INFORMATION AND COMMUNICATION TECHNOLOGY SKILLS AND

USAGE AMONG HEALTH WORKERS IN UGANDA

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ABSTRACT

Information and communication technology (ICT) has potential to enhance service delivery in health institutions. ICT services at health institutions in Uganda have been affected by lack of necessary ICT skills among health workers, poor Internet bandwidth for effective communication; lack of motivation to use ICT services for health information services and poor or no funding for ICT services at health centers. The proper usage of computer applications, Internet and mobile phone services can improve on health service delivery in the country. The purpose of this research is to find out the level of ICT skills among health workers; establish the extent to which health workers use ICT for health service delivery; and find out the availability of Internet services and usage at hospitals and other health centers. A sample size of 10 health units is selected for the survey with 20 participants from every health unit participating in the survey. Hence, 200 questionnaires are administered to the health workers. The research results indicate that ICT skills among health workers at health centers and hospitals are average; Internet services at health centers is irregular; and use of mobile phone communication for public education and patient services is not effective. A contextual framework for ICT-based service delivery is developed.

KEYWORDS: Health Service Delivery, Internet, Mobile Communication and Contextual Framework

INTRODUCTION

According to Crow et al (2014), Health care practitioners rely on access to relevant and up-to-date medical information in order to effectively treat their patients. They further identify online collections as efficient, low-cost avenues for such information.

There is need to provide effective access to health information resources but this presents many complexities that need to be examined. Developing countries lack a comprehensive dissemination of information resources such as health digital libraries which have been rapidly emerging in recent years (Crow et al., 2014).

In their research Awotwi, (2012), observed that the low-ICT environment of Sub-Saharan Africa poses particular problems for online distribution of health information resources in areas that may have a particular need for those very resources. Further they identified that a huge deficiency in ICT was not hardware but rather lack of affordable and reliable connectivity.

Horner and Coleman (2014) came up with a system to enable health services in maternal health; maternal health care was the focus of the Basic program because there are problems of quality in maternal health care at primary health care level in South Africa. However during their research they discovered that human resources, time, and policies were

not favorable. Training of nurses in utilization of the Basic program is a challenge, as this involves many nurses, and the training requires a substantial commitment in time from the participating nurses (Honer & Coleman, 2014).

Furthermore Horner and Coleman (2014) identified equipment, infrastructure, and finances as inadequate resources for implementation of the basic ICT program at the clinics. The options for healthcare information resources in Sub-Saharan Africa are limited by the constraints on the information resources imposed by the available ICT infrastructure (Crow et al 2014).

However Crow et al (2014) state that there is lack of access to online resources due to the fact that certain regions lack the information and communication technologies (ICT) that are widespread and reliable. The existing ICT infrastructures in many developing countries are not well understood.

One of the major problems identified by Crow et al. (2014) in their study was unreliable Internet connectivity in Sub-Saharan Africa which implies that mobile devices provide the most reliable technology for healthcare providers to carry out their work.

In addition to the above problem Crow et al (2014), identified the following problems as major hindrances to ICT in health services. First Healthcare workers are chronically in short supply in Sub Saharan Africa. This deficit of doctors makes it crucial to have efficient ways for medical personnel to communicate with one another and to gain access to medical information that can be used as a diagnostic and teaching tool. Furthermore, there are other factors that have affected health services in developing countries such as migration of medical personnel, low salaries for medical workers, and irregular power supply. This is further compounded by one persistent barrier to health information dissemination and the translation of medical terminology.

Another problem that affects health information resources for healthcare professionals is the need to keep them up–to-date. Healthcare workers need up-to-date information and health information resources change often, sometimes daily (Crow et al., 2014). According to Crow et al (2014), inadequate medical infrastructure is a big problem in developing countries. This is deficit is of particular concern because the general trend in medicine is moving away from direct examination of patients by doctors and towards image-based lab diagnostics, which require specialized equipment.

When information and communication technology is effectively utilized in healthcare service delivery, increased information flows and the dissemination of evidence-based knowledge can be realized (Awotwi, 2012).

BENEFITS AND LIMITATIONS OF ONLINE HEALTH INTERVENTIONS

Many benefits are associated with online support groups (Finn, 1995, 1999, Madara, 1997). Participants communicate to each other and share ideas 24 hours a day and seven days a week at times most convenient to them. Participants develop responses to online discussions at their own speed. Problems associated with transport and geographical boundaries are eliminated. People who cannot easily move or who have speech or hearing difficulties participate quite easily. People with stigmatizing disorders such as HIV/AIDS or breast cancer, or persons experiencing psychological tortures resulting from sexual abuses may find online support a more welcoming venue to discuss sensitive issues. The state of anonymity created for online groups allows discussions of potentially embarrassing topics and increases the possibilities for self-disclosure and encourages honesty and intimacy (Ferguson, 1997; Galinsky et al, 1997; Madara, 1997; Klemn and Nolan, 1998). There is little or no influence from socio demographic factors such as age, gender,

racial or ethnic identity, income and social status (Finn, 1995; Madara, 1997). Weight disability and other signs of physical appearance together with social skills and vocal characteristics are eliminated (Davison et al, 2000). There is unlimited number of participants in an online group. Internet covers the whole World. This international exposure enriches discussion content contributed by different people with different experiences, perspectives, disabilities and different points of view while at the same time promoting feeling of universality (Finn, 1999; and Braithewaite et al, 1999).

In addition to the above benefits, White and Dorman (2001) acknowledged the following benefits of using online forum for health discussions:

- *Reaching the difficult to reach* – Online support provides opportunity to reach groups of people who may not be accessible through face-to-face sessions. For example, some studies show that men are generally more attracted to online groups than to face-to-face groups

- *Cost-effectiveness* – no payments for transport, no need for physical meeting space and a professional can be involved to moderate the discussions

- *Empowered consumers* – democratization of medical information. Online environment is beneficial for health education messages.

- *Acquisition of technology skills* – through online discussions, health workers and group discussion participants get to learn and practice techniques for online communication.

However, there are a number of limitations to online discussions, for example, much of the world's population cannot participate in online group discussions because many people have no access to Internet (Madara, 1997 and Braithwaite et al, 1999). In some cases very large volume of data are generated through postings in online discussions and participants may not have the time to practically read all the messages posted (Shaw et al, 2000). Some of the postings may also not be valuable. Another limitation is the situation that online messages may be easily misinterpreted once read because of the absence of visual and audio data (White and Dorman, 2000).

Research Design

This study used a cross-sectional survey design which involves collection and analysis of data. Quantitative approach was used to describe frequency distribution and means.

Study Population and Sample Size

The study population was 3500 medical staff.

Sample size was determined using Krejcie and Morgan (1970) sampling table. The value is 364.

Sampling Design and Procedure

The study adopted a simple random sampling procedure in order to get representative views of the various stakeholders in hospitals and health center IVs and selected individuals who work in outpatient departments, medical wards, laboratories and maternity wards. The unit of inquiry comprised doctors, nurses, lab technicians, nurses and midwives in selected hospitals and health centers that include Mulagu hospital, Kadic hospital, Mpumudde health center IV, Mukuju health center IV, Nsambya hospital, Mengo hospital, Naguru hospital, Kibuli hospital, Rubaga hospital, Butabika hospital, Norvik, Namirembe and Mukono.

Data Sources

The primary data was directly collected from the respondents through administering structured questionnaires. The primary respondents included doctors, nurses, lab technicians, nurses and midwives.

Data Collection Instrument

The questionnaires enabled the respondents to read and understand questions before responding. Questions were related to computer literacy, mobile phone usage for medical information communication and the use of internet technology by the medical staff. Questionnaire was designed on a five-point Likert scale (1 indicating an extremely negative rating and 5 an extremely positive rating) to gather responses related to the items. Cronbach alpha was computed for each construct to identify whether the items belonged together within a construct. There are a number of opinions on acceptable levels of Cronbach alpha. For example, Nunnally (1967) proposes an alpha of 0.80 or higher, while Treacy (1985) suggests a value of 0.7 or higher. For our research values of Cronbach alphas are above 0.70

Data Processing, Analysis and Presentation

In procession, analysis and presentation of data, the data collected was coded, edited for incompleteness and inconsistence to ensure correctness of the information given by the respondents. Data was tabulated and entered in the statistical package for social scientists (SPSS) software. Descriptive statistics was used to analyze the questionnaires. The table below presents the positions of the respondents in hospitals and health centers.

Designations of the Medical Staff

No.	Category	Frequency	Percentage
1	Doctor	28	16.8
2	Nurses	51	30.5
3	Medical Assistants	28	16.8
4	Medical officers	6	3.6
5	Laboratory Assistants	31	18.6
6	Other medical staff	23	13.8
		167	100

In the next table the academic qualifications of the respondents are presented.

Highest Academic Qualifications

Qualification	Frequency	Percentage
Degree	86	51.5
Diploma	74	44.3
Certificate	7	4.2
Total	**167**	**100**

Gender

No.	Gender	Frequency	Percentage
1	Male	74	44.3
2	**Female**	**93**	**55.7**
Total		**167**	**100**

In the next table, the theoretical constructs are measured in terms of means as well as the frequency distributions.

The following scales are used:

1-Strongly disagree (**SA**), **2**–disagree (**A**), **3**-Not sure (**NS**), **4**–Agree (**D**), **5**-Strongly Agree (**SD**)

NO	ITEM	SD		D		NS		A		SA		Mean	SD
		F	%	F	%	F	%	F	%	F	%		
1	Knowledge of MS Word	14	8.4	30	18.0	19	11.4	74	44.3	30	18.0	3.45	1.21
2	Knowledge of MS Excel	13	7.8	29	17.4	25	15.0	75	44.9	25	15.0	3.41	1.16
3	Knowledge of MS PowerPoint	7	4.2	47	28.1	31	18.6	57	34.1	25	15.0	3.27	1.14
4	Knowledge of MS Access	18	10.8	43	25.7	25	15.0	56	33.5	25	15.0	3.16	1.26
5	Received training in computer applications	13	7.8	27	16.2	31	18.6	75	44.9	20	12.0	3.55	2.62
6	Value the use of computer applications	9	5.4	29	17.4	23	13.8	75	44.9	31	18.6	3.53	1.13
7	Intention of studying computer courses	7	4.2	24	14.4	39	23.4	65	38.9	32	19.2	3.54	1.08
8	Use of mobile phones for sending reminders	26	15.6	71	42.5	55	32.9	10	6.0	5	3.0	2.38	0.92
9	Use of mobile phones to call ambulance	22	13.2	68	40.7	51	30.5	16	9.6	9	5.4	2.71	2.56
10	Use of mobile for sending lab results	35	21.0	72	43.1	48	28.7	5	3.0	7	4.2	2.26	0.96
11	Use of mobile phones to consult doctors	24	14.4	68	40.7	52	31.1	14	8.4	9	5.4	2.49	1.01
12	Use of mobile phones to provide counselling	33	19.8	67	40.1	47	28.1	12	7.2	7	4.2	2.53	2.50
13	Use of mobile phones for health education	28	16.8	76	45.5	50	29.9	11	6.6	2	1.2	2.29	0.86
14	Having active email address	8	4.8	21	12.6	11	6.6	85	50.9	42	25.1	3.79	1.10
15	Internet connectivity at the health center	11	6.6	32	19.2	30	18.0	52	31.1	42	25.1	3.49	1.24
16	Management uses email for communication	15	9.0	34	20.4	35	21.0	57	34.1	26	15.6	3.26	1.20
17	Internet services are available and accessible	16	9.6	36	21.6	34	20.4	56	33.5	25	15.0	3.22	1.22
18	Internet services link this health center to others	15	9.0	31	18.7	35	21.1	51	30.7	33	19.9	3.59	3.46
19	Internet services are good and reliable	12	7.2	37	22.2	42	25.1	46	27.5	30	18	3.26	1.19
20	Government provides Internet infrastructure	14	8.4	45	26.9	49	29.3	32	19.2	27	16.2	3.07	1.20

FINDINGS

Results from this research indicate that the medical personnel in health centers and hospitals have high level of computer literacy and they generally use Internet and email services for communications. From the findings, we note that more than 50% of the medical workers are computer literate and more than 50% use Internet and email services. There is inadequate use of mobile phones for medical information communication to the patients.

In the open-ended questions some respondents gave the following responses in quotes:

"Internet connectivity is restricted to top management. The use of Internet is very limited".

"I do not have Internet in my office. I do not send emails".

"Mobile phones are used to remind clients on appointment"

"Mobile phones are used to call mothers whenever they miss appointments in the hospital".

Contextual Framework for ICT-Based Service Delivery in Health Institutions

Based on our research findings and comprehensive literature review information, we consider the following factors relevant to develop a framework for ICT-based service delivery in the context of Uganda.

Computer Literacy among Health Workers

Computer literacy is the first pre-requisite for ICT usage in health service delivery. The health staffs need to be trained in basic ICT application software and Internet usage for effective communication of health information.

Network Connectivity

Computer hardware can easily be acquired as the hardware cost continues to reduce. The issue of Internet connectivity is still a big problem. The initial investment for Internet setup is usually high and the subsequent maintenance charges are also expensive. In most cases the Internet usage is restricted to the top management because of insufficient bandwidth. This limits other health workers from accessing and using Internet services such as email communications.

Mobile Communication

The ubiquity of mobile phones makes them convenient tools for health information communication. Our survey results show that mobile phones are not effectively used for health information communication. Neither did we find any mobile application software for health information system.

Online Resource Access

Online information for health services is not effectively used by health workers. Access to online quality and up-to-date information is not effective.

Health Workers' Attitude to ICT Usage

The passion for technology usage is important for effective utilization of ICT resources for health information services. The ICT equipment should be put to proper usage if benefits are to be realized. Health workers need training and sensitization in situations where specialized software is deployed for health information services.

Electric Power Supply

Reliable electricity supply is important for computerizing information system for health information service delivery. In absence of hydroelectric power other alternative sources such as solar power should be utilized.

Based on the above factors, we developed the following framework.
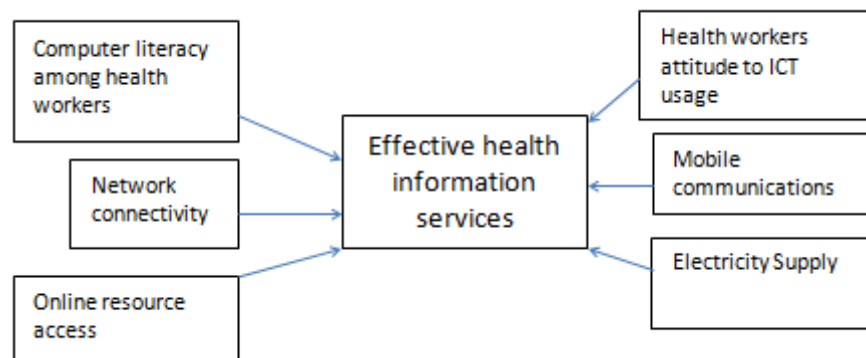
DISCUSSIONS AND CONCLUSIONS

Information and communication technology is an effective tool for communicating medical information. ICT can enhance medical service delivery in a number of ways. Health education can be done online using dedicated web sites and this can be extended to mobile learning. Patient information about reminders to medical visits/appointments and administration of medication can be monitored using mobile communication. From the health clinics and hospitals we visited, it is evident that mobile technology has not been harnessed for patient information communication. Research is recommended in development and experimentation of mobile applications for medical information communication in poor resource settings. Relevant mobile applications can be developed to address contextual issues which should take into consideration language and cultural issues. This research did not investigate the attitude of health workers towards the use of information technologies for health information delivery and the effectiveness of the use of online medical information. We plan to investigate these two variables in our next survey.

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