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Assessment of information management in selected rural health centers in Ntungamo district, Uganda

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Abstract
Information management has become important in most organizations including hospitals and health centers and this is because access to information and other resources have become easier due to improvement and developments especially in technology. The purpose of this study was to examine the infrastructure used in rural health centers in managing information and to ascertain how quality of information was maintained in rural health centers. The study was conducted in two health centers of Rubaare health center IV, and Rwashamire health center IV, in Ntungamo district in western Uganda, questionnaire were used in the target population of 50, and a sample size of 44. 41 questionnaires were returned and this gave a return rate of 93.2 %.The results showed that infrastructure for information management is available but there is need to improve on the numbers and the findings in maintaining the quality of information clearly demonstrated that the health centers were using the manual or paper based system for maintaining the quality of patient records. The respondents reported having very little computer knowledge and limited access to computers (mean=2.63) and internet services (Mean=2.49), which suggests a lack of necessary skills among the health workers. The respondents disagreed (mean=2.20), that the health centers use an electronic health records system for maintaining patient's records. The study suggested that health centers use computers in managing patient records and maintaining the quality of information as this will help them ensure privacy of data, reduce errors. The health centers need to establish written policies, which dictate on the relevance of computer knowledge to health workers and its relevance to the performance, quality of patient's information and have daily backups of the information.

Keywords: information management, information infrastructure, information quality

1. Introduction
In recent years, biased ferrite material for microstrip antenna structures has attracted noticeable attention. Ferrite is one of the important magnetic materials which are used as in both types single and polycrystalline. Some novel characteristics of Information management focuses on having all necessary information managed to allow for good and timely decision making. To properly manage any sort of information, there is need to have good information infrastructure in place, as this will help achieve or maintain the quality of information that is dealt with at hand. Therefore, information management has become very important in most organizations including hospitals and health centers, because access to information and other resources have become easier due to improvement and developments especially in technology, such as the Internet and electronic commerce which allow people to access information at anytime and anywhere. Mmamolefe and Billy, (2014) [5] said that integration of components such as computers to maintain the quality of information in health centers can be a firm hold for the transformation of health related problems especially for people living in rural areas with limited accessibility to health resources. Basing on this background, Health care in Uganda has undergone transformations, ranging from health, culture to technology, but despite emphasis on IT in healthcare to improve administrative processes and quality of care, Uganda is still lugging behind as its healthcare system has been slow to integrate use of ICT (Information and Communication Technology) such as computers for record management.
Maintenance of patient records such as their age, date of birth, patient numbers, residential addresses and diagnosis numbers in rural health centers have for long remained paper based and most of the records that are no longer required are moved or destroyed regularly. The reason for this is to maintain storage areas clear and accessible for the users, thereby saving time and resources required to retrieve records. Destroying records that are not urgently needed renders such information unavailable, and makes it difficult to trace the history of older patient diagnosis and treatments. The migration to electronic medical records (EMR) has become necessary because paper based records have problems like being temporal, spatial, and monetary constraints, continued accumulation, hence reducing storage space. (Hwang *et al*, 2009; Muchangi and Nzuki, 2014) [5].
This study aimed at assessing information management in selected rural health centers. Specifically by establish the infrastructure for information management in rural health centers and to ascertain how rural health centers maintain the quality of their information.

2. Literature review
The way information flows and how it is secured can be pictured as a system. When designed well to support the organization, the need to study and analyze the system

becomes of great importance to all the people around it. When this has not been done effectively, the system turns out to be a problem to the users, unlike the problem it was designed for, therefore great care should be taken when building systems. This is true because when care is taken, it will help secure the health centers mission and goals and therefore help in managing information. Small rural hospitals typically have access to fewer resources to finance health IT, complete strategic planning, or engage in long-term implementation projects (Louise *et al*, 2006;John *et al*, 2011) [19, 16].

Additionally, these health centers have difficulty recruiting or financing full time departmental staff, particularly IT and nursing personnel who are experienced with health IT implementations knowledge compared to the urban hospitals. For most countries, the government concentrates and spends more on urban health care development, compared to improvement of rural health facilities.

Healthcare technology and electronic medical records (EMR) have changed the healthcare industry drastically over the last decade as well as the past few years. Paperless Healthcare systems become inevitable and any healthcare institute that does not adopt technology will fall behind the rest of the industry and probably become extinct with time (Asion and Lari, 2014).

Technology is not about schools and business, lagging behind in technology will affect the health industry as well, because the majority of health centers have been slow to accept using ICT and still dwell on managing patients' records manually or paper based.

While health centers in Uganda are in the infancy of technology, it is certain that there is light at the end of the tunnel, because Howard is more concerned that as hospitals, clinics and other healthcare organizations are working hard to implement electronic health records and participate in health information exchange, they need to work to develop robust information security measures to assure patients that their information will be protected and therefore win patients trust. (Howard, 2013) [11].

2.1 What is information infrastructure?

Critical information infrastructure as ICT infrastructure on which functionality of critical infrastructure depends on phones, computers, back up devices like external hard drives, whose destruction would clearly affect the functionality of an organization (Chander, (2013) [21]. In order to protect critical infrastructure, there is need for prevention and early warning to the users, detection of any threats, reactions to the detections and a technique for crisis management as emphasized by Chander (2013) [21].

Critical information infrastructure can be defined as "communications or information services whose availability, reliability and resilience, are essential to the functioning of a modern (national) economy, security and other essential social values". Implying that information infrastructure remains essential to the proper development of a nation as per Vincenzo *et al* (2013) [28].

An information infrastructure is defined as "a shared, evolving, open, standardized, and heterogeneous installed base" (Hanseth, 2002) [9] and by (Pironti, 2006) [24] as all of the people, processes, procedures, tools, facilities, and technology which supports the creation, use, transport, storage, and destruction of information.

2.2 What is information quality?

The quality of information can be perceived well if it builds on the philosophy of information which in turn needs to be a foundation in a philosophy of language which clearly defines its meaning (Jens, 2013). Therefore, to understand how low or high the quality of information is, there is need to first understand the concept of information itself. Hence, the quality of information can be accessed through evaluating the information itself, and from it derive how much quality it holds. When two people are in a communication, it is important that they realize the relevance of their communication, and therefore the need to maintain the quality of such information conveyed or passed across. Additionally, continuous improvement of information helps contribute to good quality of information.

Quality is a significant imperative for transpower, which requires access to information about the major cause of problems on the ground (Heard *et al*, 2013) [27]. As people still focus on delivering information and services, maintaining its quality remains a vital part that must be considered. This is true for information, because what could have worked a few years ago in maintaining the quality of information, may not work the next coming years for the same purpose.

2.3 Information management problems in rural health centers

It is not a good idea to keep maintaining paper based records for patients, although manual systems have remained persistent for a long time according to Kedar *et al*, (2014) [18]. Health workers may look at a few medical notes, and think that they are few, but as time goes by, these transform into multiple records ranging from hundreds to millions, rendering some of the information inaccessible. This is possible especially if very old records have to be burnt, in order to create room for incoming records. This can have adverse effects on physician to patient relationship and outcome.

The migration to electronic medical records (EMR) has become necessary because paper based records have problems like being temporal, spatial, and monetary constraints affects them a lot including continued accumulation, hence reducing storage space(Muchangi and Nzuki,2014) [5]. Natural disasters also displace individuals and can render information at the health center inaccessible for some time.

Eric (2010) [7] said that "Sadly, all too many health systems in the developing world still suffer from the equivalence of information shock; a system-threatening condition characterized by the inability to generate, access or act on even the most essential health information."

Other problems are that, clinical personnel do not take time to observe and understand how duties and roles are managed in care delivery, such that mistakes happening around them as work flows, just pass by unnoticed (Jeff and Peggy, 2012) [14] and believe that problems with information faced by rural health centers seem an unending story.

The greatest problem health centers are still facing up to date are financial challenges, which are a stumbling block to the delivery of better healthcare services as per Russ and Josh, (2014) [26]. Most countries in the globe are facing this problem

mainly because the cost of growing health care seems to double rapidly.

2.4 Managing patient records using computers

According to International Data Corporation (IDC) technologies (2012) [12], in order to move from manual to electronic health records, it is important to realize that this requires the use of computers. The introduction of fast and accurate digital technology and components such as analog to digital converters, information systems and information technology has taken over the manual control systems and replaced them with automatic systems. Computers have a very fast processing power that they are taking over the use of note books, records books and receipt books. Digital systems save time and effort spent in looking for piled up data from record rooms.

Modern ICTs and organizations today rely on the use of computers and Internet, and studies have showed that there is a close and inseparable relationship between economic development and computing technology (Angela *et al*, 2013) [2]. It's urged that IT (Information Technology) has for long been used in many areas to reduce errors, improve patient safety and improve record keeping (Prashant *et al*, 2012) [25]. Several areas have employed it, such as schools, businesses, agriculture and hospitals are no exception. Therefore, the use of computers in rural health centers for managing patient and staff records can reduce the error rate as some computer applications show areas were errors are seen. It is further urged that while facilitating provision of services, increased health care access is an important and worthy endeavor, in a way that more people in the system means more demand for services that numerous health care systems are unable to accommodate due to workforce shortages, patient locations, and infrastructure limitations(Russ and Josh,2014) [26].

2.5 Managing patients' records using Electronic Health Records (EHR)

The following suggestions are what health centers can use or apply in order to help them manage patient records efficiently using computers (Jeff and Peggy, 2012) [14]:

"Clinics should map and standardize their key workflows before EHR selection, using what they learn to determine which EHR tools best support their workflows." Much as it is acceptable that rural clinics need to start using EHR, these areas need to understand how they can utilize the record system they are taking up.

It is clear that many health workers need training on how to use computers and there for advocating for the need and concern to train staff members on how to collect information and enter it into the EHR is a brilliant idea to get the work started. This could help to increase efficiency, improve clinical care and ensure patient safety. The medical personnel need to learn how information is processed and organized with the help of EHR, and therefore aid them in the process of decision making.

It's agreed that many studies conducted concluded and suggested that the use of computerized systems or computers enforced privacy and protected the quality of information in health care and could improve patient health results (Assion *et al*, 2014) [3]. Health centers need to uplift their potential in using new technology that requires the use of computers in maintaining electronic health records and be reminded that

regular backups for such systems are very essential. The theory of Rogers on the diffusion of innovation also makes emphasis on information technology adoption such that the aspects of compatibility of the new innovation with the existing systems become interoperable as people move from manual systems to digital, computerized systems for better output. John *et al*, (2014) [17] also added that the use of computerized physician order entry forms for managing patients records, had the capacity to reduce errors that arise from hand written diagnosis and prescriptions, reduced delays encountered in completing receipts and forms, and facilitated faster updates to existing patient records, the more reason rural health centers need to start use of computers, and information technology in healthcare.

One of the factors affecting diffusion of EHR is lack of ICT skills, which could help in the use of computers or specifically ICT in the medical field for managing patient records. Computers are not only used to manage records, but will help health workers to access online material that will reflect improvements in technology for health related issues.

2.6 Quality Improvement Requirement

The Department of Health Policy in the School of Public Health and Health Services, (2012) [6] reflected on performance and highlighted that there is need for programs to evaluate performance in Rural Health Clinics (RHC). There is need to evaluate the needs of the clinic and use any available data to improve quality of information and care offered to the patients. In conditions or circumstances where quality has been compromised or ignored, it has been defined that the very data about patients could be used to improved quality of health care. Chances are that many RHC do not take this seriously; even though it is the building stone on managing the quality of patient information that they deal with routinely.

A report by HRSA, (2013) [22] mentioned that, when there are Tele-health Network Grant Programs (TNGP), projects can be supported as these networks help improve health care services through training, they also increase access to better quality health care, and can be used to broaden and improve the quality of health information provided to patients, their families and the community at large. This report gives an over view or guide to maintaining the quality of information.

On the other hand, a report by the department of health policy, (2012) [5] agrees that, "although medicare already reimburses RHCs for tele-health services, adoption has been relatively low as the result of high up-front costs." This low adoption rate has been associated with financial constraints. The author suggested funding and technical assistance be availed to RHCs to enable them implement Health information technology (HIT).

Across the globe, health care systems recognized the need for innovation and are adopting new digital HIT, such as EMRs and telemedicine, the major focus is on confidentiality, integrity and availability of information. Reassurances are that HIT and innovation were becoming important pioneers and contributors to improve the quality of information, reduce the cost of care, and improve patient outcome in health related environments (Russ and Josh, 2014) [26].

2.7 Establishing Infrastructure

The idea of establishing infrastructure for health centers is a great opinion, but for John *et al*, (2011) [16] he believes that as much as rural health centers face problems with establishing infrastructure to run complex health information technology equipment, there are still more under lying challenges such as no internet connections, lack of up-to-date hardware, poor privacy and security mechanisms, lack of experts in the IT field, and no support especially when completing the systems under construction. The geographic locations of these clinics limits them from proper access to the necessary infrastructure such sufficient Internet bandwidth in their communities.

It's emphasized that, "inadequate access to basic infrastructure and development services remains a key impediment to improving health, welfare, and security for many Africans" Focus is on Africa, because most African countries have little access to good technology infrastructure especially as applied to primary health care in health centers (Carolyn Logan,2014) [4]. The resources necessary to start up and manage information infrastructure are relevant and remain essential.

Malcom (2013) [22], said that regardless of IT being in place, to achieve better security and maintenance of IT implies that the technological aspect places greater trust in the devices used and provides an equally high level of access to the resources used by the organizations. Infrastructure needs to be managed effectively in order to achieve the goals intended for the purpose of security and quality.

Indira, (2014) [13] is keen about infrastructure, as he mentions that poor infrastructure used in delivering data or information that is developmental, is one of the greatest challenges affecting rural development and opportunities that would provide better and Sustainable Livelihood to the local people. Therefore, while promoting rural health development, one of the areas needing a lot of emphasis, is the infrastructure. Improvement of rural health information technology needs to be embarked on.

"Inadequate access to basic infrastructure and development services remains a key impediment to improving health, welfare, and security for many Africans." Much as the majority of health workers have been able to access and use mobile cell phone services, underserved populations still have very little or no access to infrastructure necessary for management of information, and looking at Africa globally, Africa remains a growing continent, needing attention and most countries in Africa are facing the same challenges when it comes to education, and health care for the rural people (Carolyn, 2014) [4]. Felix *et al*, (2014) [8], report that the implementation of HIT applications in developing countries are slower in rural areas, and one of the reasons for this is, problems with technical infrastructure, computer knowledge, skills, and experience. These are areas that need to be strongly addressed as these are the same problems facing rural health centers in Uganda.

2.8 Infrastructure threats

According to a Network and Information Security Standards Report, (2007) [23], these attacks can be directed to the infrastructure that supports ICT such as the computer hardware, which can cause direct cut off of supply and provision of services to the health center such as networks,

medical and healthcare, financial, transport, utilities and many more. These threats can be in form of theft, natural disasters like torrential rains, criminal intentions, and many more.

The following were categorize of threats to patient's privacy and information into two categories (Ajit and Eric, (2008). Organizational threats coming from internal users, who abuse their privileges or outsiders who exploit vulnerable information systems. System threats coming from agents in the information flow chain who take advantage of disclosed information.

3. Methodology

This research was purely quantitative and involved understanding how data that was categorical in nature was dealt with or measured. The study was a descriptive study that involved using quantitative research tools. In quantitative researches, descriptive research design is more concerned with functional relationships and the development of generalizations across populations involved in the study (Neil and Kristin, 2013) [22]. The researcher's main focus was on health workers or medical personnel within the health centers as these people interact with patients regularly and the target population was 50 for all the two health centers. Krejcie and Morgans, (1970) sample size table was used to calculate the sample size value, given the population size (50), confidence interval (95%) and margin of error (5.0%), which finally gave the sample size value of 44. A total of 44 questionnaires were distributed, and 41 were returned, giving a return rate of 93.2. The study employed purposive sampling, a non-probability sampling technique that involves group participations basing on a preselected criteria that applies to a particular research question. This technique involved purposive selection of specific units of a population that would be the sample for the population.

4. Findings

Table 1 below shows the respondents that participated in this study were 41. Their participation is also reflected in the frequency distributions and percentages shown in the table above. The following disciplines were represented: data clerks (freq=1 %age=2.4), nutrition educator (freq=1 and %age=2.4%), midwives (freq=7 and %age=17.1), HIO (freq=2 and %age=4.9%), laboratory technicians (freq= 4, %age=9.8%), accountants (freq=1 %age=2.4%), clinical officers (freq=3 and %age=7.3%), enrolled nurses (freq= 4 and %age=9.8%), theatre in charges (freq=3 and %age=7.3%), health inspector (freq=1 and %age=2.4), and there were some disciplines that were not defined (freq=14 and %age=34.1%). This lack of definition can be attributed to fear of the respondents to disclose themselves, probably for the security of their jobs. The undefined disciplines were the highest in terms of representation, as most of the people did not want to disclose their positions.

For the gender representation, the female accounted for the highest value of (freq=23 and %age=56.1%) and the men were (freq=18 and %age= 43.9).

The characteristics of respondents showed that the highest number of respondents in this study were the female and they accounted for more than a half of the sample size as represented by this values female = (freq=23 and %age=56.1).

The male respondents had the smallest representation, which showed that less than a half of the sample took part in the study. This is noted from the small value of male = (freq=18 and %age= 43.9).

Table 1: Demographic Characteristics

Item		Frequency	Percentage%
Categorization	Health workers	41	100
		Total=41	Total=100
Fields represented or Disciplines	Data clerks	1	2.4
	Nutrition educator	1	2.4
	Midwives	7	17.1
	HIO	2	4.9
	Laboratory technicians	4	9.8
	Accountants	1	2.4
	Clinical officers	3	7.3
	Enrolled nurses	4	9.8
	Theatre in charges	3	7.3
	Health inspector	1	2.4
	Undefined disciplines	14	34.1
		Total= 41	Total= 100
Gender	Female	23	56.1
	Male	18	43.9
		Total=41	Total=100

Frequency tables

The frequency, percentage, and the means are all represented in the tables.

Scale

Mean range	response	interpretation
4.21-5.00	strongly agree	strongly agree
3.41-4.20	agree	agree
2.61-3.40	not sure	not sure
1.81-2.60	disagree	disagree
1.00-1.80	strongly disagree	strongly disagree

4.1 Infrastructure for information management

The results in table 2 below showed that the respondents were

not sure (mean = 2.63) if the staff members were computer literate or not, they disagreed (mean = 2.49) to the staff members having access to Internet services, although 36% strongly agreed and 22.0% agreed that staff could access internet services. The respondents strongly agreed (mean = 4.37) that some staff members have mobile devices like phones that are used as a means of communication in the health center. The respondents were not sure (mean = 2.66) whether ICT had helped the health center maintain records for both patients and staff. The respondents were also not sure (mean = 2.78) whether data backups were taken and maintained on a flash disk, external hard drive or CD.

Table 2: Infrastructure for information management

No	Question	Strongly disagree		Disagree		not sure		Agree		Strongly agree		Mean	Interpretation
		F	%	F	%	F	%	F	%	F	%		
1	The staff members are computer literate	12	29.3	8	19.5	6	15	13	32	2	4.9	2.63	Not sure
2	The staff members have access to Internet services	15	36.2	9	22	4	9.8	8	20	5	12.2	2.49	disagree
3	Some staff members have mobile devices	2	4.9	2	4.9			14	34	23	56.1	4.37	Strongly agree
4	ICT has helped the health center maintain records for both patients and staff	11	26.8	11	26.8	6	15	7	17	6	14.6	2.66	Not sure
5	Data backups are taken and maintained on a flash disk, external hard drive or CD	13	31.7	2	4.9	13	32	7	17	6	14.6	2.78	Not sure
	Over all mean											2.98	Not sure

4.2 How rural health centers maintain the quality of their information

The results in table 3 showed that 15% of the respondents agreed and 12 % strongly agreed that patient's information is availed to anybody who needs it. Though on average that the respondents disagreed that Patient's information is availed to anybody who needs it (Mean 2.07).

The respondents disagreed (mean=2.20), that the health centers use an electronic health records system for maintaining patient's records, despite what the results showed that 15% of the respondents agreed and 12 % strongly agreed. 17.1% agreed and 7.3 % strongly agreed that When patients return for follow up, their information is retrieved from the computer, but on average, (mean = 2.17) was interpreted as disagree, which implied that the majority disagreed.

The respondents were not sure (mean = 2.61) whether New staff members were electronically included into the existing system database or not. The respondents Strongly Disagree (mean = 1.61) that Patients are told their results on phone, and this is shown from a high percentage of 68.3% strongly agreeing and 17.1% disagreeing. However the respondents were not sure (mean= 2.85) whether the health centers had a database administrator who maintained databases.

Table 3: How rural health centers maintain the quality of their information

No	Question	Strongly disagree		Disagree		not sure		Agree		Strongly agree		Mean	Interpretation
		F	%	F	%	F	%	F	%	F	%		
1	patients information is availed to anybody who needs it	26	59	6	14.6	0	0	6	15	5	12	2.07	Disagree
2	The health center uses an electronic health records system for maintaining patient's records.	21	51	7	17.1	2	5	6	15	5	12	2.2	Disagree
3	When patients return for follow up, their information is retrieved from the computer	19	46	9	22	3	7	7	17	3	7	2.17	Disagree
4	New staff members are electronically included into the existing system database.	17	42	4	9.8	4	10	10	24	6	15	2.61	Not Sure
5	Patients are told their results on phone	28	68	7	17.1	0	0	6	15			1.61	Strongly Disagree
6	The health center has a database administrator who maintains databases.	14	34	7	17.1	0	0	11	27	9	22	2.85	Not Sure
	Over all mean											2.25	Disagree

5. Discussion of findings

The results on infrastructure for information management over all mean of 2.98, read as not sure. This shows that infrastructure is not enough for example, respondents disagreed to having access to internet services and lack of hot spots, which is in line with this study. Infrastructure, and emphasizes that poor infrastructure used in delivering data or information that is developmental, is one of the greatest challenges affecting rural development and opportunities that would provide better and Sustainable Livelihood to the local people. Therefore, while promoting rural health development, one of the areas that need to be addressed limited infrastructure in order to improve rural health information technology. (Indira, 2014) [13]

"Inadequate access to basic infrastructure and development services remains a key impediment to improving health, welfare, and security for many Africans." Much as the majority of health workers have been able to access and use mobile cell phone services, underserved populations still have very little or no access to infrastructure necessary for management of information, and looking at Africa globally, Africa remains a growing continent, needing attention and most countries in Africa are facing the same challenges when it comes to education, and health care for the rural people.

(Carolyn, 2014) [4].

Implementation of HIT applications in developing countries are slower in rural areas, and one of the reasons for this is, problems with technical infrastructure, computer knowledge, skills, and experience. These are areas that need to be strongly addressed as these are the same problems facing rural health centers in Uganda. (Felix *et al*, 2014) [4].

The findings in maintaining the quality of information clearly demonstrated that the health centers were using the manual or paper based system for maintaining the quality of patient records as per the overall mean of 2.25, which was read as disagree. This mean showed that respondents disagreed to maintaining of records using computers. Therefore, the methods the health centers have been using to maintain the quality of information have not been electronic. This implies that the health centers need to try and consider using computers to maintain the quality of their information, as computer use comes with benefits such as reducing errors in data, and also ensures privacy of data which is in agreement with the study. The use of computerized physician order entry forms be used in managing patients records, had the capacity to reduce errors that arise from hand written diagnosis and prescriptions, reduced delays encountered in completing receipts and forms, and facilitated faster updates to existing patient records, the more reason rural health centers need to adopt the use of computers, and information technology in healthcare. (John *et al*, 2014) [17].

The failure to have enough computerized equipment can be attributed to high establishment costs. "Although Medicare already reimburses RHCs for tele-health services, adoption has been relatively low as the result of high up-front costs." This low adoption rate has been associated with financial constraints. The author suggested funding and technical assistance be availed to RHCs to enable them implement HIT. Tele-health represents an option for RHCs to deliver health care services like a certain primary and acute care services, dermatology, radiology, and nursing. (a report by the department of health policy, 2012) [5].

6. Conclusion

Infrastructure required to manage paper based systems is different from that used to manage digital systems. This study found out that the rural health centers identified in the study, did not have enough infrastructure (computers) for keeping records, although they were in position to maintain paper based data behind closed doors.

The respondents answered a variety of questions relating to methods used to maintain the quality of information. The results from the data confirmed that these rural health centers still use the paper based system to maintain and manage the quality of all the patient and staff records.

7. Recommendations

Health centers can consider using infrastructure such as computers to maintain patient records as this will help them ensure privacy of data, reduce errors and have access to the internet to further their understanding of medical diagnosis, they should consider training the health workers as most of them seem to have little or no knowledge at all on information technology.

The health centers need to establish written policies, which dictate on the relevance of computer knowledge to health workers and its relevance to the performance and quality of patients' information to improve delivery of services.

Rural health centers should take daily backup of any tests, results, and any prescription the doctors provide for patients, as this can ensure availability of this information anytime need arises, especially when patients return for follow up. Additionally in case of any system failure, or crushing of the system, data will be available on backup devices.

Internet services should be extended to rural health centers, as this can keep the doctors, updated, and once in a while they can goggle and check for any newly used medication in combating some disease traits, and how this medication can be administered.

The government needs to join the battle in minimizing and overcoming the use of paper based work in all hospitals and rural health centers. This can be done through providing incentives, donations, and probably establish policies that will encourage health workers to adopt technology as a means of improving the quality of health care and maintaining records.

As health centers prepare to start using computers to maintain patient records, they should consider training the health workers as most of them seem to have little or no knowledge at all on information technology. This can help reduce errors encountered when the system starts running.

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