lead to the transfer of patients could possibly have been handled in a facility if there were means through which experts involved in the management of patients could exchange information about a diagnosis, for instance. Beside exchange of information, the task of patient care would be made lighter if the

team of medical experts could reach a decision concerning any case at hand without necessarily meeting physically.

ICT plays a significant role for health care services by aiding the exchange and transfer of information among various categories of medical professions; thus, the cost and risks of transferring patients from one hospital to another for specialised care could be highly reduced. Physically transferring a patient from one hospital to another could be obstructed by the poor ambulatory services and traffic jams occasioned by bad roads, and the indiscipline of road users. Medical personnel can link with their colleagues via ICT and be informed about how to handle difficult situations, thus increasing efficiency in health service delivery and reducing the cost of health care for patients. Efficient deployment of ICT for teamwork among hospitals could leverage the low doctor to patient ratio in many developing countries and eliminate the challenges that might arise from the risk of doctors trying out their own expertise. Although some challenges exist in ICT use in many developing countries generally, such as lack of power and other infrastructure, there has been a relative increase in ICT ownership, access and even skill (World Intellectual Property Organisation n.d.). This gives some hope that ICT might be deployed to help medical experts to benefit from their colleagues' expertise and thus improve general care practices.

With recent innovations in ICT, medical personnel have a wide range of technologies to choose from. Computers, mobile telephones and the Internet and the services they offer are capable of improving communication and collaboration among medical practitioners (WHO 2008). Particularly, the versatility of mobile phone technology and its increasing application in mobile health care delivery also presents great opportunities for medical personnel. Mobile phones are cheap, readily available, and easy to use. At a relatively advanced stage, turnkey and customised software packages are available that could be used to manage collaboration and communication. The revolution in the World Wide Web (Web) is particularly intriguing, and several experiments have been done that show how medical personnel could use ICT to address their patients' health challenges. In the aftermath of the consolidation of Web 2.0 technologies, the medical community worldwide has been experimenting with the deployment of social networking technologies for cooperative patient care (Musser, O'Reilly & O'Reilly Radar Team 2005).

In their study on ICT use in hospitals in Nigeria, Idowu, Ogunbodede and Idowu (2003) have shown that notwithstanding the revolutions in ICT, a typical hospital in Nigeria demonstrates enormous infrastructural deficits. A cursory observation supports this finding; the hospitals are marked by long queues and cumbersome treatment procedures that are risky and costly to both patients and institutions. Even with the availability of ICT in hospitals, their activities appear overwhelmingly manual in almost every segment and this hinders the flow of information and impedes health care delivery and administration.

Using ICT for sharing information among medical professionals is expected to become a routine and natural work and learning process. Merely using ICT for communication would satisfy some conventional information needs, for instance, for moving a patient from one location to another. But a more exciting and trendy application of ICT lies in its capacity to facilitate experts joining hands across ICT networks to solve clients' health problems. In the current ICT revolution, health care services can be provided without moving either the patient or the expert – what moves is the expertise. Health care providers could sit behind computers and consult with experts from various places to decide on what approach to take to meet a certain health care need.

The current research focused on ICT use and communication and collaboration among hospitals which are registered with the Nigerian National Health Insurance Scheme (NHIS) and located in Ibadan city, Nigeria. The NHIS was established under Act 35 of 1999 by the Federal Government of Nigeria, and is aimed at providing easy and affordable access to healthcare for all Nigerians through various prepayment systems (NHIS 2006). The scheme was officially launched on 6 June 2005. Presently, 5 949 healthcare providers, 24 banks, five insurance companies and three insurance brokers have been accredited and registered nationwide to participate in managing the scheme. The criteria for admitting hospitals into the scheme include the hospitals having adequate basic medical facilities. By all assessments, therefore, hospitals admitted into the scheme should represent the best in the country. This expectation should relate to some consciousness about and application of ICT in health care delivery.

2   LITERATURE REVIEW

2.1   ELECTRONIC HEALTH

Banjoko, Banjoko and Omoleke (2008) have defined e-health to embrace the use of electronic information and advanced telecommunication techniques to support long distance clinical healthcare, patients' health records, patient and professional health related education, public health and health administration. The WHO (2014) has defined e-health as the transfer of health resources and health care by electronic means. E-health encompasses the delivery of health information for health professionals and health consumers through the Internet and telecommunications; using the power of IT and e-commerce to improve public health services, for example, through the education and training of health workers and use of e-commerce and e-business practices in health systems management. A synthesis of these definitions shows that e-health could be taken as the application of ICT across the whole range of functions that occur in healthcare from prevention and diagnosis to follow-up. E-health is a means to deliver healthcare tailored to the needs of citizens. Silber (2003) has identified the components of healthcare that can benefit from ICT as follows: computer-assisted diagnosis, electronic health records, online registries and electronically assisted prescription. Others are digital library, tele-

monitoring, hospital information systems, tele-surgery, online training and distance education programmes, and online communities of professionals and citizens.

The whole concept of e-health illustrates the relevance of ICT in medical practice; improving patient care requires an information system that can prevent errors from occurring in the first place, and which makes it easy for health care professionals to acquire and share information related to quality improvement. Communication between patients and healthcare providers is, therefore, a vital aspect of e-health at the hospital care level. ICT use could enhance general patient health management; increase compliance with guideline or protocol-based care (Chaudhry et al 2006); as well as improve the management of chronic diseases such as asthma, diabetes or heart failure, and other diseases that often require regular monitoring. It could also help in managing missing background patient information such as family and past medical history, and drug sensitivity in the clinical setting. The role of ICT in health is certainly not new; there are increasing dynamics of organisational and socio-economic developments, and rapid technological advancements, and these compel the adoption of better means of addressing the complexities and dynamics of a changing health care environment (Spanjers, Hasselbring, Peterson & Smits 2001).

 The revolution in ICT in the health sector has matured significantly. According to the WHO (2008), the use of ICT in health is not merely about technology, but a means to reaching a series of desired outcomes: health workers making better treatment decisions; hospitals providing higher quality and safer care; and people making informed choices about their own health. The WHO has further suggested that ICT will help governments become more responsive to health needs; enable the national and local information systems to support the development of effective, efficient and equitable health systems; as well as make policy makers and the public aware of health risks and give them better access to the information and knowledge they need for better health.

2.2   COMMUNICATION AND COLLABORATION IN HEALTH CARE

According to Turban, McLean and Wetherbe (2003), communication is an interpersonal process of sending and receiving symbols with messages attached to them. Although their book focuses mainly on managers in organisations, their suggestion that most professionals spend about 90 per cent of their time communicating may have great implications for the role of communication in organisations generally. In the health system, communication occupies a significant place both in the management of human health and the execution of administrative activities (Rimal & Lapinski 2009). Hospital communication involves the transmission of messages to staff, medical and paramedical practitioners, their clients and other stakeholders within a hospital, and among hospitals. Hospitals engage in the regular collection, processing and distribution of information.

Based on data collected from the Cochrane Database of Systematic Reviews and a hand search of bibliographies, Kripalani, LeFevre, Phillips, Williams, Basaviah and Baker (2007) have examined the deficits in communication and information transfer between hospital-based and primary care physicians. They found that delayed or inaccurate communication between hospital-based and primary care physicians negatively affects the continuity of care and contributes to adverse events. In their conclusions, they observed that interventions, such as computer-generated summaries and standardised formats, may facilitate the more timely transfer of pertinent patient information to primary care physicians and make discharge summaries more consistently available during follow-up care. Ineffective communication can lead to improper medical care. Many hospitals in the developed countries are taking active steps to address their ICT needs (Pecukonis, Doyle & Bliss 2008).

Communication and collaboration are intertwined – there cannot be collaboration without communication, and vice versa. Collaboration and communication among medical experts is fundamental to current healthcare systems for the effective delivery of accessible, continuous and comprehensive services to promote integrated care, health networks and programme management (Huxham & Vangen 2000). Healthcare professionals assume complementary roles and work cooperatively together, sharing responsibility for problem-solving and decision making to formulate and carry out plans for patient care (Fagin 1992). Collaboration and communication in the health system cuts across inter-professional concerns, and covers the exchange of expertise to encompass inter-organisational collaboration, such as collaboration hospitals. Collaboration and communication creates synergy among professionals in different disciplines and among different types of health care facilities: primary, secondary and tertiary-care institutions.

Inter-hospital collaboration draws on the expertise of the facilities of other hospitals for the benefit of any immediate and emergency need (Forte & Fowler 2009). Collaboration emphasises that time is of the essence and improves consultation capabilities by giving physicians access to clinical and diagnostic and other information. Also, for patients who may require more advanced treatment, collaboration speeds the information transfer and exchange process, and ensures that patient care continues uninterrupted – both during transport and upon arrival at the destination clinics. Collaboration reduces the stress, inconvenience and expense of unnecessary transportation. In many countries, hospitals are reaching collaboration agreements among themselves to improve their collaboration strategies for meeting clients' needs. They are forming associations and networks, and creating an inventory of their skills and deficits both in terms of manpower and facilities so that they could benefit from one another in times of stress. In the United States (US), agreements abound among hospitals in this regard. For instance, in 2011, Saratoga Hospital announced a collaboration agreement with Albany Medical Centre (Cignoni 2011) to speed up and enhance the evaluation and treatment of stroke patients from the region. Generally, hospitals are established to save lives, and they respond to one another when there is a need, even if there is no collaborative agreement. In

Ellingson's (2002) study on communication, collaboration and teamwork among health care professionals, the various formats of collaboration have been identified, defining and describing the benefits of hospital teamwork in the health system.

2.3   ICT USE IN HOSPITALS

There are two categories of ICTs used in hospitals (Mayanja 2007). The first is the computerised medical equipment for monitoring and diagnosing patients, and this includes a wide range of specialised equipment for blood pressure and ultrasound, among others. Some of this equipment is becoming increasingly wireless, thus making it possible for the patient not to be confined to a bed. Also, most of these ICTs are highly specialised for specific medical purposes, but their computerised counterparts are not presently readily available in developing countries (MEDPAC 2007). The most ubiquitous ICT is that used for administrative purposes including keeping electronic patient records, and other database purposes.

ICT holds the ace for efficiency in modern health care services. Digital collaboration will enable individuals and organisations to cooperatively plan, design, develop, manage and research products and services (Turban, Mclean & Wetherbe 2003). With adequate ICT facilities, face-to-face meetings by medical personnel working on the same case could be replaced by interactions across the digital technologies. The Internet revolution, with attendant developments such as the Web, mobile technologies, email and Web 2.0, has impacted positively on collaborative health care delivery. Kassirer (1995) has predicted that email use may result in office visits being more productive only when patients need to be seen. Yellolees and Brooks (1999) observed that fewer doctors would be needed beyond 2010, given the increasing versatility of ICT applications in health care.

ICT enables the transfer or exchange of masses of data and information within and between hospitals through networks in order to provide the right information in the right place (Bates 2001; Bates and Gawande 2003). Medical records could become more accurate, durable, retrievable, stored, analysable and distributed (Harpole & Khorasani 1997; Rothschild, Khorasani & Bates 2000). ICT-enabled inter-hospital collaboration can also lead to workflow improvements (Allan & Will 2001). In a collaboration between Saratoga Hospital and Albany Medical Centre in the US (Cignoni 2011), the hospitals were linked electronically, allowing emergency physicians at Saratoga Hospital and specialists at Albany Medical Centre to view patients' scans simultaneously in real time, and decide the best course of treatment. Cignoni (2011) reported that this has streamlined the process for identifying those patients who need advanced care and also helped to speed up treatment. ICT has evolved to become capable of bringing experts located in distant and remote places together to meet, discuss and agree on a course of action to meet patients' needs. Shortliffe, Patal, Conino, Barnett and Grenes (1997) have listed situations in which some specific ICT can be used. For instance, email could be used for critiquing others' ideas and for guiding technical discussions – while conference calls and web services could guide brainstorming and presenting ideas to others, respectively.

MEDPAC (2007) has listed and briefly described some of the health information systems that could enable efficient communication and group management of clients' health in the hospitals. They include: electronic health record; computerised provider order entry; clinical decision support system; picture archiving and communications system; bar coding; radio frequency identification; automated dispensing machines; and electronic materials management and interoperability. Although these technologies might appear sophisticated, and might not be generally available in many private hospitals in the location of the study, there are variants of them, such as email, word processing, mobile calls and SMS, and so on, that could be indicative of how ICTs are being deployed.

2.4 CHALLENGES OF ICT-ENABLED HOSPITAL COMMUNICATION AND COLLABORATION IN NIGERIA

Communication and collaboration among hospitals using ICT faces several challenges, both environmental and general, in communities with a low ICT usage. The question of power supply and infrastructure generally, for instance, will be an important issue to consider (Idowu, Ogunbodede & Idowu 2003). Next is low technological capacity of both the environment and the experts themselves. Issues could also be raised about privacy and security of patients' information when these details are passed through the electronic network. Patients need to know which data are stored about them, and that access levels for doctors, nurses and other actors are transparent and clearly defined. It is also crucial for patients themselves to have access to their own data and have the power to control the use of such data. Also, the unavailability of any legislation on e-health, as is the case in many countries (MEDPAC 2007), may be a source of constraint on hospitals' ICT use. Finally, there may be policy challenges. For instance, protocols for hospital collaboration exist in many developed countries defining exactly how medical experts could join hands to meet patients' needs (Idowu, Ogunbodede & Idowu 2003). Wang et al (2009) have suggested a model for inter-hospital collaboration, and reported a higher rate of arrival at hospitals to which patients were referred.

The next category of challenges relates to the hospitals and their operators, an issue that requires to be investigated in more depth. McCallin and McCain (2009) observe that some medical personnel may not want to share their ideas on health issues in which they are authorities with their colleagues. Besides this, the level of knowledge and confidence the medical experts possess in using ICT may be a determinant of their readiness to cooperate electronically to meet clients' needs. There is further implication in D'Amour and Oandason's (2005) study that hospitals that have established a high reputation may not be willing to collaborate with lower ones, but may prefer to transfer patients to them. Collaboration among geographically dispersed hospitals with different goals and cultures may also provide significant challenges (Shortliffe et al 1997). Medical experts have a variety of expertise; professional competence in the various fields is important to create the respect and value necessary for entitlement and the development of truly

collaborative relationships. Individual hospitals have to put aside their own interests so that a fruitful collaboration can be developed whereby the partners direct their desires and activities to meet the patients' needs.

There are several factors that relate to the nature of ICTs, for instance, Baggs and Schmitt (1988) have rightly observed that medical practice is nomadic in nature. At certain stages of ill health, such as when they are confined to bed, patients do not go to the doctor, rather the doctor and other health care givers go to the patients. This feature of health care is not supported by the design of computers and their operating systems which appear to be suited for stationary activities, such as office use. A more appropriate technology should lead to sharing information and knowledge without being restricted to stationary technologies; this will enhance health administration, remote diagnostics, and the distribution and use of medical supplies (Wasukira & Somerwell 2003). A mobile and coordinated approach to using ICTs in the delivery of health care services will enhance the quality of service and reduce overall costs.

Furthermore, using ICTs would require personnel to have a high level of confidence and comfort with using the technology, and this may not be the case in many circumstances (D'Amour, Ferrada-Videla, Rodriguez & Beaulieu 2005). Also, electronic collaboration requires competence beyond the skills needed for actual medical work. In order to collaborate, health care professionals need to know about their partners; be aware of what they can do, and how they can help them in doing it; and also know how to call for their help. ICT investments are mainly directed towards the ICT knowledge component of collaboration (Olve & Vimarlund 2006).

Communication and collaboration among hospitals is occurring regularly. Communicating information for the purpose of addressing health needs is alright; collaborating across the electronic network to diagnose and treat illnesses is also alright; and the physical transfer of patients from one hospital to another might be inevitable in some cases. Whichever is the option at any time, ICT will facilitate faster decision making and lead to achieving a more efficient health care delivery. The literature reviewed here has shown a wide range of issues on the subject matter, and has led to locating the present study in the general area of e-health. Guided by the knowledge of the level of ICT awareness and use among doctors in previous studies, the current study concentrated on whether those technologies that are available in the hospitals serve any communication and collaboration purpose. Although ICT application in health has reached its sophisticated stages (MEDPAC 2007), this review was guided by preliminary investigations which suggested that sophisticated ICTs are seldom available and used in the private health sector in Nigeria.

3   AIMS AND OBJECTIVES OF THE STUDY

The study provided a literature overview about ICT use in health care, and examined empirically how ICTs are being used by hospitals that are registered with the NHIS in

Ibadan, Nigeria to communicate information and collaborate with other hospitals for health care services. The following questions were addressed:

1. What are the types and level of ICT use in public and private registered hospitals registered with the NHIS in Ibadan, Oyo State, Nigeria?

2. Do the hospitals use ICT to foster collaboration and communication with other hospitals?

3. What is the frequency of ICT-based communication/collaboration by the hospitals?

4. What are the experiences of registered hospitals in Ibadan regarding using ICT for communication and collaboration with other hospitals?

5. Are information systems/ICT available, functioning and used in the hospitals?

6. What is the impact of the demographic characteristics of the hospitals and use of ICT?

4   METHODOLOGY

The study adopted a sample survey design – Ibadan city is very large and the hospitals are scattered all around the city.

4.1   POPULATION AND SAMPLING

There are 157 hospitals registered with the NHIS in the city of Ibadan (NHIS Ibadan Zonal Office 2012), excluding the University College Hospital and Our Lady of Apostles Hospital, Oluyoro. These two large hospitals were excluded because they are tertiary in nature and offer routine medical education. ICT use would, therefore, be at a much higher level than in the other hospitals and information from them could disguise the real situation about ICT use in the other hospitals. The list of the facilities available was verified to ensure that they were still available at the time of the study.

The names of the 157 hospitals were arranged in alphabetical order, and systematic sampling was used to select every second hospital. The aim of this process was to achieve a sample size of 50 per cent, and this equated to a sample size of 78 hospitals.

4.2   DATA COLLECTION

Data was collected using two instruments, namely, a self-designed questionnaire and a checklist. The questionnaire was chosen due to its usefulness as a tool for gathering data from a large number of respondents in a short period, as well as its ability to ensure confidentiality. The variables in the questionnaire included demographic characteristics of the hospitals, namely: age of hospital; age of head of hospital; physical availability of ICT in the hospitals; availability of hospital equipment; use of basic software packages; use of ICT for inter-hospital collaboration; perception of the respondents about use of

ICT; and perceived constraints of ICT. The questionnaire also contained questions about ownership status of the hospitals regarding whether the respondent was the owner or just the head of the hospital. Most hospital equipment serves information functions and its availability in the hospitals could signal some awareness of ICTs.

The questionnaire included open-ended sections asking the respondents to narrate their experiences in communication and collaboration using ICT. This approach also enabled the researchers to circumvent the need for oral interviews which were envisaged to have been difficult to conduct given the bottlenecks in successfully scheduling meetings with medical officers who appeared to be too busy and unwilling to participate in the study. Face validity was provided for the questionnaire by two senior members of the Nigerian Medical Association in Oyo State who have advanced knowledge of ICT applications in hospitals.

The checklist was used to construct lists of the hospitals' equipment. During the process of validating the tools, experts identified that many of the ICTs listed in the checklist and questionnaire were too advanced for the level of ICT applications in the hospitals; they then adjusted the tool accordingly. Both the questionnaire and the checklist were completed by the owner or head of the hospital who could consult with other members of staff to complete the instruments. It was also requested that the respondent should indicate whether or not he or she was the owner of the hospital, or else indicate his or her status in the hospital. The questionnaire was administered in each hospital by the second author and two trained assistants. The quantitative data was analysed descriptively using SPSS 17, while the contents of the open-ended responses were read, synthesised and incorporated in the study.

The hypothesis that the likelihood of use or non-use of ICT in the hospital may be related to the age and gender of the owner, and the age as well as type of hospital, was tested using a binary logistic regression method. Generally, logistic regression is well suited for describing and testing hypotheses about relationships between a categorical outcome variable and one or more categorical or continuous predictor variables (Cabrera 1994). Furthermore, logistic regression is very flexible and does not require that data strictly meets the expectation of randomisation. In terms of sample size, Lawley and Maxwell (1971), Marascuilo and Levin (1983) and Tabachnick and Fidell (1996, 2001) have recommended a minimum sample size of between 50 and 100.

Computer use was calculated and the responses divided into two categories, namely: use = 1 and non-use = 0. Computer use was seen as a sufficient proxy for ICT use. The predictor variables were computed as follows: gender (male = 1, female = 0); type of hospital (private = 1, government = 2, others = 0); age of the head of the hospital; and age of the hospital were numerical observations. Availability of hospital equipment was measured by a yes or no response to a list of ICTs in the questionnaire. Types and levels of use of ICT were measured by listing the basic computer packages tasks and asking the respondents to supply their level of use as very high, high, average or low. The availability and functionality of ICT were measured with available and functioning; available but not functioning; not available; and don't know.

5   RESULTS

A total of 78 copies of the questionnaire were administered to 78 hospitals along with the checklists; no questionnaire or checklist was invalidated.

5.1   SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

Table 1 presents the socio-demographic characteristics of the respondents. Males accounted for 73.1 per cent of the respondents, while 26.9 per cent were females. The mean age of the respondents was 41.58 years with the largest proportion of respondents falling within the age group of 25–35 years. The mean age of the males was 42.35 years while that of the females was 39.48 years.

Table 1: Socio-demographics of the respondents

Variable	Measurement	N	Percentage (%)
Age of the respondent	< 25 years	2	2.6
	25–35 years	30	38.5
	36–46 years	15	19.2
	47–57 years	20	25.6
	> 58 years	11	14.1
Specialty of the respondent	General Practitioner	39	50.0
	Family Medicine	6	7.7
	Obstetrics and Gynaecology	5	6.4
	Community Health	3	3.9
	Eye Care	3	3.8
	Dentistry	3	3.8
	Surgery	2	2.6
	Physiotherapy	61	2.6
	Other Specialty	7	9.0
Age of the hospital (years)	0–5	26	33.3
	6–10	8	10.3
	11–15	8	10.3
	16–20	7	9.0
	21–25	6	7.7
	26–30	8	10.3
	31 and above	15	19.2

Half (39 = 50%) of the heads of the hospitals were general practitioners while 39.6 per cent had another specialty (Table 1).

Most of the hospitals (85.9%) were private and the majority reported that the level of health care provided is secondary (67.9%). About a third of the hospitals (33.3%) have been in operation for about five years, while the rest have been serving for upwards of five years, with the mean length of service being 15.04 years. The majority of the heads of the hospitals (83.3%) who completed the questionnaire on behalf of their hospitals were the owners of the facilities.

5.2   AVAILABILITY OF HOSPITAL EQUIPMENT

Much hospital equipment is designed to generate information with which the medical experts take decisions about the health of their clients. In response to what specific hospital equipment is available in the hospitals, Table 2 shows that 47.4 per cent have an ultrasound scan facility, while 34.6 per cent have an ECG. At most, three of the hospitals reported having an auto refractor, a glucometer, a hematological analyser and an adopler, while just two hospitals each have a cybex and a lensometer. EMR, e-prescription and PACs were completely absent.

Table 2: Availability of hospital equipment

Do you have the following facilities?	Yes	
	Frequency	**Percentage (%)**
Ultrasound	37	47.4
ECG	27	34.6
Auto refractor	2	2.6
Glucometer	2	2.6
Hematological analyser	2	2.6
Adopler	2	2.6
Cybex	1	1.3
Lensometer	1	1.3

5.3   ARE ICTS AVAILABLE AND FUNCTIONAL IN THE HOSPITALS?

Most of the respondents (98.7%) reported awareness about the role of ICT. Table 3 shows that mobile phones (93.6%), personal computers (87.2%), printers (82.1%) and Internet facilities (57.7%) were reported as being available and functioning in the hospitals. Wide area network (WAN) and video conferencing facilities were not available in any of the hospitals.

Table 3: Availability and functionality of ICTs

ICT	Available & functioning	Available but not functioning	Not available	Don't know
Mobile phone	147 (93.6%)	0 (0.0%)	0 (0.0%)	10 (6.4%)
Personal computer	137 (87.2%)	6 (3.8%)	14 (9.0%)	0 (0.0%)
Scanner	129 (82.1%)	4 (2.6%)	24 (15.4%)	0 (0.0%)
Internet	91 (57.7%)	12 (7.7%)	54 (34.6%)	0 (0.0%)
Digital camera	28 (17.9%)	2 (1.3%)	127 (80.8%)	0 (0.0%)
Intranet	26 (16.7%)	4 (2.6%)	127 (80.8%)	0 (0.0%)
Wide area network (WAN)	4 (2.6%)	0 (0.0%)	153 (9.4%)	0 (0.0%)
Personal digital assistant (PDA)	2 (1.3%)	4 (2.6%)	141 (89.7%)	10 (6.4%)

Intranet and digital cameras were reported to be available by 80.8 per cent of the respondents. Only a few respondents reported that the Internet (7.7%), computers (3.8%), PDA and scanner (2.6% respectively) and digital cameras were not functioning even though they were available.

Only two of the hospitals (2.6%) had websites (www.ibadancentralhospital.com and www.idiape.com); only 25.6 per cent of the hospitals had any form of IT staff; and 3.9 per cent had between three and four IT staff; others either had fewer or none.

5.4 WHAT ARE THE TYPES AND LEVELS OF USE OF ICT?

Less than half of the respondents (34.6%) reported their skill in browsing the Internet as very high, and 34.6 per cent performed word processing with a very high level of skill (see Table 4). A few respondents (14.1% and 18.0% respectively) reported their skill in the manipulation of databases and use of spreadsheets as very high.

Table 4: Types and levels of use of ICT

Types and levels of tasks	Very high	High	Average	Low	Very low
Word processing	54 (34.6%)	18 (11.5%)	58 (37.2%)	16 (10.3%)	10 (6.4%)
Browse the Internet	54 (34.6%)	48 (30.8%)	26 (16.7%)	8 (5.1%)	20 (12.8%)
Spreadsheet	16 (10.3%)	12 (7.7%)	36 (3.1%)	42 (26.9%)	50 (32.1%)
Database	4 (2.6%)	18 (11.5%)	24 (15.4%)	40 (25.6%)	70 (44.9%)

Note: Columns do not sum up to 157 (100%) because of multiple response questions.

A space was provided for the respondents to supply information about any other ICT applications they use; but none of the respondents listed or reported using any other application.

5.5 WHAT ARE THE COMPUTERS SPECIFICALLY USED FOR?

Most of the hospitals (83.3%) reported that they use their computers for word processing tasks and 51.3 per cent use it for financial routines, while very few (11.55%) use it for database routines. Only 16.7 per cent of the hospitals reported having their computers networked; 62.8 per cent have an Internet connection; and 64.1 per cent and 62.8 per cent use their Internet connection for email and browsing the Internet, respectively.

5.6 CONSCIOUSNESS ABOUT AUTOMATION

Only 39.7 per cent of the hospitals had thought of automating their tasks in the hospitals, while 15.4 per cent reported having actually automated one or more of their hospital tasks, but they did not indicate the tasks they have automated.

5.7 USE OF ICT FOR COLLABORATION/ COMMUNICATION AMONG HOSPITALS

Most of the respondents (96.2%) used ICT to consult their colleagues. Most (80.8%) also used ICT for the purpose of referral, while 56.4 per cent and 66.7 per cent, respectively, used it for the purpose of medical consultation and medical information exchange.

Table 5: Use of ICT for inter-hospital collaboration

Use of ICT for collaboration	Yes	
	Frequency	**Percentage (%)**
I use ICT to consult my colleagues	75	96.2
Would your purpose of communication be for referral?	63	80.8
Would your purpose for communication be for medical information exchange?	52	66.7
Would your purpose of communication be for medical consultation?	44	56.4

5.8 USE OF COMPUTERS AND HOSPITAL WEBSITES

Table 6 shows that most of the respondents (85.9%) reported that they have consulted other hospitals' websites for the purpose of making medical decision, while 14.1 per

cent have not. This pattern of response notwithstanding, only one respondent was able to remember and list the website that was consulted, although the respondent did not report the purpose for which the website was surfed.

Table 6: Use of computers and hospital websites

Use of computers and hospital websites	Yes	
	Frequency	Percentage (%)
Have you ever visited a medical website?	67	85.9
Can you remember the last time you visited a medical related website?	19	24.4
Used information from a hospital website	67	85.9

5.9   PARTICIPATION IN MEDICAL COLLABORATIVE NETWORKS

Over 90 per cent of the hospitals reported having communicating/collaborating with hospitals locally, while less than half (44.9%) have ever collaborated or communicated with hospitals abroad for a matter affecting their patients.

5.9.1   Frequency of communication/collaboration with other hospitals

More than half (56.4%) of the respondents reported that they communicate information with other hospitals less than five times in a month; 6.4 per cent of hospitals communicate 5–20 times in a month; while less than 10 per cent communicate with other hospitals more than 20 times in a month.

5.9.2   Synthesis of the open-ended questions

In the questionnaire, open-ended questions were asked about specific experiences in communication and collaboration using ICT. A synthesis of the narrations showed four categories of ICT uses, namely: (i) those who reported transferring patients to another hospital were tagged as referring hospitals; (ii) those hospitals to which patients were transferred were tagged as receiving hospitals; (iii) a negligible group that reported managing cases in their hospitals using information they collected through collaborating with other hospitals; and (iv) a large number of respondents who merely reported awareness about how ICT could be used to support communication and collaboration in the hospitals.

(i) **Referring hospitals**

Altogether 48.7 per cent of the medical personnel reported using both referral letters and mobile phones to refer medical conditions that were beyond their level of care to other hospitals. Few respondents (19.2%) communicated through referral letters only, while much fewer (5.1%) used email and instant messenger along with referral letter. More than 27 per cent of the medical personnel did not document any specific case of referral using any ICT (see Box 1).

Box 1: Use of ICT for communication and collaborating by referring hospitals

'A case of crush injury of the left ankle was referred to the UCH using telephone.'

'A patient with advanced medical condition was referred to the UCH using phone and letter.'

'We referred a 68 year old woman who had lymphadenitis to the UCH using a referral letter.'

'Perforated PUD referred to Our Lady of Apostles Hospital Oke-Ofa via referral letter.'

'Kidney stone patient was sent to the UCH using mobile phone and referral note.'

'Ischemic heart disease was referred to the UCH via referral letter phone.'

'Patient with tooth canary was referred to the UCH via letter.'

'We have referred a case of severe anaemia to another private hospital.'

'Patient requiring CT scan or urgent complicated surgery referred to UCH for proper management via phone and letters.'

(ii) **Receiving hospitals**

Some of the hospitals who received patients (29.4%) reported that they were communicated through referral letters only. Few (19.3 %) were reached by both referral letters and mobile phones (see Box 2).

Box 2: Responses of doctors who received referred patients

'Case of multiple tibia fibula fracture was referred to us by Orelope Hospital via a referral letter.'

'Adegbite Foundation Igboeley in Healthcare referred intrauterine crisis to us using phone.'

'Case of prolonged labour referred to us via mobile phone and a referral note.'

'Teju Specialist referred a case of uncontrolled hyper using a referral letter to us.'

'Naomi Medical Centre referred a case of missed and incomplete abortion to us with referral notes.'

'Immaculate Hospital has sent a patient with TB of the lungs using phone.'

'Obstructed labour was referred to us from Anu-Oluwa Hospital using a referral letter and phone.'

'Good Samaritan Hospital Bodija referred a surgery case to us while via phone and referral letter.'

'A case of dislocated RT hip joint was managed in collaboration with Obafemi Awolowo University Teaching Hospital using mobile phone.'

(iii) One respondent reported that: 'We had a severely asphyxiated baby which was well managed after consulting a specialist on the phone who told us what to do so.'

(iv) Many other respondents merely mentioned the technologies that could be used to achieve collaboration among hospitals and experts without sharing exactly their personal experiences and encounters (see Box 3).

Box 3: Other responses

'I use a mobile phone to collaborate and seek second opinion and to confirm the use of OCP in treatment of dysmenorrhoea.'

'I use Starcoms VPN services with three other hospitals in seeking second opinion: LAD, Grand Rock and Adun Hospitals.'

'Procurement of drugs from pharmaceuticals, shipment from abroad using e-mail and mobile phone.'

'I used phone calls to consult and to discuss management plans for patients.'

'We collaborate with specialists in tertiary hospitals via mobile phone.'

'We print and send ultrasound pictures to other hospitals.'

'We are in collaboration with several specialist doctors for surgeries, radiology and laboratory investigation via mobile phone.'

'ICT enhances horizontal practice and makes medical practice easy and less cumbersome.'

Another respondent said that: 'Patients refuse to go to referral centre most times.' This response justifies using ICT to collaborate for patient care instead of transferring them to other hospitals.

5.9.3 Constraints of ICT enabled collaboration

Table 7 shows that most of the respondents (71.8%) had worries about the cost of ICT operation.

Table 7: Constraints about ICT enabled collaboration

Constraint	Yes	
	Frequency	**Percentage (%)**
Cost of operation	56	71.8
Privacy of patient information	43	55.1
Cost for consumers	43	55.1
Risk of failure	33	42.3
Security	25	32.1
Effectiveness	21	26.9
Reliability	18	23.1
Convenience	10	12.8

Of the respondents, 55.1 per cent were worried about its cost for consumers and 55.1 per cent had concerns about the privacy of patients' information. Very few respondents

(26.9%, 23.1% and 12.8%) reported effectiveness, reliability and convenience as constraints to their use of ICT to collaborate.

5.10 RELATIONSHIP BETWEEN USE OF ICT FOR COMMUNICATION AND COLLABORATION AND DEMOGRAPHIC CHARACTERISTICS OF THE HOSPITALS

A total number of 58 (64.0%) respondents reported using ICT for the specified purposes, while 20 (36.0%) reported not using ICT.

Table 8: Binary logistic regression analysis of use of ICT in the hospitals

Predictor	B	SE β	Wald χ^2	P	e^β (odds ratio)	95% CI
Constant	0.5	0.8	0.4	0.41	0.10	(5.48, 9.21)
Age of hospital head	–0.2	0.0	4.4	0.03	1.9	(3.09, 7.99)
Sex (male = 1, female = 0)	0.9	0.6	5.9	0.04	0.6	(1.09, 2.89)
Age of hospital	–0.6	0.4	3.0	0.04	2.1	(1.23, 2.67)
Type of hospital (others = 0) Private Government	–0.3 0.1	0.6 0.2	1.9 1.0	0.10 0.02	2.7 1.0	(2.13, 6.11) (0.45, 1.22)

Direct logistic regression was performed to assess the impact of demographic characteristics of the hospitals on the likelihood that respondents would report that they use ICT in the hospitals. The model contained four independent variables, namely: sex of respondent; age of hospital; age of head of hospital; and type of hospital (private = 1, government = 2, others = 0). The full model containing all predictors was statistically significant, x^2 (4, N = 78) = 4.988, $p < 0.05$, indicating that the model was able to distinguish between respondents who reported use and those who did not.

The model as a whole explained 23 per cent (Cox & Snell R squared) and 32 per cent (Nagelkerke R squared) of the variance in the use of ICT in the hospitals, and correctly classified 62 per cent of the cases. As shown in Table 8, the four independent variables, namely: age of hospital; sex of respondent; age of head of hospital; and type of hospital (government) made unique statistically significant contributions to the model. The strongest predictor of reporting use was age of hospital, recording an odds ratio of 2:1. The negative slope has an implication in that younger hospitals were about twice more

likely to report ICT use than older hospitals, controlling for all other factors in the model. This result is similar to the impact of age of hospital head on use of ICT which shows that hospitals headed by younger persons are about twice more likely to use ICT than hospitals headed by older persons. Also, the odds of government hospitals using ICT was one higher than the odds for other hospital categories – private ownership of hospitals did not predict ICT use.

6   DISCUSSION OF FINDINGS

The findings documented provide useful information on how ICT is used by NHIS-registered hospitals in Ibadan, Nigeria, for communication and teamwork. Medical practitioners heading the hospitals reported on in the study are mainly male; this result might reflect gender pattern of ownership and leadership in the hospitals in the city. A recent study in Osun State found that private hospitals are owned mainly by men (Nwagwu & Adio 2012).

As would be expected, and in line with other recent studies (Adegunwa 2011; Nwagwu & Adio 2012), mobile phones are the most widely available and functioning ICT in the hospitals. According to Baggs and Schmitt (1988), an explanation for this could be that personal computers and their operating systems were originally designed and built for office use, and that they fit poorly into the nomadic, interruptive, and collaborative work of clinicians in a hospital. Korhonen and Bardram (2004) support Baggs and Schmitt (1988) when they say that, 'Using a PC, tied to the desktop, conflict[s] with a working environment where nurses and doctors move around constantly, collaborate extensively, and do not even have their own desks.' Moreover, patient information is scattered across a myriad of different systems, some of which are electronic, while many are still paper-based. The inability to quickly access a patient's medical history can hinder diagnosis, and prompt unnecessary repetition of tests, and thereby increase the cost of health care delivery. Increasingly, therefore, the mobile phone, which could accompany its user without constituting a burden, is becoming the technology of the future in the health sector.

Also, the pattern of reported availability of ICT seems to suggest that the higher the complexity of the technology, the lower its availability in the hospitals. This might point to the possibility that ICTs are not really being deployed for complex hospital tasks. With regular power outages, or the absence thereof in some cases in many communities in Nigeria, as well as poor bandwidth and high subscription costs, the non-functionality of some of the available computers and Internet services might be understandable.

The computers in the surveyed hospitals served mainly word processing purposes, indicating that the hospitals are at their earliest stages of embracing ICT. This is because word processing could be achieved although with less efficiency with any other technology such as typewriters. The six out of every ten hospitals implementing the

Internet appear somewhat high, but the Internet facilities are serving merely browsing purposes. Most of the hospitals do not have any form of computer network and databases. This information relates to low report automated activities in the hospitals even though many of the hospitals indicated having thought of doing so. A very high report of use and access to the Internet might not necessarily be a signal that the computers in the hospitals are connected to the Internet. Rather, the respondents might be reporting access to the Internet based on their mobile technology facilities, which are in many cases sufficient for web, email and social networking services, among others. For instance, only two of the 78 hospitals have websites, just as about one out of every four reported having IT staff.

Hospitals are information intensive organisations, with many of their technologies being capable of data acquisition, at the least. However, at most four out of every ten reported having at least an ultrasound facility and an ECG, which appear to be the most common equipment, most of the hospitals that were registered by the NHIS in the city recorded very low possession of some very basic hospital ICT. The complete absence of EMR, e-prescription and PACs may be indicative that the available ICTs do not serve direct health care service purposes.

Communication among health experts and among health facilities is inevitable and this is attested to by heavy inter-hospital communication that takes place locally. While nine out of every ten hospitals communicate locally, only about five of every ten look to the international community for such interaction, although the largest number of hospitals does this only a few times a month. To some extent, this result is intriguing. Despite the hospitals engaging mainly in secondary and primary health care services, the communication among them is somewhat extensive. In a sense, this observation could suggest that no health condition is trivial; more challenging health conditions may start trivially, and the primary care doctors need to liaise with other experts to ensure that a health condition does not lead to a more serious condition.

The respondents reported using ICT to consult their colleagues; the purpose ranged from referral and information exchange to medical consultation and collaboration. ICT might be serving the purpose of discussing how to refer a patient to a hospital rather than how a patient's case could be co-handled across an ICT network. However, the medical practitioners have a positive opinion about using ICT to collaborate in order to manage clients' health, with most of the respondents suggesting that ICT-based collaboration would aid provision of easy access to specialists and improved quality of care in urban areas.

ICT deployment is reported to confront some constraints, the prime one of which is cost. Realistically, ICT implementation entails some cost, although there is a report about the falling cost of ICT globally (ITU 2012). ICT Basket analysis of ITU shows further, however, that the cost of Internet access in particular remains prohibitively high in Africa. Prices of ICT goods and services are generally very high. Also, the perceived

constraint of fear of information privacy might be explained by the nature and type of technology the respondents are using for collaboration as well as their level of skill in using the technologies. Collaboration mediated by other technologies, such as Web 2.0 or purpose-built portals that are accessed only by doctors attending to a case, might be more secure and much safer.

It was envisaged that the hospitals were not implementing advanced technologies, thus adopting the approach of asking them to narrate their experiences from which inferences would be made about the ICTs they actually used, paid off. The narrations showed that the respondents were actually using ICT for communication purposes and rarely for any form of collaboration. Most of the doctors relied mainly on a combination of letters and telephones to either refer patients to other hospitals or, on very few occasions, discuss what to do with colleagues. The finding on many referrals being executed by letters only shows a lack of deployment of modern ICT, including the ubiquitous mobile phone to ease the processes of moving patients or communicating information required about patients among hospitals.

Horizontal collaboration occurred heavily among hospitals which are at the same level of service provision, and they shared information and expertise in order to solve clients' problems. Referring patients among the hospitals is not heavily practised. Possibly, since the hospitals are at the same level of service provision, their doctors might see themselves as peers and business colleagues who need to help one another to solve problems. Telephone calls appeared sufficient for this kind of collaboration. When cases involved physically moving patients to other hospitals, the results suggested that hospitals would prefer teaching and other higher hospitals. For this kind of referral, the hospitals used mainly letters. Emphasis on letters in addition to other means of information transfer means that either or both the referring and receiving hospitals are using manual record systems, and would require paper counterparts of information about referred cases for administrative purposes.

Although at a very low level, some collaboration with some laboratories does exist, and the major means of information exchange is by telephone. The clinician might just require the content of a laboratory result to take urgent decisions while waiting for the arrival of the paper records. But this practice was not well pronounced in the hospitals under study. Practices, such as using ICT to communicate or collaborate with non-governmental organisations, were not reported. Although this might reflect a relative lack of presence of individual level health care philanthropy, it might also reflect a low level of interaction between the hospitals and such organisations.

Four categories of respondents can be identified, namely: (i) hospitals that transferred patients; (ii) those that received transferred patients; (iii) a very few, in fact one case only, who used ICT to exchange information to facilitate management of a patient; and (iv) those that merely expressed knowledge of what ICT could be used to do in the hospitals. Although without specific reference to any cases, there were more responses about

ICT use by hospitals that have received transfer patients than hospitals that transferred patients. There is the likelihood that hospitals to which patients are transferred might have better facilities and more skilful manpower than those which transfer the patients. Transferring or referring patients does not necessarily mean that the expert lacks skill, but rather may be because the expert lacks skill in the current problem situation or that there are few qualified experts in the facility.

Although there is some ICT awareness and consciousness in the hospitals, the ICTs serve the purpose of exchanging information that would facilitate the transfer of patients and not necessarily for asking what should be done to manage a patient at location. This finding raises questions about how hospitals are embracing the emerging consciousness about organisational learning and knowledge management in the era of ICT. Although the study location consisted of both rural and semi-urban areas, personal knowledge of most of the hospitals mentioned showed that they are mainly facilities in the semi-urban areas. But there is no reference to linkages between hospitals in the rural areas and those in the urban areas. On the most part, the rural areas are known to scarcely have well equipped or adequately staffed hospitals; for hospitals in such places to be registered with the NHIS would, therefore, be a very ambitious expectation. Beyond this fact, this finding shows clearly that health centres and primary health care facilities located in the rural villages might be rarely linking up with hospitals in the semi-urban areas. Given the inevitability of hospitals having to collaborate, it would be expected that the facilities in the rural areas might be transferring patients without formal referral processes. It is common knowledge that health centres do not have the regular privilege of adequately trained medical doctors besides partly trained nurses and midwives, where they exist. A further observation is that rural health centres mainly merely recommend a hospital to their clients to visit.

If ICT is adequately embraced, then hospitals' capacity to manage health conditions should not necessarily depend on the number of experts in their employment; a simple web portal can serve the purpose of connecting relevant experts in real time to enable medical personnel either to carry out an intervention, or arrange for one to be carried out. In this sense, therefore, what might matter most is the availability of facilities, as well as the skill to use them, and these are problems that could be leveraged if there is a vigorous network among hospitals promoting the use of ICT instead of moving the sick. For hospitals considered fit for registration in the NHIS scheme, the expectation would be that they would hunt for clients using all possible legitimate means; they would also work hard to position their hospitals to be worth their rating. The prestige of being frontline health care centres has not resulted in the implementation of websites and other ICTs.

Just like the MEDPAC (2007) report, the worries expressed by the respondents in the study about ICT enabled collaboration focused mainly on cost; there was a very low expression of apprehension about the efficiency of ICT support for cooperation among hospitals. This result shows a high level of confidence and trust about ICT use in the

hospitals. What do these two extremities portend for ICT enabled collaboration and communication among hospitals in Ibadan? First, is how to bring down the cost of ICT for hospitals to a very low level; and second, is how to ensure that the hospitals do not transfer the cost of ICT to their clients but rather see the technologies as supporting their services. Furthermore, many public hospitals provide avenues for medical education, and, therefore, could share some of the characteristics of academic hospitals which D'Amour and Oandason (2005) showed are usually very inclined towards using ICT. Consciousness raising, some retraining and mobilisation will be required both at the association and other levels to improve ICT application in the hospitals. But a more solid motivation would come from a national policy from the Ministry of Health upholding and promoting the position of the WHO (2008) on the essence of collaboration for health care delivery.

7   CONCLUSIONS

The objective of the study was to examine the ICT capacity of hospitals registered with the NHIS in Ibadan, and to find out whether ICT is being deployed to foster communication and collaboration among the hospitals. Data was collected from medical personnel representing 78 hospitals which were randomly selected from 157 in the city. In a general sense, these hospitals have and use ICT exactly in the same manner that any organisation would be said to have and use ICT. Telephones, computers and the Internet are used to meet general communication needs. Whenever there is a need to use the services of experts in other hospitals, they mainly use letters and mobile phones to make contact, and then transfer the patient. Specific cases where medical personnel from different health facilities collaborate across the ICT network to solve the health problems of patients at their location were rarely reported. It was physically crosschecked and confirmed that the hospitals that hosted transferred patients were registered with the NHIS and were also mainly government hospitals. The implication of this is that both the best private and government hospitals in the city are yet to adequately embrace ICT in their health care services, but that the government hospitals appear to be better equipped with a wider variety of medical experts and facilities than the private ones.

The challenge arising from the study is for the health system to promote collaboration among hospitals. At the federal policy making level, efforts to inject ICT into the health system have suffered the same administrative and political lacuna that bedevil the wider Nigerian society. But the professional and health institutions could do something differently. For instance, beyond serving as pressure groups the medical professional association in the country could deliberately design programmes to promote medical personnel working together as teams using ICT. The professional associations could employ emerging organisational learning and knowledge management practices that are taking centre stage today to ensure that ICT enables hospitals that have better expertise to meet the needs of those that do not have, without necessarily moving patients from

one place to another. All the health institutions are embracing ICT, but the question remains as to what extent they are succeeding in training personnel that can meet the trendy Doctor 2.0, Medicine 2.0 or Health 2.0 philosophy.

Most of the hospitals in the present study are private hospitals, whereas D'Amour and Oandason (2005) have shown that the real leaders in adopting health information technologies are academic hospitals. A cursory observation is that private hospitals in Nigeria are usually small in size whereas government and academic hospitals are much larger. Here emerges a paradox in ICT implementation which needs to be investigated further. In other sectors, Tiamiyu (1993) has shown in a study in Nigeria that the private sector embraces new ICT faster than the public sector. Further, the present study highlighted a major learning need of medical persons working in both private and government hospitals in Nigeria.

8   IMPLICATIONS FOR POLICY MAKERS, RESEARCHERS AND COMMUNITY DEVELOPMENT

There is an implication in the findings of the study that appropriately injecting ICT into the national health system in Nigeria may include reengineering of the entire role of ICT in the care processes. There may also be a need to address inter-organisational cooperation issues, which may improve ICT induced collaboration. It may be helpful if some of the actors, such as leaders of the professional associations, assume leadership in this regard, and form hospital collaborations, and motivate key people in the sector to do so. Furthermore, beyond professional associations, hospitals could initiate associations for the purpose of exchanging expertise when the need arises. Medical practitioners are gregarious in nature and they usually work in groups (King 2000). The present study was not without limitations and would probably have been enriched by the inclusion of social and institutional variables, such as income of the hospitals and remuneration of the staff.

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